An EOH Company

DOORNHOEK FLUORSPAR MINE: FINAL EIA&EMPR

NW/30/5/1/2/3/2/1/10110EM
NW/30/5/1/2/2/10110MR

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Prepared for: **Department of Mineral Resources**

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

DOORNHOEK FLUORSPAR MINE: FINAL EIA&EMPR

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mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

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

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

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

1. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process—

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

(b) describe 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 the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) determine the—-

  (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

  (ii) degree to which these impacts—

    (aa) can be reversed;

    (bb) may cause irreplaceable loss of resources, and

    (cc) can be avoided, managed or mitigated;

(e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

(g) identify suitable measures to manage, avoid or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.

ABBREVIATIONS

BPEO	Best Practicable Environmental Option
CBA	Critical Biodiversity Area
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DFS	Definitive Feasibility Study
DMR	Department of Mineral Resources
DRDLR	Department of Rural Development and Land Reform
DWS	Department of Water & Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIA&EMPR	Environmental Impact Assessment and Environmental Management Programme Report
EIR	Environmental Impact Assessment Report
EMPR	Environmental Management Programme Report
ESA	Ecological Support Area
Exigo	Exigo Sustainability (Pty) Ltd
FTE	Full Time Equivalent
GNR	Government Notice Regulation
I&APs	Interested and Affected Parties
IDP	Integrated Development Programme
IEM	Integrated Environmental Management
IHAS	Invertebrate Habitat Assessment System
IHIA	Intermediate Habitat Integrity Assessment
IWULA	Integrated Water Use License Application

LOM	Life of Mine
MAMSL	Meter Above Mean Sea Level
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
MRA	Mining Right Application
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMAQA	National Environmental Management: Air Quality Act (Act 39 of 2004)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008)
NFA	National Forest Act (Act 84 of 1998)
NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
PES	Present Ecological State
PFS	Pre-Feasibility Study
PM10	Thoracic Particulate Matter
PM2.5	Inhalable Particulate Matter
READ	North West Department of Rural, Environment and Agricultural Development
ROM	Run of Mine
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
SASS	South African Scoring System
SEMA	Strategic Environmental Management Acts
TSF	Tailings Storage Facility

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EXECUTIVE SUMMARY

a) Purpose of this document

This document constitutes the Final Environmental Impact Assessment and Environmental Management Programme Report (DEIA&EMPR) for the proposed Doornhoek Fluorspar Mine. Please note that in line with the recent legislative changes working towards the "One Environmental System" this document has been compiled in line with section 24N of the NEMA read with Appendix 3 and 4 of the Environmental Impact Assessment Regulations of 2014 (GNR 982) and in line with the format as required by DMR as per Regulation 16(3)(b) of GNR 982.

b) Introduction

Exigo Sustainability (Pty) Ltd (Exigo) was appointed by SA Fluorite (Pty) Limited & Southern Palace 398 (Pty) Limited to facilitate the environmental authorisation (EA) and Mining Right Application (MRA) process for the proposed Doornhoek Fluorspar Mine.

The proposed Doornhoek Fluorspar Mine is located 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 3). 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 existing Witkop open pit fluorspar mine. Figure 2 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 project has the potential to contain in excess of 50 million tonnes of fluorspar and is believed to be one of the world's largest fluorspar deposits. The underground ore body has grades more than double that of the adjoining Witkop Mine (not currently mining fluorspar according to the team's knowledge) and resources sufficient to justify an initial life of mine of 30 years. The resource is proposed to be mined at 1.5 million tonnes per annum as follows:

- Resource Area A: Opencast mining up to a depth of approximately 60 m from year 5 to 10 (Latitude: 25°43'32.91"S; Longitude: 26°7'27.00"E)
- Resource Area C: Opencast mining up to a depth of approximately 90 m from year 20 to 30 (Latitude: 25°42'55.28"S; Longitude: 26°12'18.81"E)
- Resource Area D: Opencast mining up to a depth of approximately 90 m from year 10 to 20 with the possible mining of the areas to the side of the resource taking place from year 20 to 30 (Latitude: 25°43'53.57"S; Longitude: 26°12'35.42"E)

Construction of the mining infrastructure and access road(s) will take place during year 1 to 5. The planned infrastructure for the mining operations is as follows:

- Overburden stockpiles;
- Minerals processing plant and associated infrastructure;
- Tailings storage facility;
- Haul roads and access road;
- Mine offices;
- Water supply pipelines;
- Electrical reticulation and sub-stations; and
- Water Treatment Plant.

c) Public Participation

The process undertaken to facilitate the public participation for the proposed project is discussed in section 9. Please refer to Table 6 for comments received from Interested and Affected Parties (I&AP's) during the public participation and stakeholder consultation processes as well as the responses provided.

d) Supporting Studies

The specialist studies undertaken as part of the authorisation process are listed in section 37.2 and include the following:

- Socio-economic aspects (job creation, social investment, health, safety and security, skills training, change of land use)
- Heritage aspects
- Ecological aspects (Fauna and Flora)
- Impact on soils, land use, land capability and agricultural potential
- Wetland and aquatic aspects
- Groundwater aspects
- Surface water aspects
- Stormwater aspects
- Flooding
- Air quality aspects (dust end emissions)
- Noise aspects
- Visual aspects
- Blasting and vibration

Please refer to Appendix 7: Specialist Reports. All the specialist reports comply with Appendix 6 as per Regulation 23(5) of the EIA Regulations 2014.

e) Project Description

The proposed Doornhoek fluorspar mine will predominantly mine fluorspar along with the associated minerals (copper ore, diamond, lead, tin ore, vanadium ore and zinc ore). 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 (5) to six (6) year pre-production period is anticipated, including the plant construction which will take 2-3 years. Upon granting of the mining right (MR), including the required environmental authorisation (EA), 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 and EA including a Waste Management Licence (WML) and an Integrated Water Use Licence (IWUL). This will be followed by pre-stripping and ramping up to reach full scale mining in the years following.

Envisaged mine infrastructure will comprise 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

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). Following the settling of suspended solids on the TSF, water will be recycled for maximised re-use throughout the plant. Refer to Figure 4 for the process flow diagram.

f) Baseline description of the affected environment

- 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.
- 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. 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.
- 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 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.
- 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 stromatolites 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 stromatolites and these are expected to be mined.

- Two land types namely Ae59 and Ac71 were identified on site. 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.
- Although the site is classified mainly as Moot Plains Bushveld, representations of the Carletonville Dolomite Grassland was also observed in the area and subsequently this vegetation type is included as part of the focus area (Henning, 2016). The project area lies partially within the Grassland and Savanna Biome and therefore forms an important ecotone between the two biomes. 6 vegetation units were identified for the project area. Endemic plants, red data species, protected trees, medicinal plants and encroacher species occurring in the project area. Five main habitats for fauna and potential and confirmed red data species occurring in the project area.
- Five major wetland types were identified on site. The current impacts associated with the site are reflected in the results of the wetland integrity assessments. 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 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.

- 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 water management area (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. The 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.
- Through evaluation of the data sources the dyke 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, 3 and 4. 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.
- 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. During the latter, a total of 116 sites were visited. This included 112 boreholes, 3 springs and 2 surface water sites. 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. 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.
- 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

- 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. The town of Zeerust was established in 1867 and at the time, farms appeared around the town and related infrastructure emerged. 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 60 year age delineation for heritage structures as set out in the NHRA, and related graves / burial places should therefore be anticipated in the project area. 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. 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. Circular sections of collapsed stone walling in three groups were located on the farm Knoflookfontein. The site probably dates to the late 18th early 19th century and might be regarded as part of the Kaditswene Cultural Landscape.
- The land use is dominated by game, livestock farming and chicken farming (Figure 54), and the Witkop Mine located to the west of the project area (not currently mining fluorspar according to the team's knowledge). 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 55). 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
- The majority of the mining right area is located in the Ditsobotla Local Municipality (DLM), with a portion being extended over to the Ramotshere Moiloa Local Municipality (RMLM). Most of the surface infrastructure and Resource Area C and D are located in the RMLM while Resource Area A is located in the DLM. Both of these municipalities form part of the Ngaka Modiri Molema District Municipality (DM) in the North West Province.

g) Sensitive landscapes

Sensitive features that have been identified through the related specialist studies include, amongst others:

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

These sensitive landscapes are illustrated in Figure 65.

h) Impact Assessment

This report provides a detailed assessment of the predicted environmental impacts on specific components of the social and biophysical environment as a result of the proposed project. Please refer to Table 19.

i) Financial provision

As per the GNR 1147 of the NEMA, the calculated provision for closing for the mining operations is as follows:

- Immediate Closure Liability
    - In the event of an immediate 'lights-out' closure event at the end of the first year of operation (Year 8 after development started), the total financial provision required to successfully rehabilitate the mine is R 20 895 922.
-
- Life-of-Mine Closure Liability
    - Final LoM closure liability for the mine without any progressive rehabilitation actions is estimated to be R 102 421 420;
    - R 92 101 784 of the final LoM liability is to be planned for during the 30 year operational phase of the mine; and
    - R 10 319 636 will be required for the rehabilitation, closure and aftercare in the case of successful progressive rehabilitation during the operational period.

j) Monitoring

In order to ensure that the objectives of sustainable development and integrated environmental management are met and in order to obtain data which can inform continuous improvement of environmental practices at the site (adaptive management), monitoring and reporting will be an essential component of the proposed operations.

Mechanisms have been included for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

- Monitoring of Impact Management Actions
- Monitoring and reporting frequency
- Responsible persons

- Time period for implementing impact management actions
- Mechanism for monitoring compliance

Monitoring and management actions associated with the project are contained in Table 23 and Table 26 of this report as well as in the various specialist reports associated with this project.

k) Closing Statement

The findings of the specialist studies undertaken within this EIA&EMPR provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed project. The findings conclude that provided that the recommended mitigation and management measures are implemented, there are no environmental fatal flaws that should prevent the proposed project from proceeding.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA&EMPR will form part of the contract with the contractors appointed to construct and maintain the proposed mine and associated infrastructure. The EIA&EMPR would be used to ensure compliance with environmental specifications and management measures. The implementation of this EIA&EMPR for key cycle phases (i.e. construction, operation and closure/decommissioning) of the proposed project is considered to be fundamental in achieving the appropriate environmental management standards as detailed for this project.

It is anticipated that the project will go through further feasibility assessments post-authorisation and pre-construction. Potentially amendments to the respective authorisation may be required and will be conducted in line with the relevant legislation as may be required at that point in time. The preferred alternatives will be further subjected to a definitive feasibility - and associated engineering study prior to construction.

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT 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).

Please refer to Appendix 1: EAP's Curriculum Vitae & Qualifications.

Michael Grobler

B.Sc Honours

Masters in Organizational Leadership

Pr.Sci.Nat

Chantal Uys

BHCS Hons Archaeology

1.2.2.SUMMARY OF THE EAP'S PAST EXPERIENCE.

(In carrying out the Environmental Impact Assessment Procedure)

Please refer to Appendix 1: EAP's Curriculum Vitae & Qualifications.

Michael Grobler

11.5 years

Chantal Uys

BHCS Hons Archaeology

7.5 years

2. DESCRIPTION OF THE PROPERTY

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 Kafferskraal 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 9 Property List.

3. LOCALITY MAP

(show nearest town, scale not smaller than 1:250000).

Please refer to Appendix 3: Locality Map.

4. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

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

Please refer to Appendix 4: Site Plan

4.1. LISTED AND SPECIFIED ACTIVITIES

Table 1: Listed activities to be authorised

NAME OF ACTIVITY **(E.g. For prospecting -** drill site, site camp, ablution facility, accommodation,	**Aerial extent of the Activity Ha or m²**	**LISTED ACTIVITY** (Mark with an **X** where applicable or	**APPLICABLE LISTING NOTICE** **(*GNR 983 GNR 984 or GNR 985)***	**WASTE MANAGEMENT AUTHORISATION** (Indicate whether an authorisation is required in terms

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.)		affected).		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	GNR 984 – NEMA Listing Notice 2 of 2014 Activity 15	
			GNR 984 – NEMA Listing Notice 2 of 2014 Activity 17	
			GNR 985 – NEMA Listing Notice 3 of 2014 Activity 12 (a) (ii)	
			GNR 983 – NEMA Listing Notice 1 of 2014 Activity 19 (i)	
Construction of a processing plant and associated infrastructure including mine offices and workshops	4 Ha	X	GNR 983 – NEMA Listing Notice 1 of 2014 Activity 27	
			GNR 984 –	

			NEMA Listing Notice 2 of 2014 Activity 21	
			GNR 985 – NEMA Listing Notice 3 of 2014 Activity 12 (a) (ii)	
Establishment of ore, overburden and topsoil stockpiles	2 overburden stockpiles with combined footprint of 27.58 Ha Ore stockpile: 0.103 Ha	X	GNR 985 – NEMA Listing Notice 3 of 2014 Activity 12 (a) (ii)	X (GNR 921 – NEMWA Category B, Activity 7, 8, 9, 10 and 11)
			GNR 983 – NEMA Listing 1 of 2014 Activity 9 (i)	
			GNR 984 – NEMA Listing Notice 2 of 2014 Activity 15	
Construction of water and sewage pipelines	Potable water pipeline of 27km in length Sewage pipeline in excess of 1000m	X	GNR 983 – NEMA Listing 1 of 2014 Activity 10 (i)	
Construction of a sewage treatment plant and water treatment plant	WTP – with a footprint		N/A	N/A

	of 400m^2 and a daily throughput of 84 m^3 (below 100 m3)			
	STP – with a footprint of 1190 m^2 and a daily throughput of 40 m^3		N/A	X (GNR 921 – NEMWA Category C, Activity 2 – compliance with norms and standards)
Construction of facilities for the storage of oil, diesel, fuel and explosives	30 m^3	X	GNR 985 – NEMA Listing Notice 3 of 2014 Activity 10 (f) i	
Construction of storm water and water service dams: 1. Storm Water Dam (Overburden dump at Resource A) 2. Storm Water Dam (Overburden dump at Resource C) 3. Storm Water Dams (plant and TSF) 4. Potable water Dam 5. Fire Water Dam 6. Spray water Dam 7. Raw Water Dam 8. Process Water Dam	1700 m3 19000 m3 149010 m3 106 m3 106 m3 181 m3 392 m3 1375 m3	X	GNR 984 – NEMA Listing Notice 2 of 2014 Activity 6	X (GNR 921 – NEMWA Category B, Activity 1, 10)
			GNR 983 – NEMA Listing Notice 1 of 2014 Activity 13	
			GNR 985 – NEMA Listing Notice 3 of 2014 Activity	

			2 (e) ii (dd) & (ff)	
Construction of access roads and internal haul roads and upgrading of existing access 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	GNR 983 – NEMA Listing Notice 1 of 2014 Activity 56 (ii)	
			GNR 983 – NEMA Listing Notice 1 of 2014 Activity 12 (i), (ii), (iii), (iv), (vi), (x), (xii)	
			GNR 983 – NEMA Listing Notice 1 of 2014 Activity 24	
			GNR 985 – NEMA Listing Notice 3 of 2014 Activity 4 (e) i. (ee) & (gg)	
			GNR 985 – NEMA Listing Notice 3 of 2014 Activity 18 (e) i. (ee) & (gg)	
			GNR 985 – NEMA Listing Notice 3 of 2014 Activity 14 (i), (ii), (iii), (iv), (vi), (x), (xii) in (e) North West i.	

			(ff)	
Stream/drainage diversions and partial backfilling of open pits			GNR 983 – NEMA Listing Notice 3 of 2014 Activity 19 (e) i. (ff) , (hh) & (ii)	X (GNR 921 – NEMWA Category B, Activity 7)
			GNR 983 – NEMA Listing Notice 1 of 2014 Activity 19	
Construction of electricity distribution infrastructure	Electrical distribution line with a capacity of 132 kV	X	GNR 983 – NEMA Listing Notice 1 of 2014 Activity 11	
36 m Telecommunications Tower			GNR 985 – NEMA Listing Notice 3 of 2014 Activity 3 (e) i. (ee) & (gg)	
Generation and storage of tailings	TSF: 150 Ha TSF volume is 30 000 000 m^3	X	GNR 984 – NEMA Listing Notice 2 of 2014 Activity 16	X (GNR 921 – NEMWA Category B, Activity 1, 10 and 11)
			GNR 983 – NEMA Listing Notice 1 of 2014 Activity 10	

5. DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

(Describe Methodology or technology to be employed, including the type of commodity to be mined 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 Mine 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 3). 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 2 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 (copper ore, diamond, lead, tin ore, vanadium ore and zinc ore). 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 (5) to six (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

Envisaged mine infrastructure will comprise 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 have been 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.

However subsequent to the hydrogeological assessment and supporting regional water balance is proposed that water supply be conducted from groundwater resources. Groundwater resources will be developed in Compartment 1 and 2 with the possibility of compartment 8 should sufficient resources not be available in the first two mentioned (refer to Figure 33).

A water treatment plant with a throughput capacity of 84m^3 per day will be constructed on-site.

5.2.1. OPERATIONAL MINE WATER BALANCE

A regional water balance has been conducted (Appendix 7.9: Regional Water Balance). The water balance focussed on assessing make-up water requirements during the operational phase of the project taking into account draught and flood scenarios; with recommendations on the optimisation of water uses and scheduling. The simulated draught flood conditions result in the make-up water requirements varying.

The objective of this water balance is to assess make-up water requirements during the operational phase of the project taking into account draught and flood scenarios. The water balance is conceptual and is subject to further feasibility studies and supporting engineering designs.

Water returned from the circuit for re-use in the plant is on average 60087 m3/month and the contribution from rainwater on the TSF is 21560 m3/month.

The flows and return flows are presented in

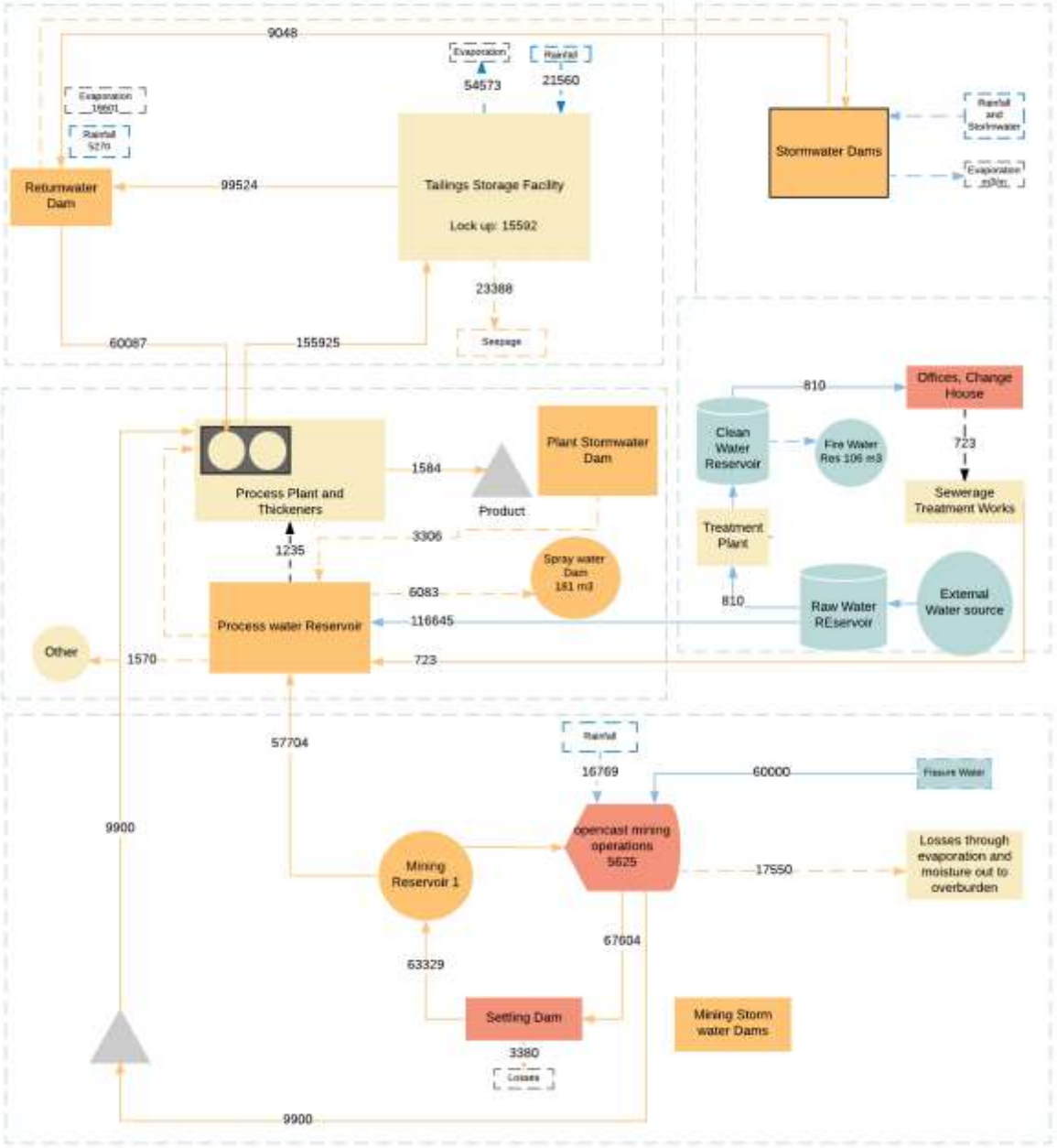


Figure **1**.

Results are summarised below:

- The average calculated make-up water from the external water source (wellfields) at full production is 116 654 m3/m (3830 m3/d). The average tonnes of ore processed at full production 123 750 tonnes per month. The average water use per tonne of ore processed was

calculated at 0.94 m3/tonnes of ore which is within the expected range of between 0.7 m3/t to 1.2m3/t for similar mining developments.

- The average percentage calculated for water returned from the TSF was 40 % with 60 % losses as a result of interstitial lock-up, seepage and evaporation. The seepage component of 23 388 m3/mon must be recaptured and pumped back to the system.
- Fissure water available for make-up water in the concentrator plant is on average 60 000 m3/m.
- A 1:50 year drought and 1:50 flood were also simulated. Make-up water requirements vary between 161,283 m3/m (drought) and 871 m3/m (excessive wet year). Provision needs to be made in the storm water management plan to accommodate extra volumes of storm water during flood scenario's. Since the Water Balance is at pre-feasibility level, a safety factor of 20% was applied to accommodate drought periods where storm water and fissure water may not be adequate to supplement the demand. This equates to a monthly make-up volume of 137 880 m3/m that would need to be secured from external sources.
- Provision needs to be made for construction and ramp-up requirements prior dewatering.

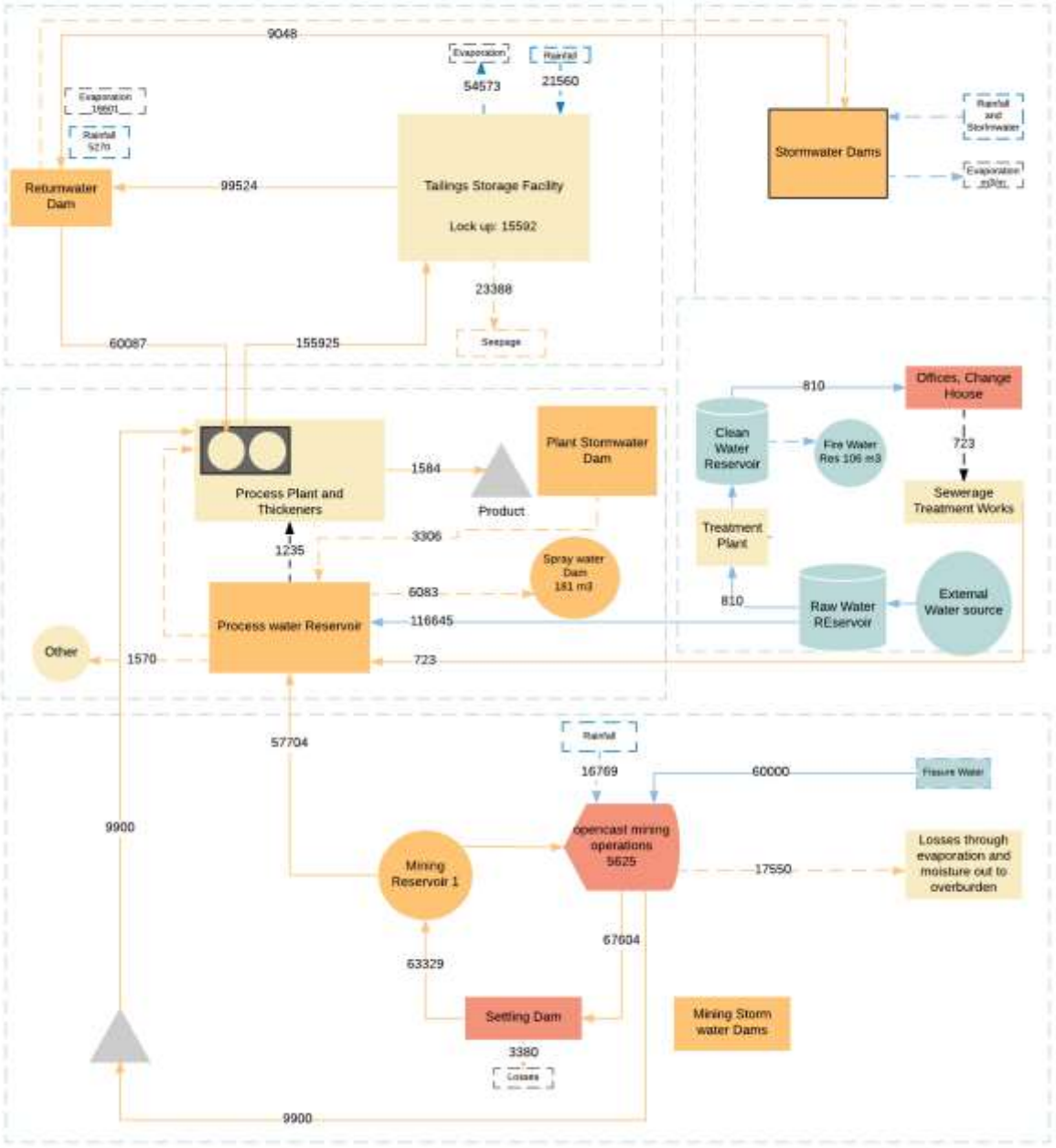


Figure 1 Water reticulation and average monthly flow rates

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 21m³.

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. Refer to Figure 4 below for the process flow diagram.

The following reagents will possibly be used during the flotation process, potential impacts and risks associated with these chemicals in the process were 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 : Pionera chemicals

From similar fluorspar mining and processing projects and analogue sites, it can be assumed that the low concentration of the above chemicals used in the flotation process will not result in any significant risks from a chemical point of view and is subject to ongoing water monitoring.

Transport, handling and storage of these chemicals require risk assessments prior to being utilized in the process and the necessary health and safety considerations should be applied and duly reviewed.

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. Sewage sludge will be stored in tanks (not lagoons) prior to disposal to a registered hazardous waste disposal 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 partially backfilled into the open pits proper once sufficient space is available.

- Concurrent Rehab/ Partial Backfilling

Concurrent partial backfilling and rehabilitation is the preferred mining method for this project. It must be noted that concurrent partial backfilling is a standard mining rehabilitation method and is used on an international scale in mining projects. 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 overburden 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 partial 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. Refer to section 8.3.3 for the overburden alternatives assessed.

It is planned for overburden material to be used for construction of any stormwater dams, dirty water dams as well as the TSF on site. This use of overburden will be acceptable from a geochemical point of view as per the findings in Appendix 7.10: Geochemical Risk Assessment.

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 STORM WATER DAMS

A stormwater dam of 1700 m^3 should be constructed at the overburden dump at Resource A. Another stormwater dam of 19000 m^3 should be constructed at the overburden dump at Resource C. stormwater dams at the plant and TSF with a combined capacity of 149 010 m^3 should be constructed (refer to Appendix 7.11: Floodline Study & SWMP).

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.

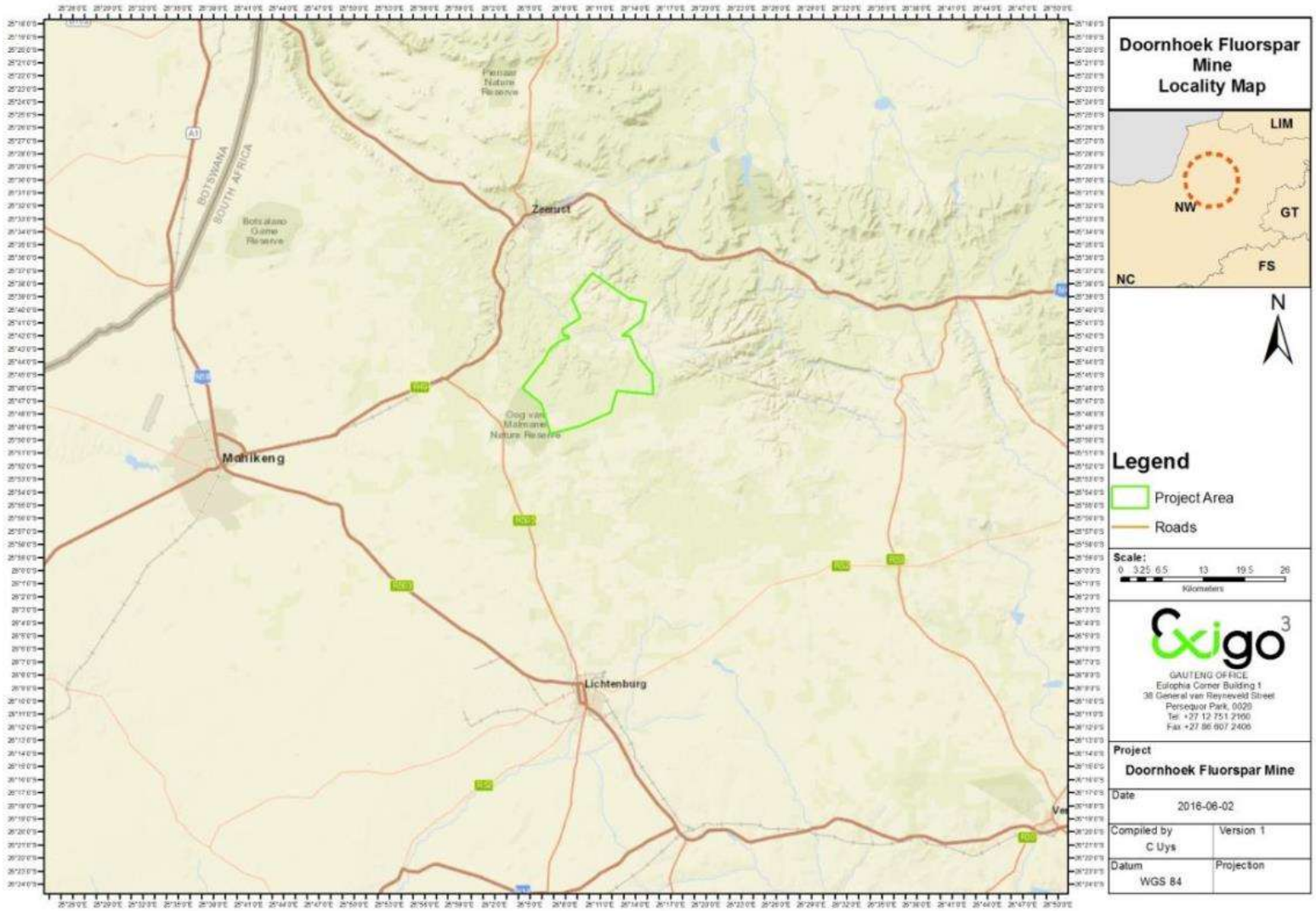


Figure 2 Regional Locality Map with Mining Right Area

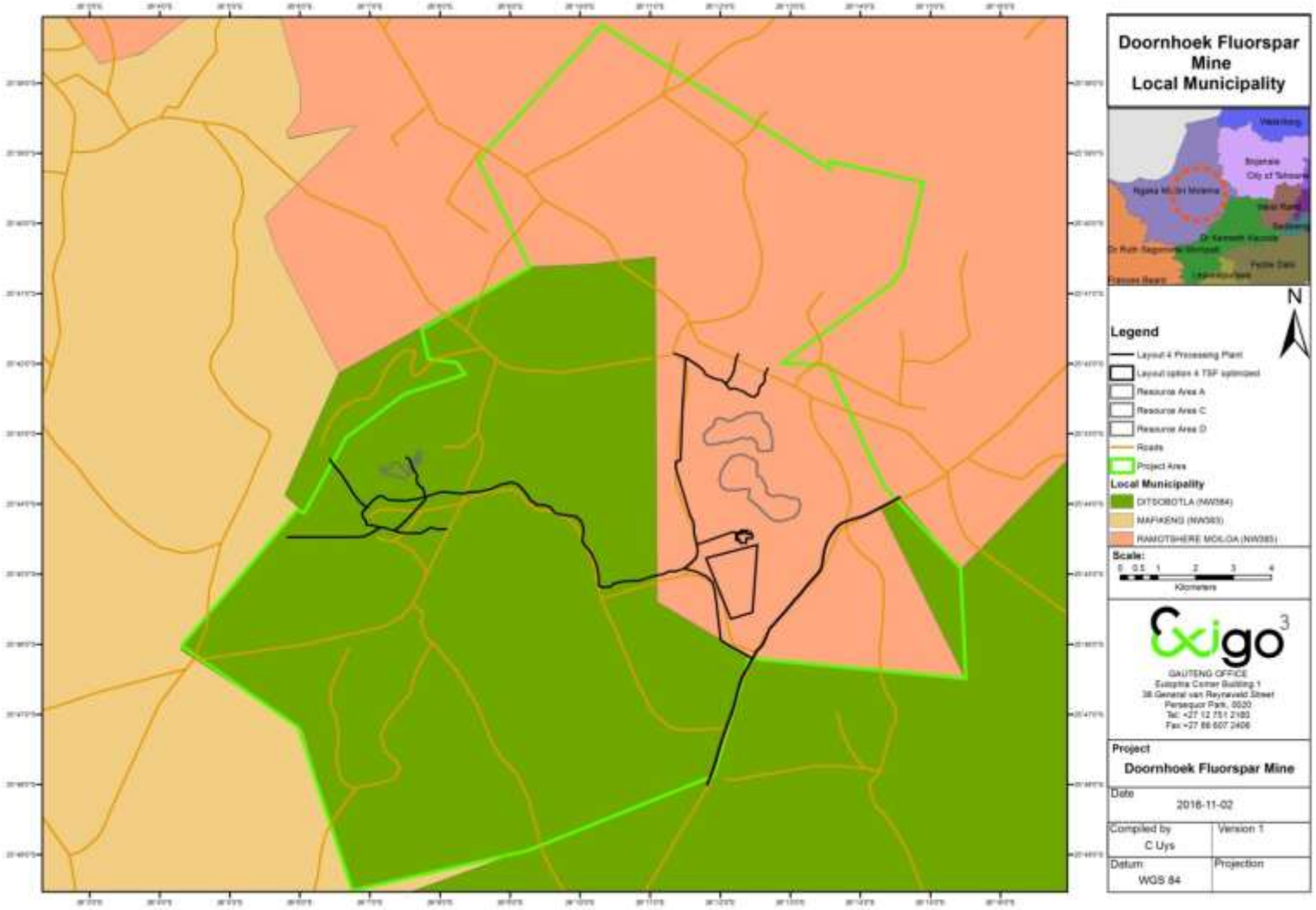


Figure 3 Municipality Map with resource areas and preferred layout alternative

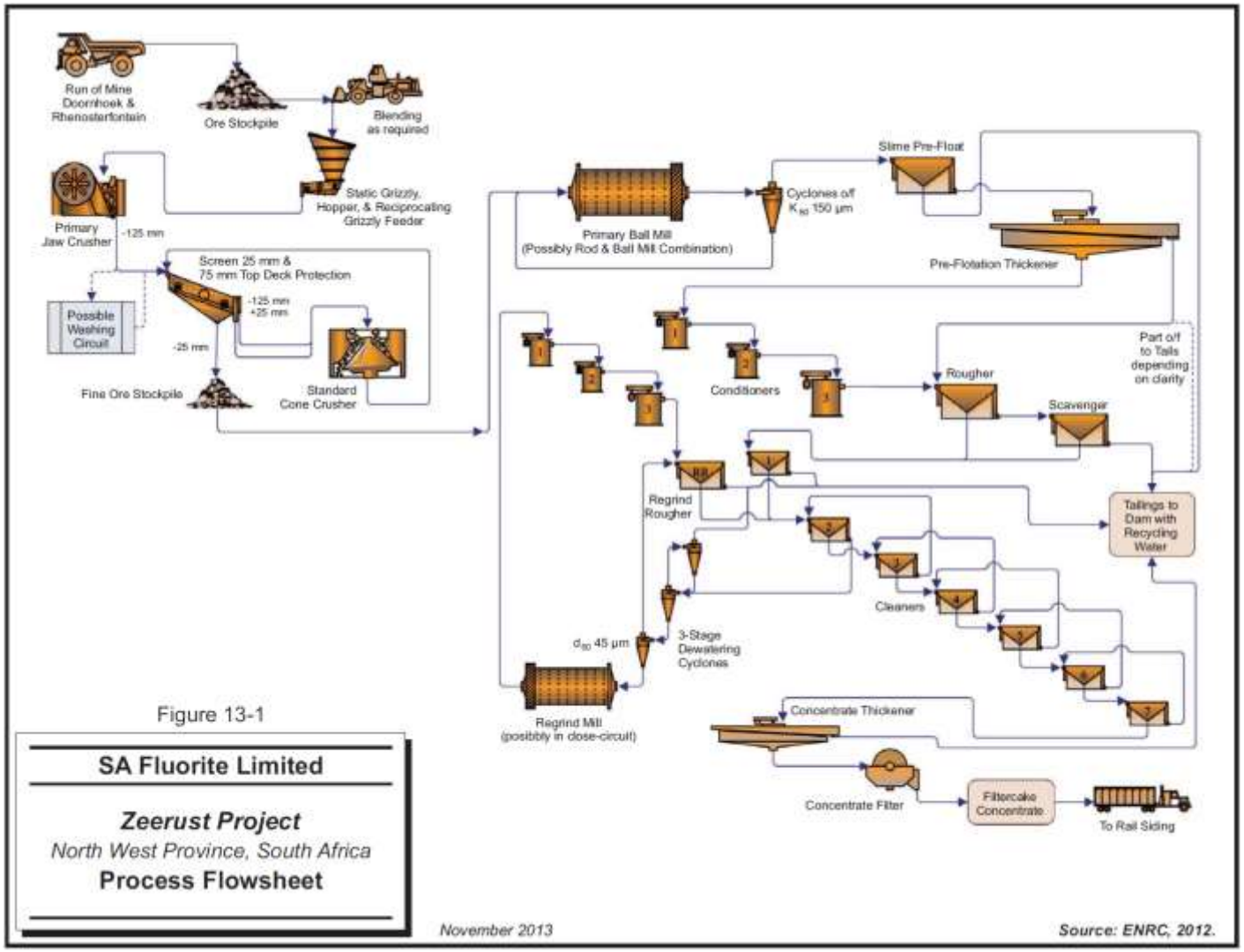


Figure 4 Process Flow Diagram

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 EIA&EMPR 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 13 July 2016). The activities specified above in Table 1 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 was distributed for public review on the 15th of July 2016 for a period of 30 days (15 July 2016 to 15 August 2016) as part of the environmental impact assessment process. The Draft EIA&EMPR was distributed for public review for a period of 30 days (5 December 2016 to 26 January 2017) and in accordance with regulation 3(2) of GNR 982 which states that for any action contemplated in terms of the EIA Regulations 2014 for which a timeframe is prescribed, the period of 15 December to 5 January must be excluded in the reckoning of days.

as identified in terms of the NEMA. 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. The NEMA gives effect to the precautionary principle in section 2 which requires that development be socially, environmentally and economically sustainable, and requires the consideration of all relevant factors including that: "a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions°. Section 24N of the NEMA states, amongst others, that the Minister responsible for mineral resources may require the submission of an environmental management programme before considering an application for an environmental authorisation. The holder (defined in section 1 of the NEMA as the holder of right or permit granted in terms of the MPRDA) and any person issued with an environmental authorisation: • must at all times give effect to the general objectives of integrated environmental management laid down in section 23; • must consider, investigate, assess and communicate the impact of his or her prospecting or mining on the environment; • must manage all environmental impacts- i. in accordance with his or her approved environmental management programme, where appropriate; and ii. as an integral part of the prospecting or mining, exploration or production operation, unless the Minister responsible for mineral resources directs otherwise; • must monitor and audit compliance with the requirements of the environmental management programme; • must, as far as is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and • is responsible for any environmental damage, pollution,	A risk averse and cautious approach (the precautionary principle) was followed throughout the EIA process with regards to the assessment and management of environmental risks. This EIA&EMPR has been compiled in line with the requirements for EMPRs as provided for in section 24N of the NEMA.

pumping and treatment of polluted or extraneous water or ecological degradation as a result of his or her operations to which such right, permit or environmental authorisation relates. Section 24S of the NEMA provides that residue stockpiles and residue deposits must be deposited and managed in accordance with the provisions of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), on any site demarcated for that purpose in the environmental management plan or environmental management programme in question	
GNR 1147 (20 November 2015) of the National Environmental Management Act, 1988 (Act No. 107 of 1998) - Financial Provisioning Regulations In accordance with the above legislation, the holder of a mining right must make the prescribed financial provision for the costs associated with the undertaking of the management, rehabilitation and remediation of the negative environmental impacts due to prospecting, exploration and mining activities and the latent or residual environmental impacts that may become known in future.	The Final Rehabilitation, Decommissioning and Mine Closure Plan was compiled in accordance with GNR 1147 (refer to Appendix 7.17: Rehabilitation, Decommissioning and Mine Closure Plan).
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	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 was considered in the compilation of the EIA&EMPR.

hereinabove). The objects of the MPRDA, as set out in section 2 thereof serve as a guide to the interpretation of the Act. The objects of the MPRDA are as follows: • recognise the internationally accepted right of the State to exercise sovereignty over all the mineral and petroleum resources within the Republic; • give effect to the principle of the State's custodianship of the nation's mineral and petroleum resources; • promote equitable access to the nation's mineral and petroleum resources to all the people of South Africa; • substantially and meaningfully expand opportunities for historically disadvantaged persons, including women, to enter the mineral and petroleum industries and to benefit from the exploitation of the nation's mineral and petroleum resources; • promote economic growth and mineral and petroleum resources development in the Republic; • promote employment and advance the social and economic welfare of all South Africans; • provide for security of tenure in respect of prospecting, exploration, 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.	
National Water Act (Act No 36 of 1998) [NWA] In terms of the NWA, the national government, acting through the Minister of Water 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)); • 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	An IWULA for the mining development was be submitted to the Department of Water and Sanitation (DWS) on 6 February 2017. 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 documentation and correspondence. 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 GNR 704 were adhered to, and where relevant exemption was sought from the requirements of GNR 704. All clean and dirty water management structures have been designed in accordance with section 6 of the GNR 704.

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 GNR 704 of 4 June 1999 (GNR 704). The aforesaid GNR 704 provides for inter alia the capacity requirements of clean and dirty water systems (regulation 6), the protection of water resources by a person in control of a mine (regulation 7), security and addition measures (regulation 8) and temporary or permanent cessation of a mine or activity (regulation 9). According to GNR 704 "no person in charge of a mine may carry on any underground or opencast mining, prospecting or any other operation or activity under or within the 1:50 year flood-line or within a horizontal distance of 100 metres from any watercourse or estuary, whichever is the greatest". Insofar as the undertaking of section 21 water uses is concerned, an application for registration and water use licensing was undertaken. Of particular relevance within the context of waste disposal and water use and management the applicable water uses were 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 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	Based on the archaeological findings on site, the NHRA and the associated permitting process is expected to be applicable to this project thus requiring a Phase 2 Archaeological Impact Assessment and destruction permit. A Phase 1 Archaeological Impact Assessment has been conducted for the project and is attached as Appendix 7.2: Archaeological Impact Assessment.

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 the NEMA in view of the repeal of the listed activities under the ECA). Provided that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of subsection (3), and any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.	
National 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 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,	The legislation and relevant notices will be heeded throughout the proposed mining operations and has been considered in the Ecological Impact Assessment. Refer to Appendix 7.4: Ecological Impact Assessment.

capturing, killing, gathering, collecting, plucking, picking parts of, cutting, chopping off, uprooting, damaging, destroying, having in possession, exercising physical control over, moving or translocating". The Minister has made regulations in terms of section 97 of the NEMBA with regards to Threatened and Protected Species which came into effect on 1 June 2007. Furthermore, the Minister published lists of critically endangered, endangered, vulnerable and protected species in terms of section 56(1) of the NEMBA. Additional Notices published in terms of the NEMBA which may find application to the proposed mine and which will be considered include: 1. National list of ecosystems that are threatened and in need of protection – GNR 1002 of 9 December 2011; 2. Alien and Invasive Species Regulations, 2014 – GNR 598 in Government Gazette 37885 dated 1 August 2014; 3. Alien and Invasive Species Lists, 2016 – GN 864 in Government Gazette No. 40166 dated 29 July 2016.	
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 on the development footprint.
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. However the following regulations and standards published in terms of NEMAQA have been taken into account in the process as well as in the AQIA Report (Appendix 7.12: Air Quality Impact Assessment): 1. National Dust Control Regulations (GNR 827 in Government Gazette 36974 dated 1 November 2013); 2. National Ambient Air Quality Standards applicable to PM10 (GNR 1210 of 24 December 2009);

	3. National Ambient Air Quality Standard for PM 2.5 (GNR 486 of 29 June 2012).
National Environmental Management: Waste Act (Act 59 of 2008) ("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 National Norms and Standards published in terms of the NEMWA. Section 20 of the NEMWA pertains to the consequences of listing waste management activities and states that no person my	The waste management activities as listed 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 1 above.

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 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. With effect from 2 June 2014 the definition of "waste" has been amended in terms of the National Environmental Management: Waste Amendment Act (Act 26 of 2014) (NEMWAA).[1] In addition section 4(b) of the NEMWA has been deleted in terms of the National Environmental Laws Amendment Act (NEMLAA, Act 25 of 2014) with effect from 2 September 2014. As a result, the NEMWA finds application to residue stockpiles and residue deposits generated at a mine. Government agreed that the aforesaid amendments and the One Environmental System will only be implemented as from 8 December 2014. Together with the aforesaid amendments, **Schedule 3: Defined Wastes** to the NEMWA commenced on 2 June 2014. In terms of the aforesaid Schedule 3, residue stockpiles and residue deposits, which include wastes resulting from exploration, mining, quarrying, and physical and chemical treatment of minerals are listed in **Category A** and accordingly defined as hazardous waste. On 23 August 2013 the following Regulations were published in terms of the NEMWA which requires waste to be classified: Waste Classification and Management Regulations (GNR 634 of 23 August 2013) and the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GNR 635 of 23 August	A waste classification was conducted to classify the tailings and overburden material for the proposed mine. Refer to Appendix 7.10: Geochemical Risk Assessment. Mineralogical analyses was also conducted with regards to the characterisation of the residue stockpiles

[1] In terms of section 1 of the NEMWA, "Waste" means:
"(a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or
(b) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette,
but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste-
(i) once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;
(ii) where approval is not required, once a waste is, or has been re-used, recycled or recovered;
(iii) where the Minister has, in terms of section 74, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or
(iv) where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste."

2013). In order to conduct the waste classification, leach tests and a total analysis needs to be conducted. The leach test entails the leaching of a solid sample of waste with reagent water and the subsequent analysis of the leachate for specific components. The total analysis entails the analysis of the solid material for the total concentration of specific components that are present in the waste sample. The results of these two tests are compared to regulatory criteria and a classification is done based on the results of this comparison. Residue stockpiles and residue deposits must be managed in the prescribed manner on any site demarcated for that purpose in the environmental management programme for the mining operation (section 43A of the NEMWA). On 24 July 2015 the Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits, 2015 (GNR 632) were published in terms of the NEMWA. The purpose of GNR 632 is to regulate the planning and management of residue stockpiles and residue deposits from, amongst others, a mining operation. GNR 632 further provides for the characterisation and classification of residue stockpiles, the iinvestigation and site selection and the design of residue stockpiles, impact management and monitoring and reporting systems for residue stockpiles.	as per GNR 632.
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) 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	A land development application will be submitted to the relevant municipality by the applicant along with the Environmental Authorisation and Mining Right (please refer to the relevant meeting minutes in Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers).

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.	
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 was heeded throughout the proposed EIA process and compilation of the SLP (please refer to Appendix 7.18: Social and Labour Plan (SLP)).
Ramotshere Moiloa Local Municipality (RMLM) Reviewed Integrated Development Plan IDP 2015/2016	The IDP was heeded throughout the proposed EIA process and compilation of

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 SLP (please refer to Appendix 7.18: Social and Labour Plan (SLP)).
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 was heeded throughout the proposed EIA process and will be heeded in the compilation of any future SLP's.
Guidelines	
Department of Water and Sanitation Internal Strategic Perspective (DWS ISP) for the Marico, Upper Molopo and Upper Ngotwane Catchments (February 2004) The objective of the ISP is to provide a framework for DWS's (previously DWAF) management of the water resources in each Water Management Area, until the Regional Offices can hand over the management functions to the established CMA. This will ensure consistency when answering requests for new water licences and informing existing water users (including authorities) on how the Department will manage the water resource within the area of concern. Stakeholders must be made aware of the bigger picture as well as the management detail associated with each specific water resource management unit.	The ISP was taken into account in the compilations of the Hydrogeological Impact Assessment (Appendix 7.8: Hydrogeological Impact Assessment).
Need & Desirability Guideline (GNR 891 OF 20 October 2014) In Terms Of The Environmental Impact Assessment (EIA) Regulations, 2010 This document is one of a series of guideline documents on environmental impact management legislation and regulations. The EIA Regulations make it clear that an Environmental Assessment Practitioner (EA") appointed to manage an EIA process must, amongst other requirements, have knowledge of all guidelines that have relevance to the proposed activity and the EIA process, and	The guideline was taken into account in the compilation of Section 7 below.

must throughout the EIA process take into account all relevant guidelines. While guidelines may contain information that provide guidance in terms of best practice in terms of certain EIA aspects, the guidelines also address, often in laymen's terms, how to meet the peremptory requirements prescribed by the legislation. While the best practice guidance must to be taken into account, the peremptory requirements of the legislation must be adhered to. This guideline must be read together with the NEMA, the EIA Regulations, the relevant SEMA(s) and its Regulations, and is not intended to be a substitute for the provisions of the NEMA, the SEMAs or the Regulations, in any way.	

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. WHAT IS FLUORSPAR?

Fluorspar, also known as fluorite, is a mineral composed of Calcium fluoride (CaF2). Fluorspar deposits are generally categorized by CaF2 content, as one of metallurgical grade (60– 85%), ceramic grade (85– 96%) or acid grade (97%+). Fluorspar is the dominant source for the chemical element fluorine, and due to fluorine's extreme chemical properties, it's largely irreplaceable in its use. Fluorspar is mainly used for the production of hydrofluoric acid and aluminium fluoride, and is used as a flux in steelmaking, iron and steel casting, primary aluminium production, glass manufacture and cement production, as well as in the production of lubricants, refrigerants and cookware. The fluorspar market, including its downstream applications, is worth approximately USD120 billion.

Downstream applications and end uses include (amongst others) the following:

- Refrigerants
- LCD Screens
- Lithium Batteries
- Light Bulbs
- Solar Panels
- Toothpaste
- Mouth Wash
- Composites for Automobiles
- Nuclear Power
- Microelectronic Sensors
- Anaesthetics
- Active Pharmaceutical Ingredients
- Speciality Coatings

- Flame Retardant Clothing
- Food Packaging
- Aerospace applications

7.1.1.ENERGY BENEFITS

Fluorspar is used in the steel industry as a flux in basic hearth, basic oxygen and electric arc furnaces where it is added to the heats in amounts ranging from 1 to 10 kg/t of steel produced. Fluorspar promotes fluidity of slag (by reducing its melting point) and thus facilitates removal of sulphur and phosphorus from the steel into the slag. Fluorspar serves the same purpose in iron foundries, where it is added to the cupola charge in the proportion of around 7 to 9 kg/t of metal melted.

Fluorspar is also used in the refining process of silicon and ferrosilicon. The equilibrium between the melt and slag is achieved when a certain amount of aluminium in the alloys is reached and alumina content in the slag is increased. To reach lower aluminium content, slag treatment might be repeated two or three times, but this leads to higher silicon losses and increased electrical energy consumption. The addition of fluorspar assists with decreasing viscosity and keeping the oxygen content low (Tangstad, 2013).

Metallurgical or sub-metallurgical fluorspar is also used as a flux in cement production and is added to the mix of raw cement materials before introduction to the rotary kiln. The addition of fluorspar to the above processes allows the furnace or kiln to operate at a lower temperature, thus saving fuel and electrical energy (Kogel et al, 2006). The mined fluorspar therefore has the potential to significantly contribute to the reduction in energy usage in these and other industrial process with the subsequent positive impact on the carbon footprint of the industries in which it is utilized.

7.2. 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 % of all known reserves. Fluorspar is used mainly in the aluminium, steel and chemicals industries (Chamber of Mines, 2009) (Refer to section 7.1 above for further uses of fluorspar). Calcium fluoride (“CaF2“) is a critical commodity for all industrialized nations, it is included in the USA’s top 5 list of foreign source-reliant minerals and the European Union’s list of 14 most critical minerals. With a reserve of 41Mt, South Africa is the largest reserve in the world. The Global fluorspar market is valued at c. USD 2.0 billion p.a. and global downstream market worth c. USD 120 billion p.a. Chinese producers have historically been the dominant force in the global fluorspar sector, however in recent years South Africa has grown to become the largest holder of reserves. SA has 17% of the world’s

fluorspar reserves, while China has 10%. Strong support exists from the South African government for the development of local beneficiation.

Globally the USD120 billion fluorochemical industry is shifting new production towards the source of the raw material, fluorspar. South Africa is in the favourable position to have large, rich and diverse deposits of fluorspar, positioning itself to increase beneficiation within the country to serve the rapidly growing local and regional markets, and for export purposes. Excess demand is expected despite the new mines that will be coming on-stream between 2014 and 2020.

Not only is fluorspar a strategic mineral in foreign jurisdictions, but it is seen as a strategic mineral in South Africa. The strategic importance of fluorochemicals was confirmed by the launch of the Department of Trade and Industry's ("DTI") Fluorochemical Expansion Initiative ("FEI") in 2009. The purpose of the FEI is to promote the beneficiation of a wide range of downstream products for South Africa's abundant resources of fluorspar. This would ultimately lead to the creation of new business ventures and firms which would result in economic growth and development in South Africa. It is anticipated that the DMR's decision with regards to this application will have a significant impact on downstream beneficiation of South Africa's fluorspar reserves.

As recently as May 2012, in the opening of the Department of Science and Technology's Budget Vote Debate, the Minister of Science and Technology highlighted the strategic advantage that is created by the abundance of fluorspar and the economic potential that results there from. The Department of Mineral Resources has also stated in its Beneficiation Strategy for the Minerals Industry of South Africa, June 2011 (at page 15), that the beneficiation of fluorspar is critical for government to build nuclear power stations to compliment the fossil fuel based electricity.

Doornhoek Fluorspar Mine will be one of the world's lowest cost fluorspar producers due to:

- Large flat lying clean resource with favourable metallurgy;
- Latest technology;
- Shallow open-pit mines which are easier to mine.

In summary Doornhoek is the largest contained fluorspar deposit in the world that consists out of a single large flat-lying shallow orebody, which is amenable to opencast mining to max depth of 90m, with good infrastructure, favourable metallurgy and a LOM far in excess of 30 years. The resource is favourable for the development of downstream processing facilities.

There are currently two principal commercial grades of fluorspar:

- metallurgical grade (metspar), containing less than 97% CaF2, typically 85% or more CaF2; and
- acid grade (or acidspar), containing greater than 97% CaF2.

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 for 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 5. 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.

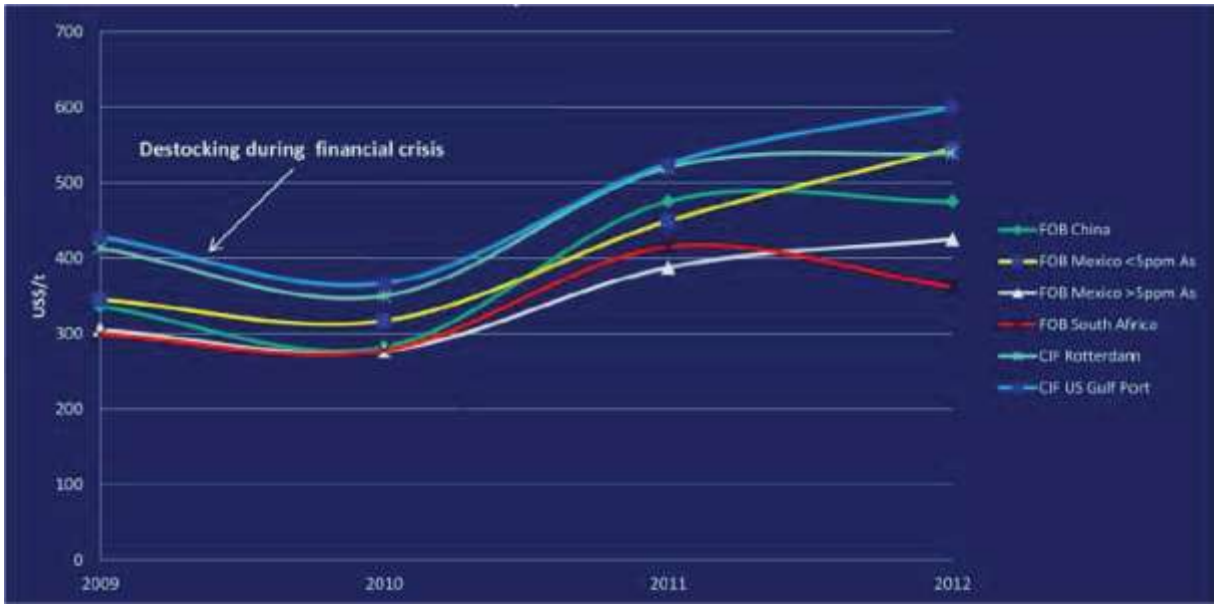


Figure 5 Acid grade fluorspar prices 2009 to June 2012 (Byron, 2012)

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 Mine 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 Mine 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).

7.3. 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-west 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 but not mining fluorspar according to the team's knowledge.

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 has been further assessed and evaluated in the table below and relevant specialist studies as per the Need & Desirability Guideline (GNR 891 of 20 October 2014), with specific reference to Appendix 7.1: Socio-Economic Impact Assessment.

Table 2: Need and Desirability Table

Doornhoek Fluorspar Mine Need and Desirability	
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	Please explain
Please refer to section 6 of the Wetland Impact Assessment and section 6 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment and Appendix 7.6: Wetland Impact Assessment).	
2. How were the following ecological integrity considerations taken into account? :	
a) Threatened Ecosystems	Please explain
Refer to section 9.4 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment).	

b) Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure	Please explain
Please refer to section 4.3 of the Ecological Impact Assessment and section 5 of the Wetland Assessment (Appendix 7.4: Ecological Impact Assessment and Appendix 7.6: Wetland Impact Assessment).	

c) Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs")	Please explain
Refer to section 9.1 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment).	
d) Conservation targets	Please explain
Please refer to section 9 and 9.4 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment).	
e) Ecological drivers of the ecosystem	Please explain
The following ecological drivers, namely the Klein Marico River, soils and vegetation inter alia were assessed in the Wetland and Aquatic Impact Assessment Reports, the Land Use and Soil Potential Impact Assessment Report and the Ecological Impact Assessment Report respectively. Refer to Appendix 7: Specialist Reports.	
f) Environmental Management Framework	Please explain
No Environmental Management Framework exists for the project area.	
g) Spatial Development Framework	
No Spatial Development Frameworks for the North West, the Ngaka Modiri Molema DM, the Ramotshere Moiloa LM or the Ditsobotla LM were available during the compilation of the report. Therefore, it was not possible to determine whether the project is in line with the spatial visions of these administrative units or whether it may contradict them. Having said this, no contradictions with the spatial planning of the municipalities were identified during the interviews with the local authorities. (refer to the SEIA in Appendix 7.1: Socio-Economic Impact Assessment).	
h) Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)	Please explain
The Groot Marico River and its tributaries (which include the Klein Marico River in the project area) supply water to Gaborone based on the TSWASA agreement signed in 1988 between Botswana, South Africa and the former homeland of Bophuthatswana. The project area has commercial agriculture along the banks of Marico River. There are therefore more commercial farms and eco-tourism as the area has significant surface water resources. It is therefore keen that impacts on surface water resources as well as groundwater resources are adequately managed and mitigated. Please refer to section 5 of the Hydrogeological Impact Assessment (Appendix 7.8: Hydrogeological Impact Assessment).	
3. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Please explain
Please refer to section 6 and Tables 18 and 19 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment)	
4. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Please explain
Please refer to section 6 and Tables 18 and 19 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment)	
5. What waste will be generated by this development? What measures were explored to firstly avoid waste and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	Please explain
It is foreseen that the development will generate solid construction waste, domestic and hazardous waste as well as sewage. Please refer to Table 19 of the Ecological Impact Assessment for mitigation measures for waste	

management (Appendix 7.4: Ecological Impact Assessment)			
6. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?			Please explain
Please refer to Section 6 and 7 of the Archaeological Impact Assessment (Appendix 7.2: Archaeological Impact Assessment).			
7. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?			Please explain
Please refer to section 8 for the alternatives considered for the proposed development as well as Table 19 for the potential impacts of the development and Table 23 for proposed mitigation measures.			
8. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?			Please explain
Refer to Table 23: Mitigation Measures to rehabilitate the environment.			
a) Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)?	**YES**	NO	Please explain
The natural resource dependency in terms of water and power will increase, however the proposed development will promote economic development and will therefore reduce the dependency upon natural resources, for example grazing by game and livestock.			
b) Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important	**YES**	NO	Please explain

priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this proposed development alternative?)			
Refer to section 13 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment)			
c) Do the proposed location, type and scale of development promote a reduced dependency on resources?	**YES**	NO	Please explain
The natural resource dependency in terms of water and power will increase, however the proposed development will promote economic development and will therefore reduce the dependency upon natural resources, for example grazing by game and livestock.			
9. How were a risk-averse and cautious approach applied in terms of ecological impacts			Please explain
A risk analyses of the impacts identified was conducted to determine the significance of the impacts on the fauna and flora of the study area.			
a) What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?			Please explain
Refer to section 2.3.4 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment) and section 28 of the Draft EIA&EMPR.			
b) What is the level of risk associated with the limits of current knowledge?			Please explain
Refer to section 2.3.4 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment) and section 28 of the Draft EIA&EMPR.			
c) Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?			Please explain
Refer to section 2.3 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment). A risk analyses of the impacts identified was conducted to determine the significance of the impacts on the fauna and flora of the study area.			
10. How will the ecological impacts resulting from this development impact on people's environmental right in terms following:			
a) Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?			Please explain
Please refer to section 6 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment).			
b) Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?			
Please refer to section 6 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment).			
11. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss			Please explain

of heritage site, opportunity costs, etc.)?	
Refer to Table 19.	
12. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	Please explain
Please refer to section 6 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment).	
13. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option (BPEO)" in terms of ecological considerations?	Please explain
Please refer to section 8 of the EIA&EMPR	
14. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Please explain
Please refer to section 6 and 6.2.4 of the Ecological Impact Assessment (Appendix 7.4: Ecological Impact Assessment)	
15. What is the socio-economic context of the area based on, amongst other considerations, the following considerations?	
a) The IDP (and its sector plans' vision, objectives, strategies indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,	Please explain
From a local policy perspective, the proposed project does not appear to contravene any strategy or plan developed by the Ditsobotla or Ramotshere Moiloa LM's and is rather in line with the local IDPs. Refer to the socio-Economic Impact Study: Chapter 2 for further information.	
b) Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	Please explain
No Spatial Development Frameworks for the North West, the Ngaka Modiri Molema DM, the Ramotshere Moiloa LM or the Ditsobotla LM were available during the compilation of the report. Therefore, it was not possible to determine whether the project is in line with the spatial visions of these administrative units or whether it may contradict them. Having said this, no contradictions with the spatial planning of the municipalities were identified during the interviews with the local authorities.	
c) Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	Please explain
The land where the proposed activity is planned to be developed is currently used for commercial agricultural activities comprising of livestock farming, game breeding, and game hunting. Due to the water shortages experienced in the area, no irrigation or crop production is undertaken on any of the farm portions that may be affected by the proposed development.	
d) Municipal Economic Development Strategy ("LED Strategy").	Please explain
Mining, agriculture and tourism are the most important activities for economic growth in the study area, as identified in the local LED strategies. Refer to the socio-Economic Impact Study: Chapter 2 for further information.	
16. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	Please explain
The expected socio-economic impacts from the proposed development will be both of positive and negative nature. Positive impacts will include the stimulation of the economy as a result of investment into the	

establishment of the mine and its operations, creation of temporary (during construction) and sustainable employment that will last for up to 25 years, increase in household income and government revenue. The mine is also likely to contribute to skills development and local economic development through the implementation of it Social and Labour Plan. At the same time, due to the nature of the area where the proposed mien is to be developed, which is characterised by rural agriculture, some losses in the commercial agricultural sector due to land sterilisation could be experienced. The area also boasts game hunting activities that attract tourists and contribute to the local agricultural sector's development; since some of these are located on the farm portions that are expected to be impacted by the mine's footprint, they may need to be relocated or closed down, which could have a negative effect on the local production and employment. The development of the mine, though, is still expected to have a positive net effect on the local economy.			
17. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	YES	NO	Please explain
SA Fluorite has developed a Skills Development Plan (SDP), which will include implementation of programmes such as portable skills development, mentorship, learnerships and internships during the mine's operations. In addition, Adult Basic Education and Training as well as Bursary programme will also be implemented. Furthermore, the mine is expected to invest into the local water-related infrastructure to assist the local municipality in addressing its key water-related challenges.			
18. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?			Please explain
The local area is in dire need for investment that would create sustainable employment opportunity and that would increase the local revenue base that could be used to address some of the socio-economic challenges in the area. The SLP of the mine suggests that the mine will invest R2.2 million into the water project during the first five years of its operation, which could notably improve the standard of living of local residents. Creation of sustainable employment opportunities would also assist in addressing the developmental and social challenges of the local community.			
19. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	YES	NO	Please explain
The mine is envisaged to operate for 25 years, suggesting that it will benefit not only the current generation but will also assist in improving livelihoods of the future generation by creating sustainable employment opportunities for some of the households in the region.			
20. In terms of location, describe how the placement of the proposed development will:			
a) result in the creation of residential and employment opportunities in close proximity to or integrated with each other,			Please explain
Up to 70% of labour to be employed during operations is envisaged to come from the local communities. Many of these jobs will also be unskilled and semi-skilled, therefore, offering opportunities for the local labour to find employment closer to their place of residence.			
b) reduce the need for transport of people and goods,			Please explain
The mine will be established about 30 km by road from Zeerust and nearby townships. The proximity of the mine to Zeerust and surrounding townships will assist the local labour to find employment closer to their place of residence and reduce their needs for commuting to further away towns and areas in search for work and/or for actual employment.			
c) result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),			Please explain
Refer to road improvement measures recommended in the Traffic Impact Report (Appendix 7.14: Traffic Impact Assessment) and Table 23.			

d) compliment other uses in the area,	Please explain
The mine will be located not far away from the Witkop Mine that was put on maintenance. Importantly, the mine will not be sterilising arable land.	
e) be in line with the planning for the area,	Please explain
No information on the actual plans for the area was possible to obtain due to the lack of respective spatial framework. However, no contradictions with the spatial planning of the municipalities were identified during the interviews with the local authorities. Furthermore, mining is recognised by the local authorities to be one of the priority sectors to stimulate economic development and create jobs.	
f) for urban related development, make use of underutilised land available with the urban edge,	Please explain
Not applicable	
g) optimise the use of existing resources and infrastructure,	Please explain
The land where the proposed mine is planned to be established is currently used mainly for commercial agricultural activities such as livestock farming of game farming. The land is not arable land, but its grazing capability is between 11-17 ha per Large Livestock Unit, which is considered to be of moderate capability. The area though is endowed with fluorspar mineral resources that are not possible to mine unless the land use changes. Mineral resources that are planned to be mined are envisaged to be exported, which will earn South Africa foreign exchange.	
h) opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	Please explain
The mine is envisaged to contribute to addressing some of the water related challenges in the municipality, which include among others the poorly maintained and inadequate water infrastructure.	
i) discourage "urban sprawl" and contribute to compaction/densification,	Please explain
The project will potentially create jobs for the local people and therefore will discourage out migration from the local municipalities to urban areas that may be perceived to provide greater chances of finding employment.	
j) contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	Please explain
The project area is a rural area and therefore consists of dispersed farmsteads and settlement. However it can be anticipated that future development will take place according to urban town planning principles and existing infrastructure will be used optimally.	
k) encourage environmentally sustainable land development practices and processes,	Please explain
Refer to Section 8 and Table 23.	
l) take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	Please explain
The mine is envisaged to harness fluorspar minerals that are aimed for export and that are widely used in production of glasses and enamels.	
m) the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	
Although the proposed development may result in closure or reduction of some of the commercial agricultural activities, the net benefit of the mine from an economic perspective is expected to exceed the losses that may result from its establishment.	
n) impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	Please explain.
Please refer to section 6 and 7 of the Archaeological Impact Assessment (Appendix 7.2: Archaeological Impact Assessment).	

o) in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	Please explain
The mine's construction and operation will stimulate economic activities of directly and indirectly affected businesses, which subsequently leads to the creation of new businesses. In addition, demand for goods and services by mine workers will lead to creation of local businesses and therefore a more integrated settlement.	
21. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	Please explain
Refer to the points below.	
a) What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Please explain
The economic benefits derived from the development of the mine were based on the assumptions extracted from the financial model developed for the project by the project proponent and dated 2016. Any changes to the data would result in the changes of the economic impacts. Also refer to section 3 of the Socio-Economic Impact Assessment Report. Furthermore, in order to identify potential negative effects of the project, interviews with various directly and indirectly affected parties were conducted. The feedback received from these parties was assumed to be sufficient to predict the extent and significance of potential negative effects.	
b) What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	Please explain
Some of the information with respect to the land uses and socio-economic conditions of the farm portions that may be directly or indirectly impacted by the project was not possible to obtain due to various reasons. How, this gap in knowledge is relatively small considering the data that was possible to gather.	
c) Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	Please explain
A conservative approach was applied to the identification of both positive and negative effects of the project.	
22) How will the socio-economic impacts be resulting from this development impact on people's environmental right in terms following:	
a) Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Please explain
Please refer to Table 19 and Table 23.	
b) Positive impacts. What measures were taken to enhance positive impacts?	Please explain
Please refer to Table 19 and Table 23.	
23) Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	Please explain
The mine's construction and operational phases stimulates economic activities of directly and indirectly affected businesses which translates into the creation of new employment opportunities and creation of businesses. This results in increased household income and subsequently increased household expenditure, through this, an additional round of value adding is created. The mine should seek to procure materials, goods, services, and other products required for the operation from local suppliers as far as feasible to increase the positive impact on the local economy.	
24) What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	Please explain
The study included the assessment of both positive economic effects that will be created and the negative	

economic effects that will be exerted by the project. The comparison of these allowed for the identification of the most beneficial option. Please refer to section 8.1.	
25) What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	Please explain
Refer to section 8.1.	
26) What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	Please explain
Refer to section 8.1.and Table 23	
27) What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Please explain
Refer to Table 23.	
28) What measures were taken to:	
a) ensure the participation of all interested and affected parties,	Please explain
Refer to section 9 and Table 6.	
b) provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	Please explain
Refer to section 9 and Table 6.	
c) ensure participation by vulnerable and disadvantaged persons,	Please explain
Refer to section 9 and Table 6.	
d) promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	Please explain
Refer to section 9 and 37.13	
e) ensure openness and transparency, and access to information in terms of the process,	Please explain
Refer to section 9 and Table 6.	
f) ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and	Please explain
Refer to section 9 and Table 6.	
g) ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was being promoted?	Please explain
Refer to section 9 and Table 6.	
29) Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the	Please explain

needs of an area)?	
The project will require different skills set, ranging from unskilled to semi-skilled up to skilled and highly skilled. It is expected that the majority of the workforce consisting of unskilled and semi-skilled will be sourced from local communities; these will be the market for the low income housing opportunities. The skilled and highly skilled labour will be sourced from the urban areas and possibly the rest of the country and these will likely create a market for middle to high income housing opportunities.	
30) What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Please explain
Refer to section 37.11.9	
31) Describe how the development will impact on job creation in terms of, amongst other aspects:	
a) the number of temporary versus permanent jobs that will be created,	Please explain
During construction about 222 employment opportunities will be created that will be supported for about two years. The construction phase though will coincide with the ramping up period, which means that many of the jobs created during construction will be then retained in the operational phase and will become sustainable. Overall, the project will create on average 222 sustainable jobs that will be supported for about 25 years.	
b) whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	Please explain
Most of the employment opportunities created at the mine will be for unskilled and semi-skilled workers, which are in abundance in the local municipalities. Furthermore, the Witkop Mine, which also mined fluorspar, has been put on care and maintenance thus creating a supply of workers that could be easily absorbed by the proposed project. It is therefore believed that the area is likely to provide up to 70% of the human resources requiring by the mine during its operations.	
c) the distance from where labourers will have to travel,	Please explain
Most of the workers employed at the mine are likely to come from Zeerust and its surroundings, thus people will need to travel about 30 km from their place of residence to work.	
d) the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and	Please explain
Positive impacts will be created where jobs are created while others will be spread all over the country resulting in the distribution of benefits to other communities.	
e) The opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	Please explain
As mentioned previously, some potential losses of agricultural land may be experienced which could lead to the downscaling or closure of some agricultural activities, which also include tourism activities on the bases of game hunting. Given the knowledge of the socio-economic environment of the zone of influence, it is envisaged that the effect on the job losses will be smaller than the number of jobs that the mine will be creating (222).	
32) What measures were taken to ensure:	
a) that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and	Please explain
Refer to the section 6 and Table 6 with reference to the liaison with government departments, of which the results were submitted to the competent authority.	
b) that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	Please explain
N.A.	
33) What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial	Please explain

use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?			
Refer to Table 23			
34) Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	YES	NO	Please explain
Yes the measures are achievable. Please refer to Appendix 7.17: Rehabilitation, Decommissioning and Mine Closure Plan.			
35) What measures were taken to ensure that 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 will be paid for by those responsible for harming the environment?			Please explain
Please refer to the financial provision as calculated in Appendix 7.17: Rehabilitation, Decommissioning and Mine Closure Plan.			
36) Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?			Please explain
Refer to section 8.			
37) Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?			Please explain
The project is not expected to have a significant negative cumulative effect on any of the socio-economic parameters. The potential negative cumulative effects are also expected to be offset by the positive impacts created by the development.			

8. MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE INCLUDING A FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE.

NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

8.1. Process to assess alternatives

The then Department of Environmental Affairs and Tourism (DEAT) guidelines for Integrated Environmental Management (IEM)) procedure requires an environmental investigation 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 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; and
  - Waste disposal.
- **Technology alternative**
- **Mining and Deposition Methodology alternatives**
  - Mining Method Alternatives
  - Overburden Deposition Alternatives
- **The "no-go" alternative**
  - Assessed per environmental aspect/area

8.2. DETAILS OF THE DEVELOPMENT FOOTPRINT 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.

8.3. 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 and geographic formations such as dykes
- Proximity to surface water features
- Ownership of surface rights and subsequent social impact
- Nuisance factors (including noise and visual impacts) and subsequent social impacts (including infrastructure and man-made features)
- Climate was not specifically referenced as the sites are in the same climatic region.

8.3.1. 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 all the resource areas (A, C and D) 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 and 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.

The disadvantages of proposed location alternative 3 are:

- The proposed location alternative is situated partly over resource area C resulting in partial sterilization of the resource.
- 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.
- 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 is 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 and thereby the impact minimised.
- 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.

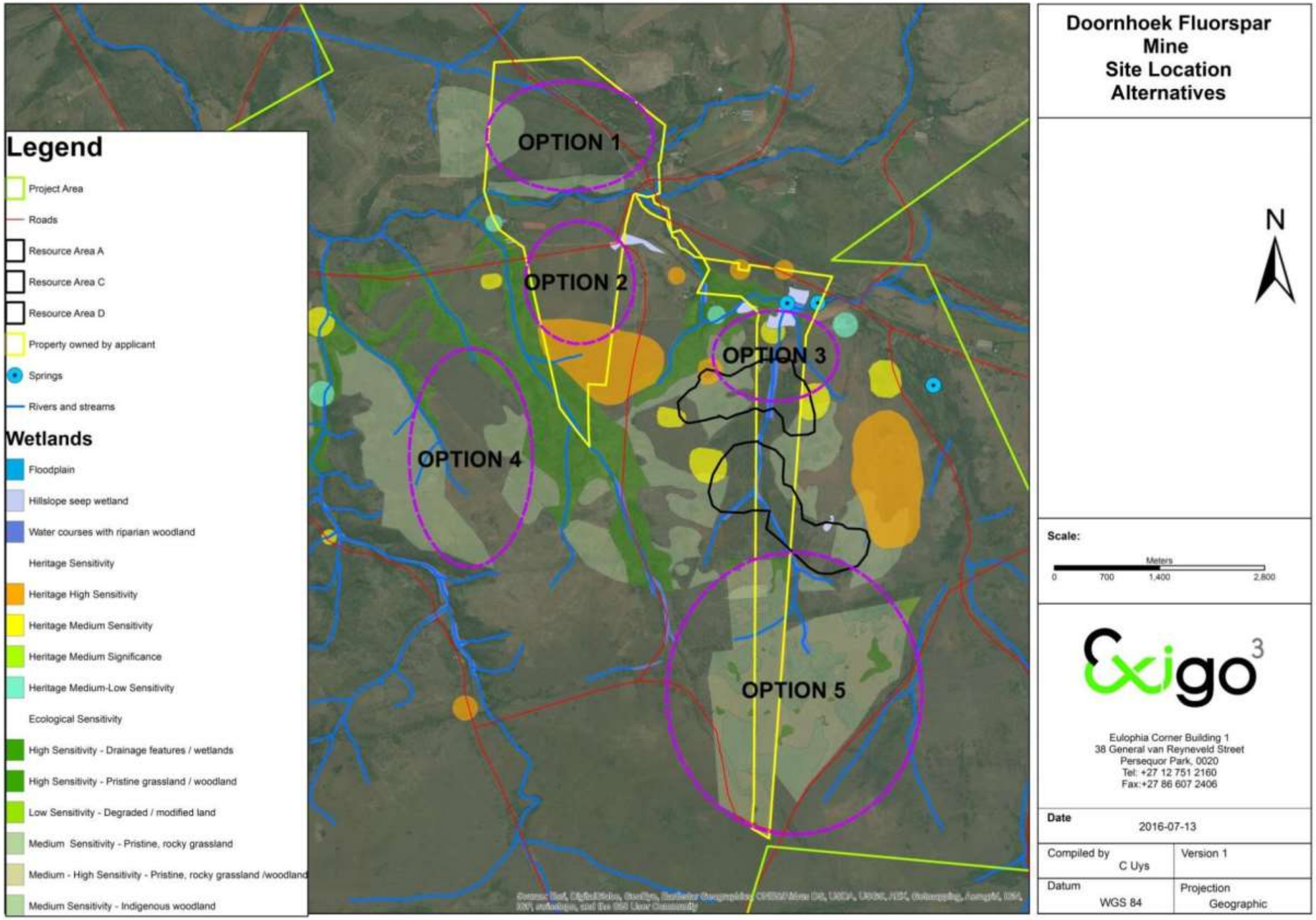


Figure 6 Location Alternatives/Options Map

8.3.2.LAYOUT ALTERNATIVES

Four (4) 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.
- The TSF is located over dykes and in two compartments as per Appendix 7.8: Hydrogeological Impact Assessment thus impacting over both compartments in terms of groundwater impacts.

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 and falls in two compartments as per Appendix 7.8: Hydrogeological Impact Assessment thus impacting over both compartments in terms of groundwater impacts.
- 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 TSF footprint falls in one compartment as per Appendix 7.8: Hydrogeological Impact Assessment thus limiting impact to only the one relevant compartment in terms of groundwater impacts.

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 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.
- The TSF is located over dykes and in two compartments as per Appendix 7.8: Hydrogeological Impact Assessment thus impacting over both compartments in terms of groundwater impacts.
- The TSF footprint is situated over any drainage features.

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.

i. Layout 4.1 - **Optimized Layout 4** (improved TSF location)

The position of Alternative 4's TSF was further optimized during this EIA Phase by taking into account recommendations in the Hydrogeological Impact Assessment as required in terms of Regulation 6 of GNR 632 for the TSF to avoid any geological formations and dykes. The TSF was moved further north and slightly east to avoid the north south dyke present towards the west of the TSF.

The benefit associated with this optimization is that the groundwater impacts are contained / limited to one compartment as opposed to two, thus reducing the overall groundwater impact.

Please refer to Figure 11 below.

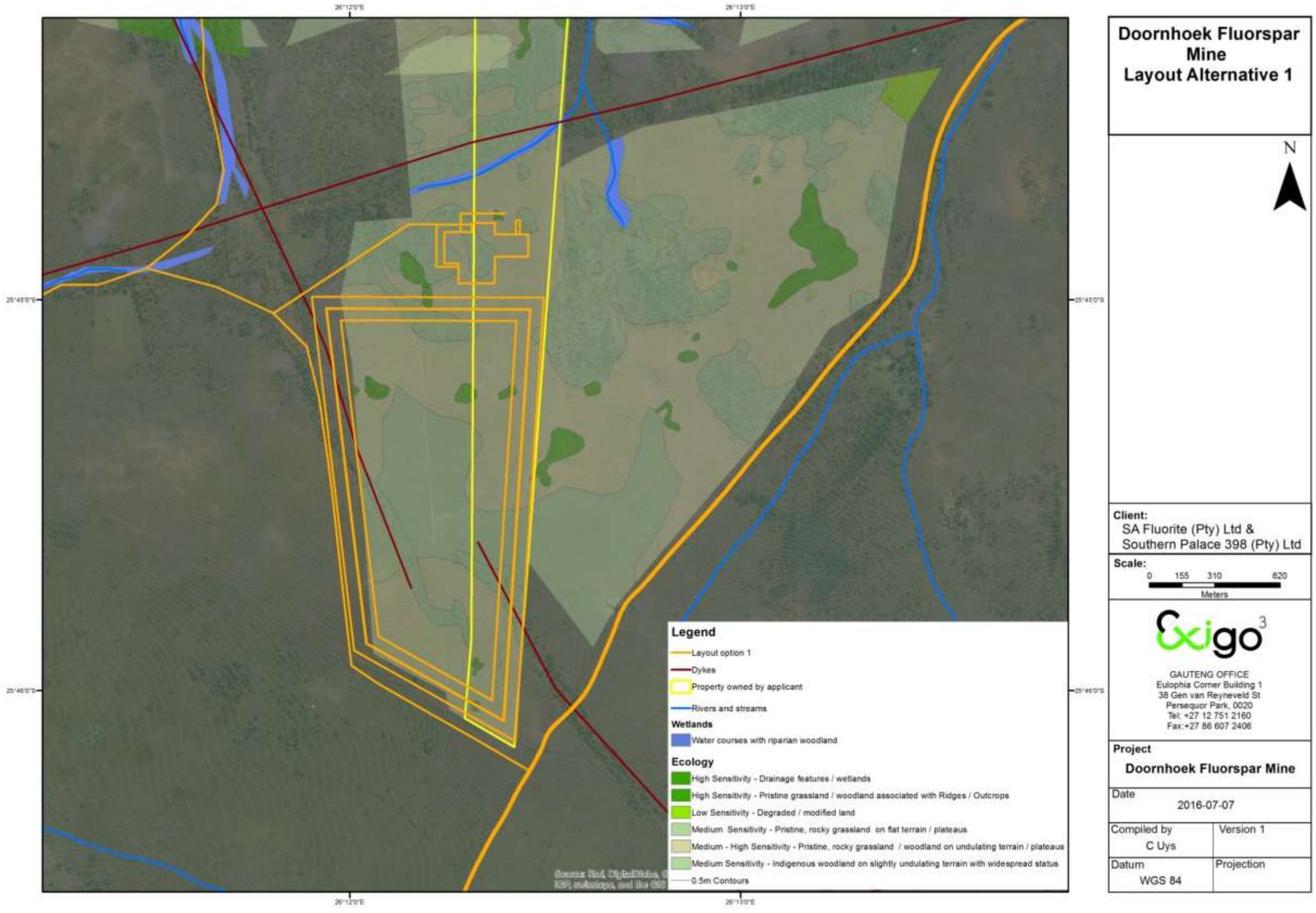


Figure 7 Layout Alternative/Option 1

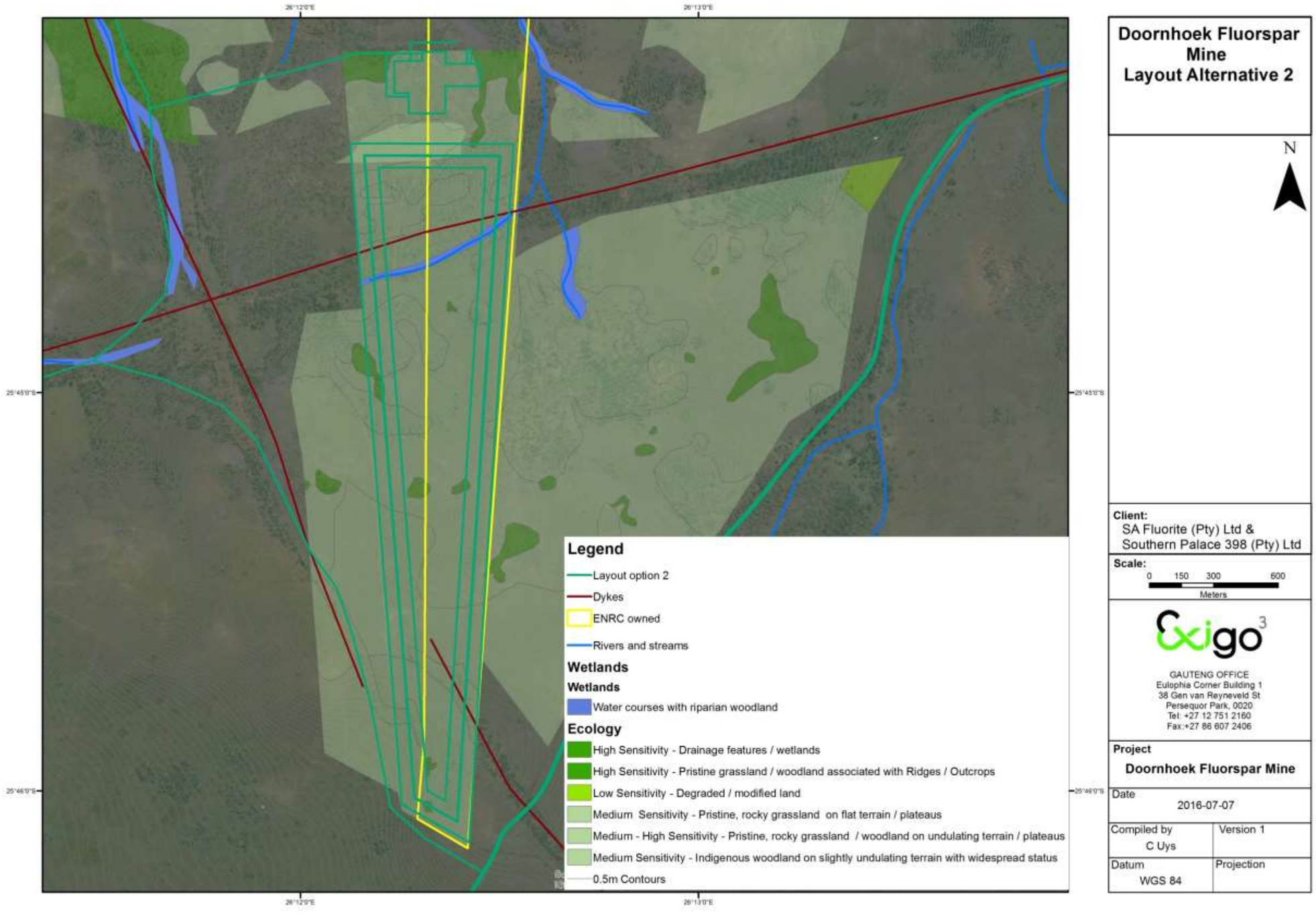


Figure 8 Layout Alternative/Option 2

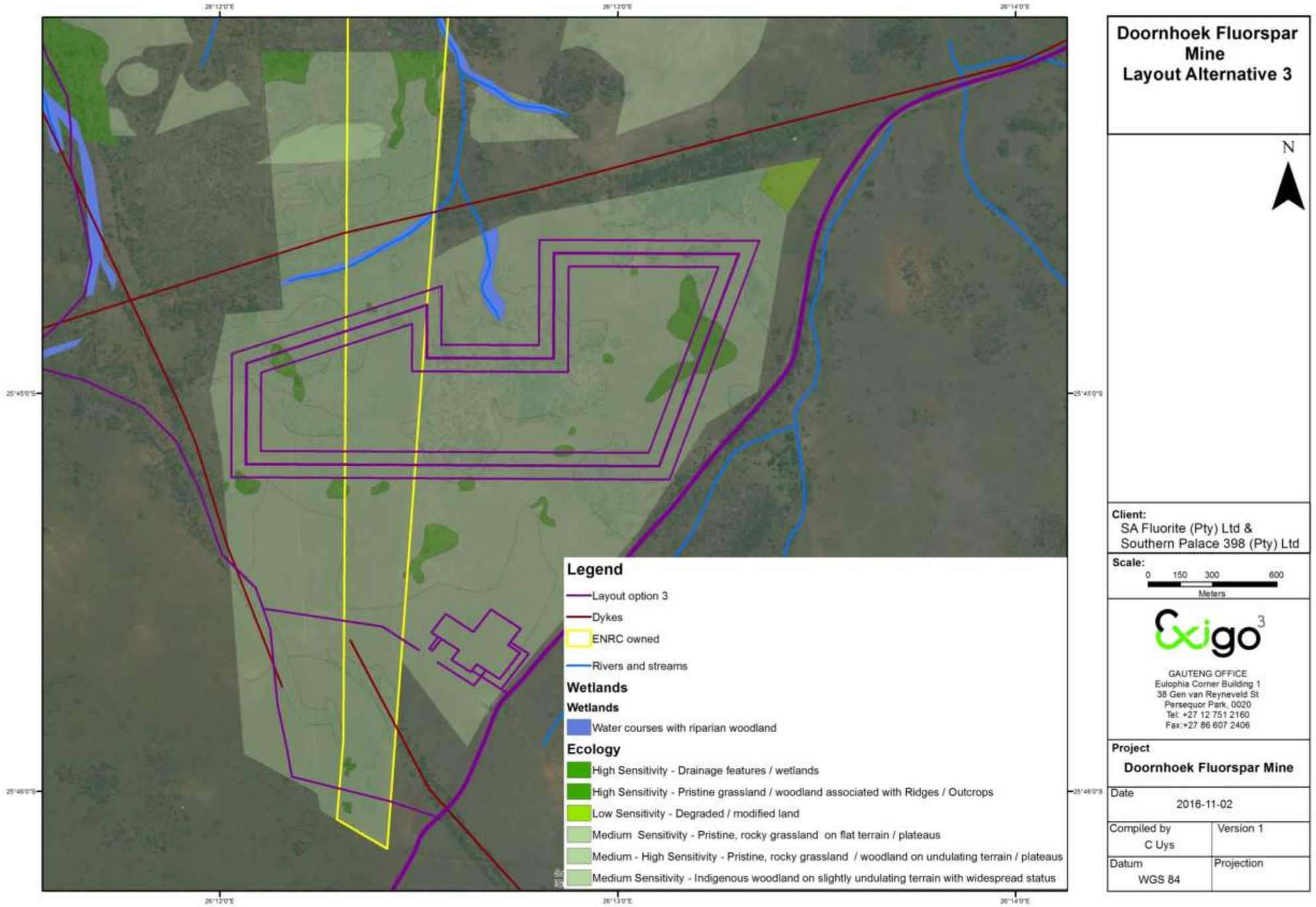


Figure 9 Layout Alternative/Option 3

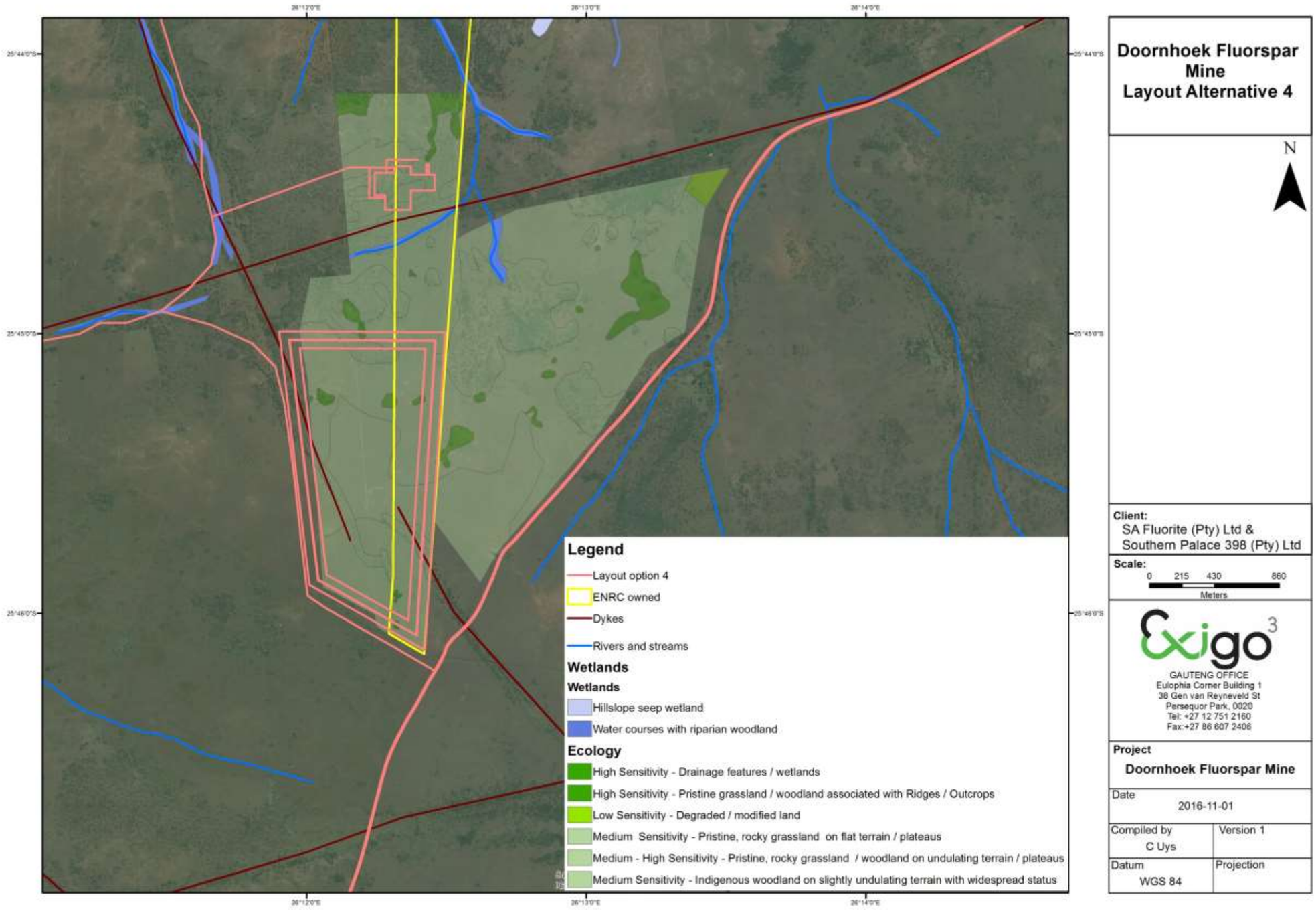


Figure 10 Layout Alternative/Option 4

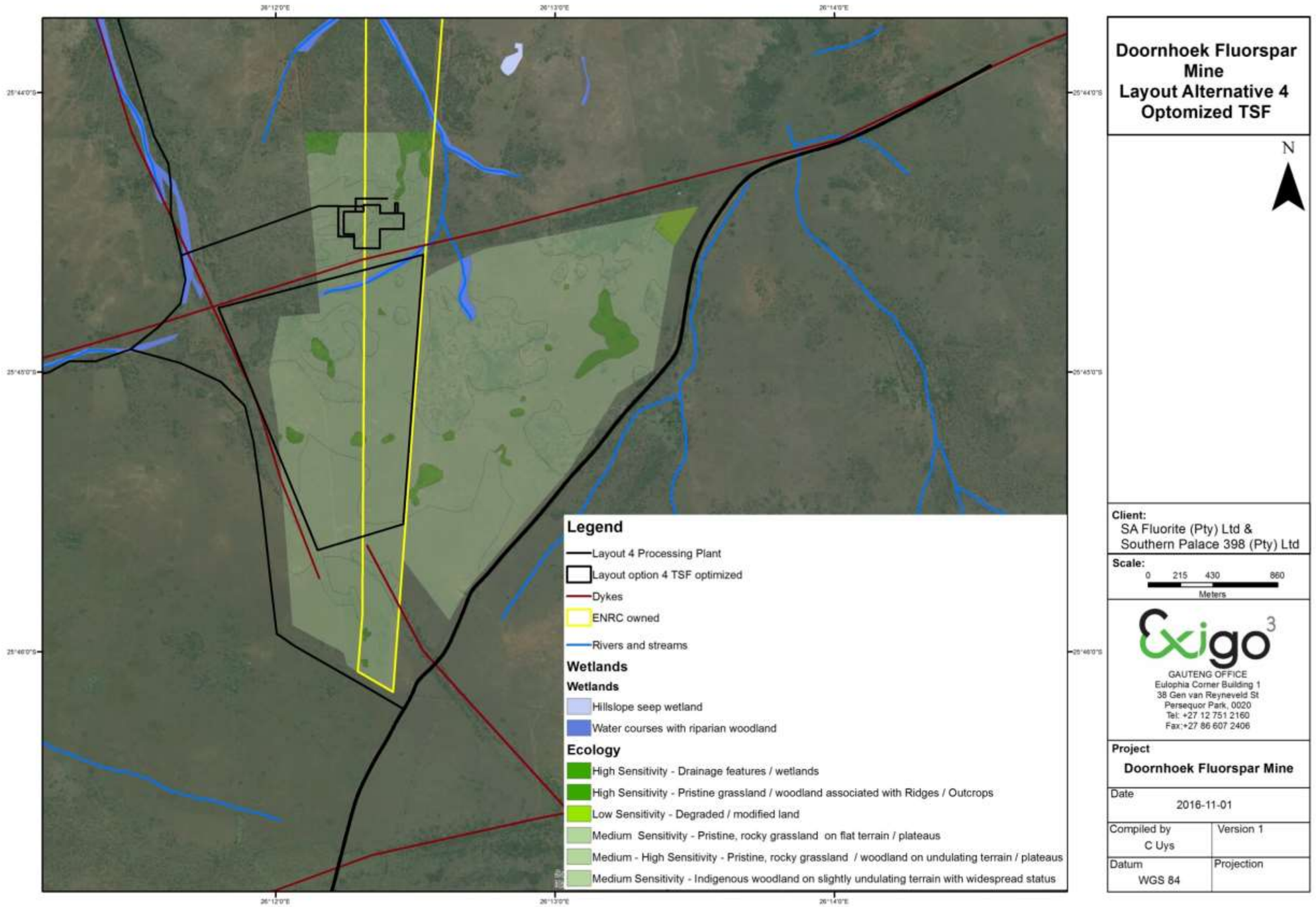


Figure 11 Layout Alternative/Option 4.1 Optimized

8.3.3.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.

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 disadvantages of layout alternative 2 are:

- The dump footprint is located on a wetland area.

Alternative 1 is the preferred alternative for Resource A.

c) The indicated overburden dump for resource area C & D is currently the preferred option (Refer to Figure 13). An alternative to place the overburden dump to the south of Resource Area C was considered as this is further away from the Klein Marico River. However the benefit associated with the dump acting as a noise barrier and visual screen between the open pit and sensitive receptors (refer to section 5.10 on rehabilitation and concurrent partial backfilling) outweighed the alternative location benefit.

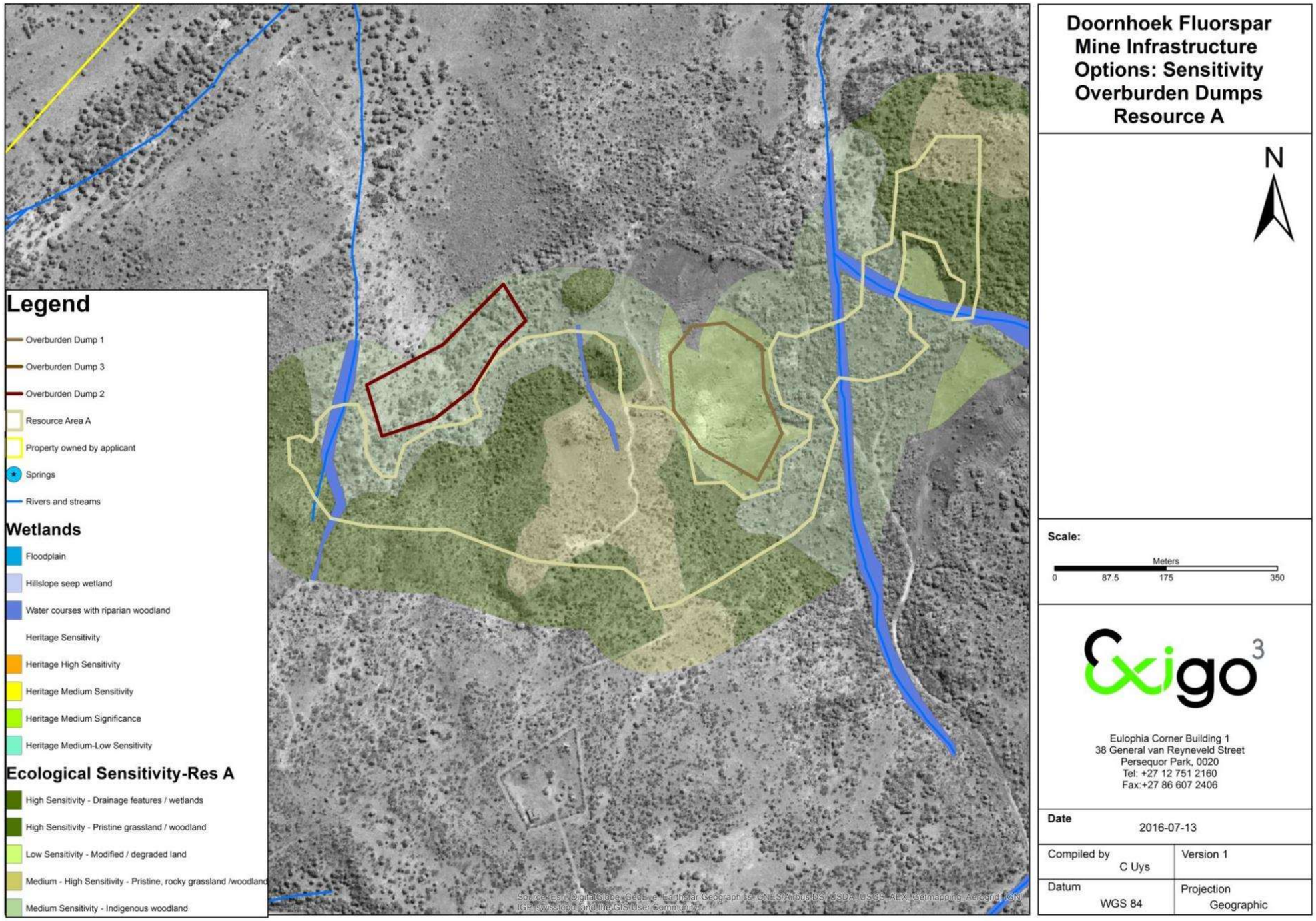


Figure 12 Overburden Dump Alternatives for Resource Area A

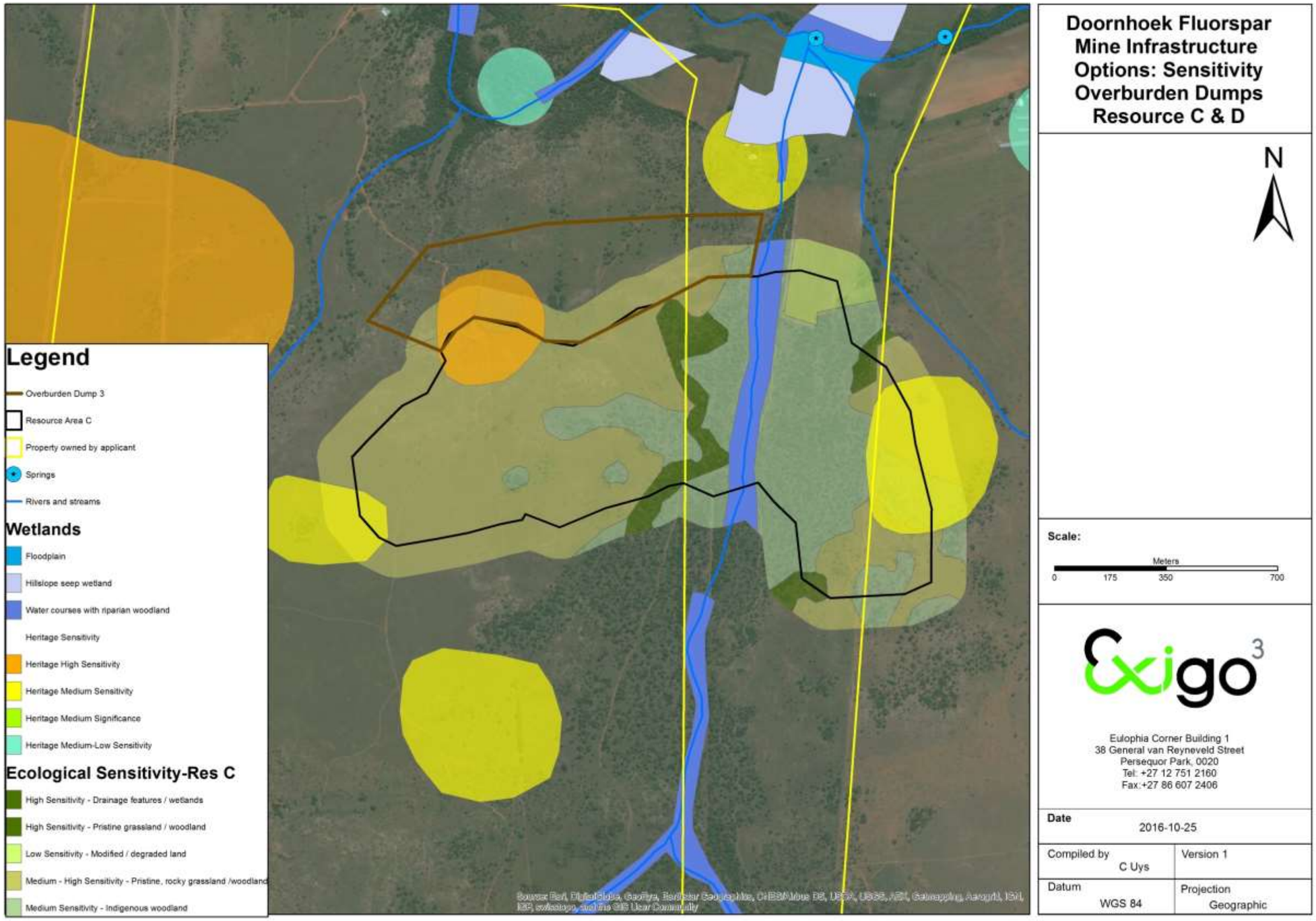


Figure 13 Overburden Dump for Resource Area C & D

8.3.4.LAYOUT AND LOCATION 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 five plant and TSF layout alternatives as well as the two overburden dump layouts for Resource Area A.

Please refer to Figure 7 to Figure 13 for the alternative layouts.

The options were rated against each other in terms of significant environmental aspects as Irrelevant/NA (0), Not preferred (1); Less Preferred (2); Suitable (3) and Most preferred (4) from an environmental impact management point of view. The descriptive key to the comparative table is included below:

Irrelevant/Not Applicable (0)
Not Preferred (1)
Less Preferred (2)
Suitable (3)
Most Preferred (4)

The weightings were determined by extracting the highest assessed impacts per aspect (With Mitigation). This approach therefor allows for the management of the highest potential impacts occurring, taking the proposed specialist mitigation measures into consideration, in other words the impacts with the highest rating post mitigation requires a larger emphasis in comparison to others. Negative impacts were used in this regard.

Table 3: Comparative alternatives assessment

Aspect	Relative Weighting	1 Site Location Alternatives				2 Layout Alternatives					3 Overburden Layout Alternatives - Resource Area A	
		Option 1	Option 2	Option 4	Option 5	Layout 1	Layout 2	Layout 3	Layout 4	Layout 4.1 - Optimized 4	Option 1	Option 2
Socio-Economic Impacts	0,086	3	3	1	4	2	2	1	4	4	4	3
Hydrogeological Impacts	0,086	1	1	3	4	3	1	1	3	4	3	2
Archaeological Impact	0,013	3	1	3	4	0	0	0	0	0	0	0
Geochemical Impacts	0,025	1	1	3	4	3	1	1	3	4	3	2
Ecological Impacts	0,126	4	1	2	3	3	1	4	3	3	4	3
Soil and landuse	0,126	3	2	4	3	3	1	3	4	3	4	3
Wetland Impacts	0,126	1	3	3	3	3	1	4	3	3	4	1
Aquatic Impacts	0,108	1	3	3	3	3	1	4	3	3	4	1
Noise Impacts	0,014	1	2	3	4	0	0	0	0	0	4	2
Air Quality Impacts	0,086	1	2	3	4	4	2	1	2	3	4	2
Visual Impacts	0,108	1	2	3	4	3	2	1	4	4	4	3
Traffic Impacts	0,094	1	2	3	4	0	0	0	0	0	0	0
Total	**Weighted Avg**	1,83	2,07	2,83	**3,51**	2,64	1,16	2,21	2,87	**2,94**	**3,46**	2,00
	Avg	1,75	1,92	2,83	**3,67**	2,25	1,00	1,67	2,42	**2,58**	**3,17**	1,83

The applied integrated assessment approach within the broader specialist team has therefore led to the following recommended options, and it should be noted that the weighted averages and standard averages correspond for all the comparisons.

With regards to the site location alternatives Option 5 has been presented as the preferred option.

With reference to the site layout alternatives the assessment proved to be in strong favour of utilizing the Option 4.1 (for both the plant and TSF), which is the optimized Option 4 with regards to the TSF.

The preferred overburden location is Alternative 1.

With specific reference to the TSF and overburden dumps, reference was made to the Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits, 2015 (GNR 632 of 24 July 2015), and regulation 6 thereof.

In terms of Regulation 6(6) of GNR 632 the competent persons who conducted work relating to mine residue that has the potential to generate leachate that could have a significant impact on the environment and groundwater are included in the Appendix 7.8: Hydrogeological Impact Assessment and Appendix 7.10: Geochemical Risk Assessment.

The above preferred alternatives will be further subjected to a definitive feasibility -and associated engineering study prior to construction.

The rest of this EIA&EMPR will focus on assessing and mitigating the impacts associated with the preferred alternatives and as presented above.

8.4. SERVICE ALTERNATIVES

8.4.1.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.

Table 4 summarises the water supply options identified, CAPEX and OPEX cost estimations as well as major advantages and disadvantages for each alternative. A water supply options analysis was conducted as part of the decision-making process for the Hydrogeological Impact Assessment.

Table 4 Water supply options analysis matrix and cost-benefit evaluation

Option no.	Water Supply Option	Absolute distance (km)	Weighed distance (km)	Average elevation (mamsl)	Differential Head	Total capital expenditure (R) (Excl. VAT)	CAPEX (R/m^3)	OPEX (R/m^3)	Advantages	Disadvantages
1	Municipal supply via Witkop Mine	15.00	20.25	1200.00	80.00	Third most expensive	Third most expensive	Third most expensive	Resource already in use and allocated.	Resource expected to be under stress and not sustainable
2	Zeerust sewage works discharge	28.00	37.80	1170.00	335.00	Most expensive	Most expensive	Most expensive	Environmental and social options.	High capital expenditure. High operational costs. High maintenance. Water treatment costs. Post closure commitment. Low assurance level.
3	Municipal groundwater supply expansion	30.00	40.50	1405.00	300.00	Second most expensive	Second most expensive	Second most expensive	Existing infrastructure to Witkop Mine.	Municipal aquifer under stress, without additional abstraction. Pipeline extension CAPEX.
4	Dolomitic aquifer	10.00	13.50	1550.00	-60.00	Least expensive	Least expensive	Least expensive	Low capital expenditure. Low operating costs.	Ownership and landowner consent.
5	Transfer existing agricultural rights	unknown	unknown	unknown	unknown	unknown	To be investigated			

From the above matrix, it is evident that groundwater will be the economical preferred option of the follow-up water exploration phase. It is proposed that water supply be sourced from groundwater in Compartment 1 and 2, and possibly Compartment 8 if sufficient water does not exist in Compartments 1 and 2.

It is recommended that further groundwater exploration be undertaken in the above compartments as per the recommendations in Appendix 7.8: Hydrogeological Impact Assessment.

The applicant understands that groundwater development may have a negative impact with regards to water supply in terms of water quantity and quality due to mining activities and water supply to the mine, and will implement mitigation measures such as monitoring to mitigate and limit any impacts in this regard. Any landowners who may be affected will be subject to compensation or purchase

agreements.

8.4.2.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.

It is proposed that energy minimization and optimization strategies are developed in further feasibility studies prior to the mine development.

8.4.3.ACCESS ALTERNATIVES

Two access alternatives were identified (refer to Figure 14 and Figure 15). The two alternatives access routes are as follows:

a) Alternative access route 1 - the alignment is via R49-D139 and D1194 to resource Area A and Resource Areas C and D.
b) Alternative access route 2 – Via Road D404 to P172-2 with a road upgrade of a section of D404.

The route alternatives were assessed comparatively against one another on the following aspects:

- Carbon footprint (i.e. distance of traveling required)
- Traffic impacts and safety
- Ecological impacts
- Wetlands impacts
- Heritage impacts
- Capital costs (i.e. amount of upgrades required)
- Stormwater Management impacts
- Regulatory requirements (such as IWUL, floodlines)

a) Route option 1's alignment is via R49-D139 and D1194 to resource Area A and Resource Areas C and D.

   From an access road point of view the preferred route from Zeerust to the mine is described in section 4.1 of the TIA. This route comprises existing SANRAL and Provincial surfaced roads and also serves as an access route to the rail siding near Jacobsdal.

   In terms of mitigation measures, it is anticipated that the implementation of a turning lane for

trucks at the turn-off to the rail siding along Road D139. Indicated at point UP1 in Figure 11 of the TIA.

The following road upgrade is proposed from a road safety point of view to accommodate loaded right-turning trucks:

- 60m right-turn lane on D139.

The advantages of route option 1 are:

- Carbon footprint (i.e. distance of traveling required) - this option is associated with the shortest distances and therefore have a lower carbon footprint during the LOM.
- Traffic impacts and safety: less traffic upgrades are required as per the TIA, shorter distance equals less safety impacts. Less use of public roads.
- Capital costs (i.e. amount of upgrades required): capital costs are an economic consideration that impact the feasibility of the project and or cost to the applicant. However not rated as an environmental impact in the assessment approach. The capital costs are the lowest for this option for this option due to fewer upgrades required.

The disadvantages of route option 2 are:

- Regulatory requirements (such as IWUL, floodlines): a large number of culverts and rerouting of drainages are required as part of this option requiring relevant authorizations.
- Wetlands and Ecological impacts: more ecological impacts.
- Larger impact on Heritage.

b) Access route 2 - Road upgrade of a section of Road D404 to P172-2

From the access at point (P7) there is a section of approximately 7,2km of gravel road to P172-2 that will require upgrading if this access is used. From a road network point of view and access to the mine we prefer that this access remain a low order access for mine use only, and that the access at point (P4) be used.

In terms of a mitigation measure, this gravel road is in bad condition and rehabilitation of the road to a proper well graded and drained gravel road is proposed to serve the access at point P7.

The advantages of route option 2 are:

- Less Wetlands and Ecological impacts.
- Less impact on Heritage.
- Regulatory requirements (such as IWUL, floodlines): a smaller number of culverts and rerouting of drainages are required as part of this option requiring less relevant authorizations.

The disadvantages of route option 2 are:

- Carbon footprint (i.e. distance of traveling required) - this option is associated with the longest distances and therefore have a larger carbon footprint during the LOM.
- Traffic impacts and safety: more traffic upgrades are required as per the TIA, longer distances equals more safety impacts. More use of public roads.
- Capital costs (i.e. amount of upgrades required): capital costs are an economic consideration that impact the feasibility of the project and or cost to the applicant. However not rated as an environmental impact in the assessment approach. The capital costs are the largest for this option for this option due to fewer upgrades required.

Table 5 Summary of the impacts associated with the route alternatives

Aspect	Avg	1 Route/Access Alternatives	
		Option 1	Option 2
Capital costs (i.e amount of upgrades required)	1,50	4	1
Stormwater Management	1,67	1	3
Ecological Impacts	1,83	2	3
Wetland Impacts	2,00	2	3
Heritage Impacts	1,17	1	3
Carbon Footprint (travelling distance)	1,33	4	1
Traffic impacts and safety	1,50	4	1
Regulatory requirements (such as IWUL, floodlines)	1,17	2	4
Total	**Weighted Avg**	30,17	29,00
	Avg	2,50	2,38

It should be noted that the two options are ranked very close to each other and it is recommended that the route options be subjected to a further road and or logistics feasibility study prior to construction.

However Option 1 is preferred and part of this application with subsequent upgrades recommended in the TIA (Appendix 7.14: Traffic Impact Assessment).

A re-alignment of the existing route option 1 is recommended subject to detailed traffic and road designs. Reconstruction will in all likelihood be required. The re-alignment of the route option 1 will result in decreased floodline impacts.

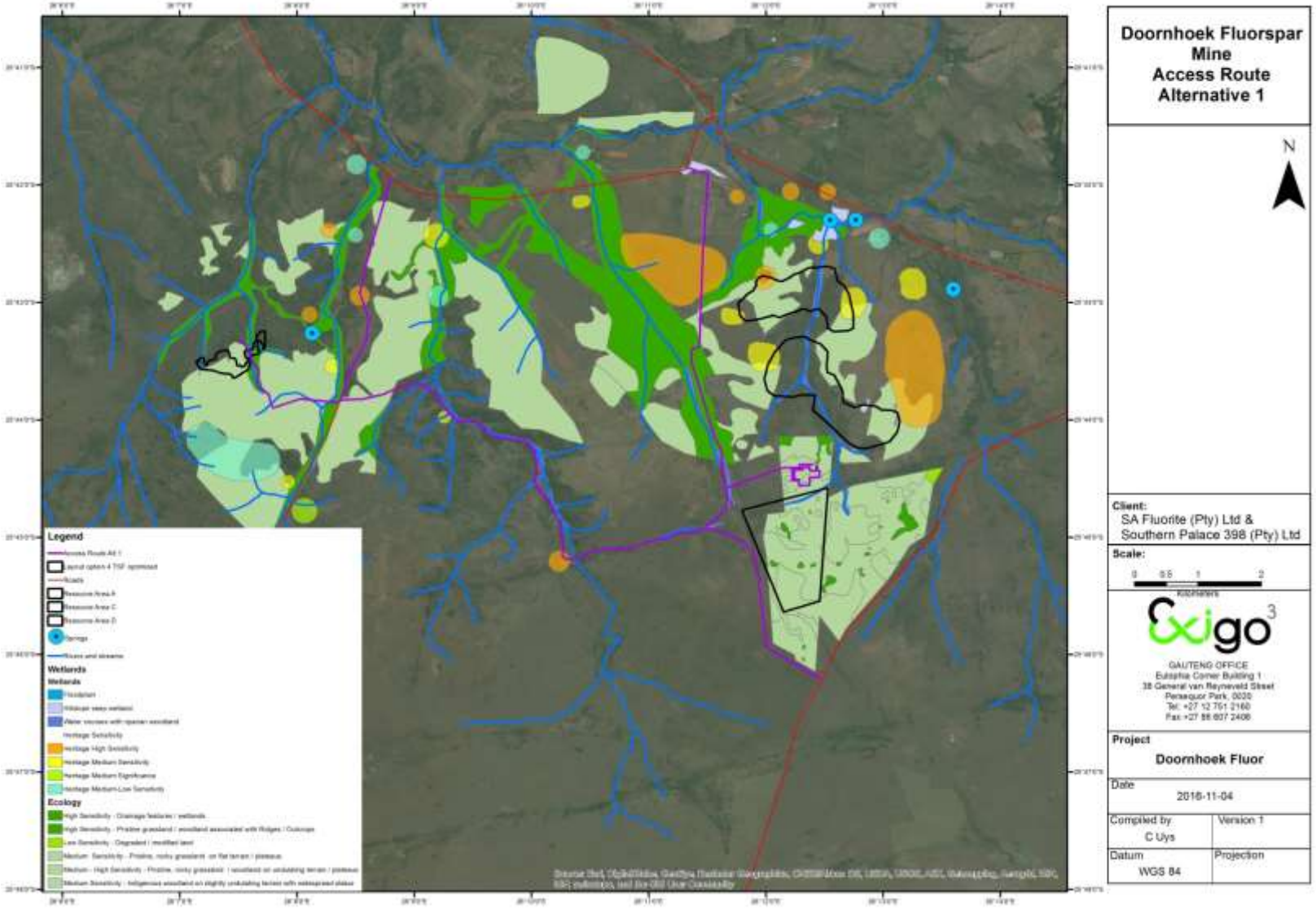


Figure 14 Access Route Alternatives 1

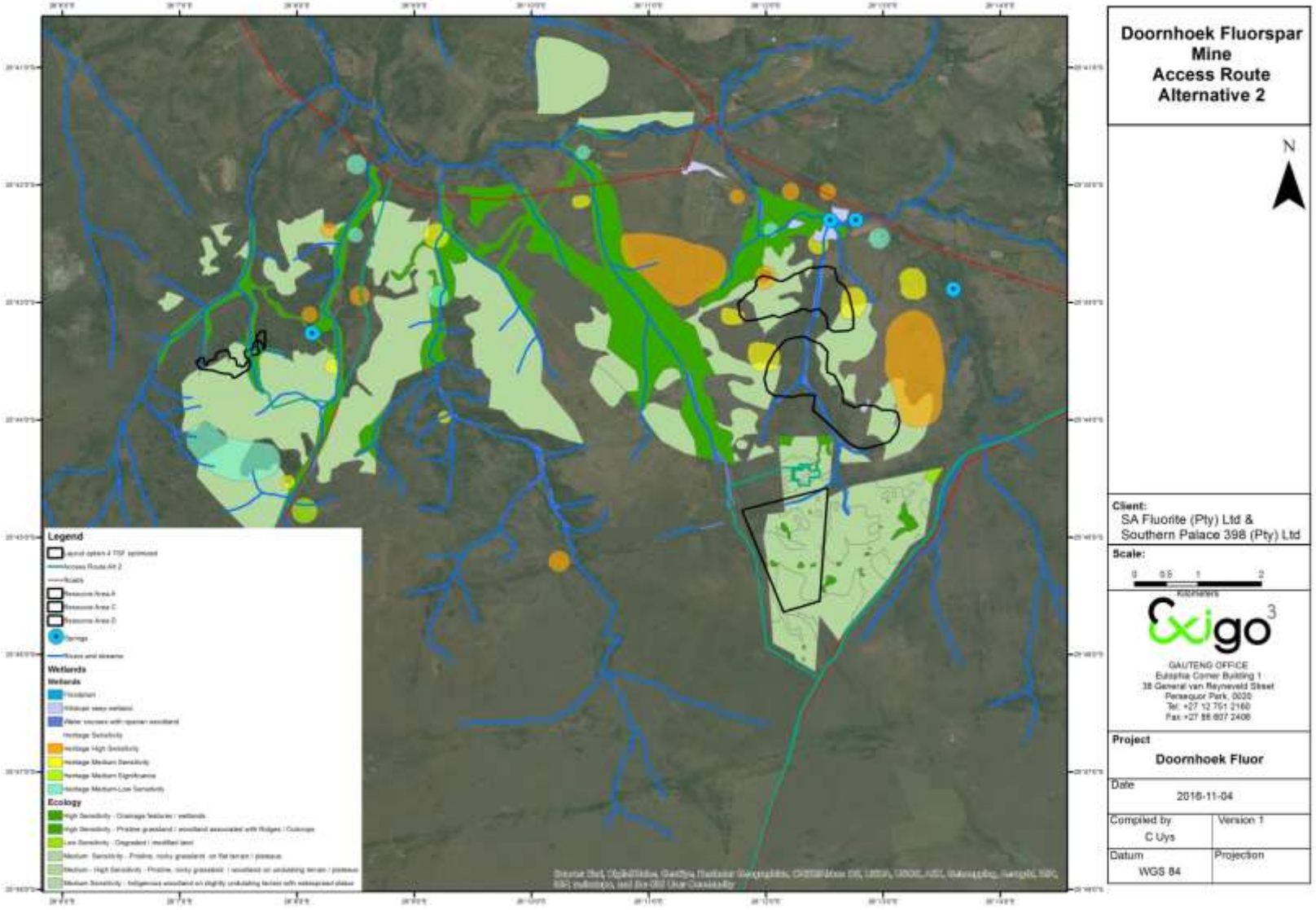


Figure 15 Access Route Alternative 2

8.4.4.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 m^3 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 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.

8.5. TECHNOLOGY ALTERNATIVES (WITH REGARDS TO TRANSPORT OF ORE AND PRODUCT)

It is foreseen that the proposed mining 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 could 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, and 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.

8.6. MINING AND DEPOSITION METHOD ALTERNATIVES

8.6.1.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 partial backfilling.

Concurrent Partial Backfilling:

Concurrent partial backfilling and rehabilitation is the preferred mining for this project. It must be noted that concurrent partial 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 overburden 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 partial 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 partial backfilling makes rehabilitation possible as soon as mining has been completed in one area.

Concurrent partial 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 partially backfilled with all the associated biophysical benefits.
- Improved Time efficiency, improved mining safety.

8.6.2.OVERBURDEN DEPOSITION ALTERNATIVES

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 a 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 be approximately 5 m above the highest point on the screened work area. Refer to Figure 16 below:

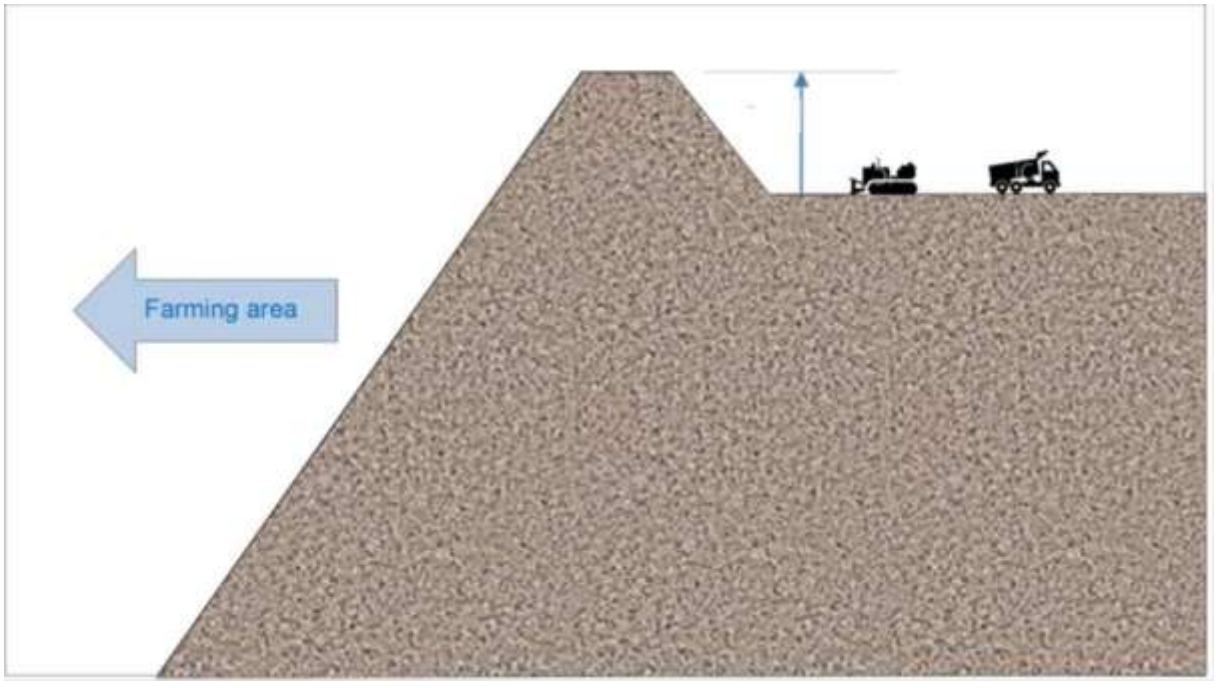


Figure 16 Outer Shell Method of Construction

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.

8.7. CONCLUSION

Table 3 serves as a summary of the risks identified for the five site location alternatives, the five 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 the optimized Alternative 4.1 (for both the plant and TSF) due to the optimization of the position of the TSF. The preferred alternative for the overburden dump is Alternative 1.

Table 5 summarises the risks identified for the two route options. It should be noted that the two options are ranked very close to each other and it is recommended that the route options be subjected to a further road and or logistics feasibility study prior to construction. However Option 1 is preferred and part of this application with subsequent upgrades recommended in the TIA (Appendix 7.14: Traffic Impact Assessment)

In terms of water supply, groundwater has been identified as the preferred option. The preferred access road alternative is Alternative Option 1. 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 EIA&EMPR will focus on assessing and presenting mitigation measures associated with the preferred site location, layout and technology alternatives stated above.

8.8. “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 has been 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

9. 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:

9.1. 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 Mahikeng 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 15th 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 held on the 28th of July 2015 was also advertised in the above advert.

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

9.3. 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;
- Witkop Fluorspar Mine;
- Mmutlwa Wa Noko Committee.

A notification with regards to the availability of the Draft Scoping Report (DSR) for public review as well as the Public Meeting held on the 28th of July 2016 was also sent to stakeholders on the 15th of July 2016.

9.4. PUBLIC MEETINGS

A Scoping Phase public meeting was held on the 28th of July 2016; 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 meeting was advertised in a local newspaper on the 15th of July 2016. An EIA Phase public meeting was held on 12 January 2017. All issues raised by the I&APs during the public meetings are included in Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers.

9.5. 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 6);
- Landowners directly adjacent to activity (refer to Table 6);
- Ngaka Modiri Molema District Municipality (NMMDM);
- Ramotshere Moiloa Local Municipality (RMLM);
- Department of Mineral Resources (DMR);
- Department of Water and Sanitation (DWS)
- Mmutlwa Wa Noko Committee.

Please refer to the meeting minutes of the above focus group meetings as well as Table 6 for more details of the key issues discussed (refer to Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers).

9.6. 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) was made available for public comment on the DSR as part of the environmental impact assessment process. The availability of the DSR was announced via advert, site notices and notification letters as specified above to all the identified potential I&AP's.

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

- Electronic copies were made available on dropbox;
- Hard copies were made available at the relevant local municipalities (RMLM and DLM) as well as the public libraries in Zeerust and Lichtenburg; and
- Hard copies and electronic copies were made available upon request.

9.6.1. FINAL SCOPING REPORT

The Draft Scoping Report (DSR) was updated after the draft review to incorporate the comments received and issues raised by I&APs. The Final Scoping Report (FSR) was submitted to the DMR on the 25th of August 2016.

9.6.2. DRAFT EIA&EMPR

This Draft EIA&EMPR was subjected to a public participation process of at least 30 days. A period of 30 days (5 December 2016 till 26 January 2017) was made available for public comment on the Draft EIA&EMPR as part of the environmental impact assessment process. The availability of the Draft EIA&EMPR was announced via notification letters as specified above to all the identified potential and registered I&APs.

In addition, the Draft EIA&EMPR was distributed for comment as follows:

- Electronic copies were made available on dropbox;
- Hard copies were made available at the relevant local municipalities (RMLM and DLM) as well as the public libraries in Zeerust and Lichtenburg; and
- Hard copies and electronic copies were made available upon request.

9.6.3. FINAL EIA&EMPR

The Final EIA&EMPR was updated following the review of the Draft EIA&EMPR, to incorporate the comments received and issues raised by I&APs. The Final EIA&EMPR was submitted to the DMR on 6 February 2017.

9.7. SUMMARY OF ISSUES RAISED BY I&APS

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

Table 6: Comments and Response Register

nterested and Affected Parties	Contact Person	Consulted	Notification/Consultation	Issues Raised	EAPs response to issues as mandated by the applicant	Consultation Status (Concluded 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) Mr Mutali Mulaudzi (Responsible Official – Environmental Department)	Y	Meeting: On 17 May 2016 a pre-application meeting was held with the Department. Please refer to Appendix 5: DMR Pre-application Meeting Documentation and 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 Documentation and Correspondence		Concluded
			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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the Department.	Refer to Appendix 5 for the correspondence received from the Department on the application and SR.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the Department.	No comment received to date.		
Department of Water & Sanitation Limpopo - North West Proto CMA (Harties-Kurperoord Office)	Lethabo Ramashala	Y	Meeting: A pre-application meeting was held on the 22nd of February 2016 with the Department. 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.	Refer to Appendix 6: DWS Pre-application meeting documentation and correspondence.		Concluded
	Rachel Mpe		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.		
	Gladness Masindi Clement Makwela Amanda Ramotshe		Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the Department.	No comment received to date.		
			Via email:	No comment received to date.		

			On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the Department.			
Department of Rural, Environment and Agricultural Development (READ), North West Province	Head Of Department	Y	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.		Concluded
	Ngaka Modiri Molema District		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.		
	Environmental Services Chief Directorate		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.		
	Obitseng Moholo Responsible official		Via hand delivery and email: On 15 July 2016 a hard copy and electronic copy of the DSR was delivered to the Department as well as a notification informing them that the DSR was available for comment and an invitation to attend the public meeting.	Via fax: On 25 July 2016 a letter was received from the Department confirming receipt of the request for comment on the Environmental Impact Assessment Process on the 15th of July 2016. The letter also informed that the request has been assigned to Ms Obitseng Moholo with the file reference number NWP/DMR/45/2016.	Via telephone: On 23 August 2013 Ms Uys contacted Ms Moholo and enquired whether she had received the hard copy of the DSR as per the Departmental letter. She provided Ms Moholo with the reference number for the project and was informed that she had received the report.	
				Via fax: On 15 September 2016 the READ submitted the following comments on the DSR: 1. The Department had no objection to the submission of the report to the DMR. 2. An ecological assessment must be conducted and the terms of reference contained in Annexure 1 must be followed, the full terms of reference must be accessed from the SANBI website. 3. The EAP must be specific when quoting listed activities, for instance, activity number 10 (i) and (ii), or both. 4. A detailed surface water and groundwater study must be conducted by a geohydrologist to indicate the extent of potential dewatering of wetlands/springs in the area. 5. 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. 6. 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, 7. In the FSR a proof of site notice and newspaper advert must be attached. 8. Mining must better contribute to the socio-economic development of the communities in the area, especially through local enterprise development and local procurement.	Via letter: On 14 November 2016 MS Uys provided the Department with a copy of the DEIA&EMPR and the following responses to the comments raised in the letter dated 15/09/2016: 1. Noted. Please note that the FSR was submitted to the DMR on 25 August 2016. 2. Noted. Please refer to the Ecological Impact Assessment in Appendix 7.4. 3. Noted. This has been rectified in Table 1 of the DEIA&EMPR. 4. Noted. Please refer to the Hydrogeological Impact Assessment in Appendix 7.8. 5. Noted. Please refer to Table 23 of the DEIA&EMPR and Appendix 7.5. 6. Noted. Please refer to Table 23 of the DEIA&EMPR and Appendix 7.4. 7. Proof of the site notices and newspaper advert was attached to the FSR submitted to the DMR. Please refer to Appendix 8.1 and 8.2 of the DEIA&EMPR. 8. Noted. Please refer to Table 19 of the EIA&EMPR and Appendix 7.1. 9. Noted. Please refer to Table 23 and Appendix 7.2. 10. Noted. Please refer to Table 23 and Appendix 7.2. 11. Noted. The DEIA&EMPR was compiles in line with the provision for Duty of Care and remediation of environmental damage contained in section 28 of the NEMA.	

				9. A careful watching brief monitoring process must be implemented whereby an informed Environmental Control Officer (ECO) must inspect the construction sites on regular basis in order to monitor possible impacts on existing and previously undetected heritage resources. 10. Should the sites be impacted on by development in any way, it must be adequately documented and sampled by means of a phase 2 specialists study and the necessary permits must be obtained from the relevant Heritage Resources Authorities. 11. The applicant is responsible for compliance with the provisions for Duty of Care and remediation of environmental damage contained in section 28 of the National Environmental Management Act, 1998 (Act 107 of 1998).		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the Department.	Via telephone: On 5 December Ms Moholo contacted Ms Uys and asked why the review period was over the holiday period.	Via email: On 5 December 2016 Ms Uys responded that the period of 15 December 2016 to 5 January 2017 has been excluded from the review period in accordance with regulation 3(2) of GNR 982 which states that for any action contemplated in terms of the EIA Regulations 2014 for which a timeframe is prescribed, the period of 15 December to 5 January must be excluded in the reckoning of days. The review period thus ends on the 26th of January 2017 in line with the above regulation. The main reason for this timeframe is the timelines imposed by the DMR on the application, which need to be complied with. She provided Ms Moholo with a notification.	
Department of Public Works and Roads North West			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.		Comments outstanding
			Via fax: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the Department.	No comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the Department.	No comment received to date.		
Department of Community Safety & Transport Management North West	Mr Oageng Mosiane (HOD)		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.		Comments outstanding
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the Department.	No comment received to date.		

Department of Finance, Economic & Enterprise Development North West			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.		
			Via fax: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the Department.	No comment received to date.		
			Via fax: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the Department.	No comment received to date.		
National Department of Agriculture, Forestry and Fisheries	Agricultural Production, Health and Food Safety Mr. R.M. Ramasodi Mr Mabule	Y	Via email: On 21 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		Concluded
			Via email: On 30 August 2016 Ms Uys contacted Mr Ramasodi and informed him that they wished to consult with him on behalf of the Department of Agriculture, Forestry and Fisheries with regards to the Doornhoek Fluorspar Mine project. She asked whether he was available for a telecon and to provide her with a suitable date and time.	Via telecom and email: On 31 August 2016 Mr Mabule and Ms Uys discussed the following points: 1. Mr Mabule informed Ms Uys that he had received her correspondence to Mr Ramasodi from his supervisor and wished to know whether a change of land use application had been submitted to the Department as this would be required should mining be planned to take place on agricultural land. 2. Ms Uys stated that a change of land use application has not yet been submitted to the Department as they were informed that the application needs to be submitted to the local municipality along with the Environmental Authorisation (EA) for the project. They were currently busy with the EIA process for the above project and the DSR was recently made available for comment of which a notification in this regard was sent to Mr Ramasodi at the Department. 3. Mr Mabule informed that the application for change of land use also needs to be submitted to the Department for comment in terms of Act 70 of 1970 as well as to the local municipality. Ms Uys confirmed that the application will be submitted to the Department following receipt of the EA. 4. Ms Uys informed Mr Mabule that they had been requested by the Department of Mineral Resources to consult with the Department of Agriculture, Forestry and Fisheries. It was agreed that a meeting with the Department be held prior to submission of the change of land use application in order to discuss the application process.		

				5. Ms Uys informed Mr Mabule that the DEIA&EMPR will be made available for comment during October/November 2016. A notification in this regard will be sent to the Department. However a hard copy or electronic copy of the report can also be submitted to the Department for comment should this be required.		
	Mr Ivan Riggs Regional Manager Land Use and Soil Management			Via email: On 31 August 2016 Mr Mabule provided feedback confirming that they had had the discussion and that Ms Uys's understanding of the outcome of the discussion is correctly captured.	Via email: On 1 September 2016 Ms Uys thanked Mr Mabule for his feedback.	
				Via telephone and email: On 1 September 2016 Mr Riggs contacted Ms Uys and requested a copy of the notification previously sent to Mr Ramasodi. He asked whether portions of the farms are included in the mining right application of the entire parent farm/	Via telephone and email: On 1 September 2016 Ms Uys provided Mr Riggs with the notification of availability of the DSR previously sent to Mr Ramasodi at the Department, as well as a list of all the farm portions included in the mining right application.	
				Via email: On 1 September 2016 Mr Riggs informed Ms Uys that the information requested was received in good order and thanked her.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the Department.	No further comments received to date.		
Department of Agriculture – North-West	Head of Communications: Agriculture Ms Bonolo Mohlakoana		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.		Comments outstanding
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the Department.	No comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the Department.	No comment received to date.		
Department of Rural Development and Land Reform (DRDLR) previously the Department of Land Affairs	Deputy Director: Ngaka Modiri Molema District (Land Reform) Ms Yolanda Folotsi	Y	Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the Department.	No comments received to date.		Comments outstanding
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to Ms Folotsi.	No comments received to date.		

			Via email: On 19 July 2016 Ms Uys informed Ms Folotsi that the following properties included to the mining right application are state owned according to the relevant title deeds. She asked whether she could confirm whether the DRDLR is the relevant Department to consult with in this regard or refer her to the correct contact person: • Portion 20 of the farm Doornhoek 305 JP • Portion 7 of the farm Kafferskraal 306 JP • Portion 19 of the farm Strydfontein 326 JP She further more asked for confirmation on whether land claims had been lodged with the Department on the following properties: • Kafferskraal 306 JP (Portion 1, 5, 24, 25, 26, 27, 29, 30) • Knoflookfontein 310 JP (Portion 1) • Rhenosterfontein 304 JP (Portion 9, 10)	No comments received to date.	
	Mr Moduku Khwene Provincial State Land Manager: North West		Via telephone and email: On 19 August 2016 Ms Uys contacted Ms Folotsi with regards to the properties in the mining right application which were state owned. Ms Folotsi confirmed that the DRDLR were the correct Department to consult in this regard as they were previously the Department of Land Affairs. She undertook to refer the matter to the responsible person in the Department. She also agreed to send the land claims query to the correct person at the Land Claims Commission.	Via email: On 19 August 2016 Ms Folotsi forwarded the request to Mr Moduku Khwene and asked his to assist Ms Uys with the mining application on state property. She also forwarded the request to Ms Lesego Rankokwadi and asked her to assist with the land claims status of the farms as provided.	Via email: On 19 August 2016 Ms Uys thanked Ms Folotsi for her assistance and asked Mr Khwene to contact her should he require any further information. She also asked Ms Rankokwadi to contact her should she require any further information and informed her that they looked forward to receiving her feedback with regards to the land claims.
				Via email: On 12 September 2016 Mr Uys followed-up with Mr Khwene and asked whether he could assist with any feedback or requirements from the Department with regards to the mining right application which include properties owned by the state. She listed the said properties, landowner and title deed number. She informed Mr Khwene that his feedback will be much appreciated and asked that he inform her should he be available for a quick telecon to discuss the matter.	No response received to date.
				Via email and telephone: On 20 September 2016 Mr Uys followed-up with Mr Khwene again and informed him that she was experiencing difficulty in reaching him on his office line. She requested his assistance with feedback or requirements from the Department with regards to the mining right application which include properties owned by the state. She listed the said properties, landowner and title deed number. She informed Mr Khwene that his feedback will be much appreciated and asked that he inform her should he be available for a quick telecon to discuss the matter.	No response received to date.

				Via email and registered letter: On the 20 September 2016 Ms Uys provided Mr Khwene with a formal letter requesting any comments, feedback or requirements with regards to the mining right application which include properties owned by the state. She informed him that they had been requested by the Department of Mineral Resources: North West to consult with the DRDLR on the above matter. She asked to be provided with feedback prior to the 29th of September 2016.	No response received to date.	
				Via email: On 27 September 2016 Ms Uys sent Mr Khwene a reminder to please provide her with feedback by the 28th of September 2016 as per the correspondence previously provided.	No response received to date.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the Department.	No comments received to date.		
Commission for Restitution of Land Rights: North West	Ms Lesego Rankokwadi DRDLR: Land Claims Doni Mosimanekgosi Agnes Montwedi Keabetswe Mothupi Norah Lebogang Lethuli Tebogo Johannes Letsoalo	Y		Via email: On 19 August 2016 Ms Rankokwadi forwarded the matter to the relevant person, Mr Doni Mosimanekgosi who dealt with land claims enquiries and asked him to process the inquiry.	Via email: On 22 August 2016 Ms Uys thanked Ms Rankokwadi for her assistance. She asked Mr Mosimanekgosi to inform her should he require any further information.	Concluded
				Via email: On 22 August 2016 Mr Mosimanekgosi informed Ms Uys that her enquiry was received only on the 22nd of August 2016 from Ms Lesego Rankokwadi, due to network problems. However, she will receive the formal acknowledgement letter from Agnes Montwedi or Keabetswe Mothupi shortly. He further stated that the formal response letter indicating whether or not there is a claim on the said properties will be send to her within the next 7 working days.	Via email: On 23 August 2016 Ms Uys thanked Mr Mosimanekgosi for the feedback and stated that they will await the formal acknowledgement letter and the formal response letter from the Department as per the correspondence received.	
				Via email: On 23 August 2016 the Department acknowledged receipt of the request with regard to land claims for the relevant properties and informed Ms Uys that a formal response could be expected within 7 working days.	Via email: On 9 September Ms Uys followed-up with Mr Mosimanekgosi and Ms Montwedi. She informed them that they had received the formal acknowledgement letter from Ms Agnes Montwedi on the 23rd of August 2016, but were still awaiting the formal response letter indicating whether or not there is a claim on the properties provided. She attached the property list once again and requested feedback in this regard.	
				Via email: On 9 September 2016 Mr Mosimanekgosi responded to state that he will establish why the formal response letter hasn't yet been sent and will provide feedback.	Via email: On 9 September Ms Uys thanked Mr Mosimanekgosi for his prompt response. She once again followed-up with him on the 12th of September to request feedback as the applicant was concerned in light of the DMR timeline constraints imposed on him.	
				Via email:	Via email:	

				On 12 September 2016 Ms Montwedi informed Ms Uys that Ms Keabetswe Mothupi is attending to the matter and hopefully the response will be forwarded to before end business day.	On 12 September 2016 Ms Uys thanked Ms Montwedi for the prompt feedback and stated that they will wait for the formal letter from Ms Mothupi.	
				Via email: On 14 and 15 September 2016 Ms Montwedi provided Ms Uys with the formal response letter. According the Departmental database of claims lodged prior to the 31st of December 1998, no land claims have been lodged on the properties as supplied in the formal response letter. The Department did however note that there might be a possibility of a claim being lodged against a property due to the ongoing new lodgement process which commenced on 1 July 2014 and ends on the 30th of June 2019. Please refer to Appendix 8.5 I&AP Correspondence.	Via email: On 15 September 2016 Ms Uys confirmed receipt of the Departmental correspondence provided with regards to the land claims enquiry. She informed her that the letter does not include all the properties as previously provided to Ms Yolanda Folotsi. She provided her with the correspondence and property list in the regard. Ms Uys requested that the land claims status of the remaining properties also be confirmed and provided Ms Montwedi with a list of the properties.	
				Via email: On 19 September 2016 the Department acknowledged receipt of the request with regards to status of land claims for the additional properties and informed Ms Uys that a formal response could be expected within 7 working days.	Via email: On 19 September 2016 Ms uys thanked Ms Mothupi for the Departmental acknowledgement, and informed her that they looked forward to receiving the Department's formal response.	
				Via email: On 3 October 2016 Ms Montwedi provided Ms Uys with the formal response letter. According to the Departmental database of claims lodged prior to the 31st of December 1998, no land claims have been lodged on the properties as supplied in the formal response letter. Please refer to Appendix 8.5 I&AP Correspondence	Via email: On 3 October 2016 Ms Uys thanked Ms Montwedi for the formal response and her assistance.	
			Via email: On 5 December a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the Department.	Via email: On 6 December 2016 the Department acknowledged receipt of the notification letter and informed Ms Uys that a formal response could be expected within 7 working days.	Via email: On 9 December 2016 Ms Uys thanked Ms Lethuli for the acknowledgement letter and informed her that they have already received formal response letters from the Department with regards to land claims on the properties in question. She attached the relevant correspondence. She stated that they looked forward to receiving comments from the Department on the report.	
				Via email: On 13 December 2016 Mr Letsoalo provided Ms Uys with the formal response letter stating that according to the Departmental database of claims lodged prior to the 31st of December 1998, and between 1 July 2014 and 27 July 2016, no land claims have been lodged on the properties as supplied in the formal response letter. Please refer to Appendix 8.5 I&AP Correspondence.	**Noted. No further comments received to date.**	
Local Authorities						
Ngaka Modiri Molema District Municipality	Michelle van Rooyen (PA to Acting Municipal Manager)	Y	Via email: On 8 June 2016 a notification inviting	No comment received to date.		Concluded

(NMMDM)			I&AP's to register on the project was sent to the NMMDM.			
	Tebogo Mpa IDP		Meeting: On 9 June 2016 a focus group meeting was held with the municipality. Please refer to Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers.	Refer to Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers.		
	Collen Mbengo Townplanning		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.	Via email: On 11 July 2016 Mr Mbengo commented on the meeting minutes. He reiterated that the following documentation be made available once it becomes available: 1. The company's technical competency report 2. The Prospecting Rights report once the process is complete. He stated that should the public participation processes be carried out correctly, the project will: 3. Attract more Foreign Direct Investment (FDI) in the area and assist the municipality to expand the rolling out of essential infrastructure to the surrounding impoverished community. 4. Generate jobs especially for the people with limited skills. 5. If it goes off the ground, the mine will definitely generate revenue for the Municipality. 6. Procurement by the mining company once it's up and running should primarily be focused on the local SMME's. Mr Mbengo stated that he trusted and hoped for the successful implementation of the project, and that the applicant's mining plan will make more beneficial use of the mineral resources of the area and empower the locals.	Via email: On 15 July Ms Uys thanked Mr Mbengo for his comments and provided the following response: 1. The report will be provided once it becomes available. 2. The report will be provided once it becomes available. 3. Noted. Please refer to the Socio-economic Report in Appendix 7.1 for further economic benefits. 4. Noted. Please refer to the Socio-economic Report in Appendix 7.1 for further social benefits. 5. Noted. Please refer to the Socio-economic Report in Appendix 7.1 for further economic benefits. 6. Noted. Please refer to the Socio-economic Report in Appendix 7.1 for further economic benefits. Ms Uys provided Mr Mbengo with a notification with regards to the availability of the DSR for review.	
	Gift Ditsele Thabang Ramorei Morena Mofokeng		Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the NMMDM.	No further comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the NMMDM.	No comment received to date.		
Ditsobotla Local Municipality (DLM)	Municipal Manager Gorataone Moiloa (PA to MM) Mavis Matladi (PA to MM) Mr Israel Motlhabane (LED Director)	Y	Via email & sms: On 8 June 2016 a notification 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)**	No comment received to date.		Comments outstanding
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the DLM.	No comment received to date.		

			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the DLM.	No comment received to date.		
			Via email: On 7 December 2016 Ms Uys once again requested a focus group meeting with the municipal manager for the DLM to discuss the project. She asked if Ms Moiloa could please confirm the availability of the Acting Municipal Manager for such a meeting.	No response received to date.		
Ramotshere Moiloa Local Municipality (RMLM)	Suping Selau	Y	Meeting: On 11 April 2016 a focus group meeting was held with the municipality. Please refer to Appendix 8.4: Public Meeting and 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 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers.		Concluded
	Cedric Mtileni (MM's Office) Berlinda Seabi Difference Mokgalagadi Julie Amods (LED) Donald Modibersone Graham Johnson		Meeting: On 8 June 2016 a follow-up focus group meeting was held with the municipality. Please refer to Appendix 8.4: Public Meeting and 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.	**No further comment received to date.**		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the RMLM.	No comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the RMLM.	No comment received to date.		
Ward Councillor – RMLM Ward 19	Councillor PM Motang		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.		Comments outstanding
			Via sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the councillor.	No comment received to date.		
			Via sms:	No comment received to date.		

			On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the councillor.			
Ward Councillor – DLM Ward 14	Councillor Moheta Buti		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.		Comments outstanding
			Via fax: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the councillor	No comment received to date.		
			Via fax: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the councillor.	No comment received to date.		
South African Heritage Resources Agency: North West	Submission on SAHRA website Ms Natasha Higgit	Y	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.		Concluded
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the SAHRA.	Refer to correspondence below with NWPHRA.		
				Via email: On 2 September 2016 Ms Higgit thanked Ms Uys for notifying SAHRA of the proposed development. She informed her that cases left in the DRAFT status do not get processed, and that the applicant must ensure that once all relevant documents are uploaded to the case file, the status must be changed to SUBMITTED as explained at the end of the case application, so that it may reflect on the case officer's dashboard for processing. She stated that the DSR refers to several appendices (1-10) and that SAHRA requires all documents pertaining to an application in order for an informed comment to be issued. She requested that all the appendices be uploaded to the additional documents section of the case application. She also requested that the location of the proposed development be added to the case application. She asked that a .kml file of the location of the proposed development is uploaded as soon as possible for the case to be fully compliant. She asked to be notified once all the documentation has been uploaded and stated that she would endeavour to issue a comment before close of business, if not, by Thursday, as she will be on site following week Monday to Wednesday	Via email: On 5 September 2016 Ms Uys thanked Ms Higgit for her correspondence and instruction. She informed her that they were still in the Scoping Phase of the project and the DEIA&EMPR as well as the Archaeological Impact Assessment and Palaeontological Impact Assessment Reports will only be uploaded to SAHRIS during October/November 2016. She confirmed that the will update the status of the case file to ''submitted'' thereafter. She further informed her that all the appendices to the DSR have been uploaded to SAHRIS as requested, as well as a kml file of the location of the proposed development. She informed her that her comments will be included and addressed in the Comment and Response Register which will be made available for comment along with the DEIA&EMPR. **No further comment received to date.**	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the SAHRA.	Via email: On 6 December 2016 Ms Higgit thanked Ms Uys for notifying SAHRA of the proposed development. She noted that SAHRA does not accept emailed, posted, hardcopy or website links as official submissions and	Via email: On 8 December 2016 Ms Uys informed Ms Higgit that the relevant documents have been uploaded to SAHRIS and provided her with the case number.	

				asked that a case be created on the South African Heritage Resources Information System (SAHRIS) and all documents be uploaded to the case application. She asked to be informed when this has been completed and be provided with the Case ID Number.		
				Via email: On 11 January 2017 Ms Higgit informed Ms Uys that an interim comment had been issued on the SAHRIS case as follows: The Environmental Impact Assessment and all appendices must be submitted to the SAHRIS Case file so that an informed comment can be issued. Should you have any further queries, please contact the designated official using the case number quoted above in the case header.	Via email: On 3 February 2017 Ms Uys informed Ms Higgit that the Archaeological Impact Assessment and Palaeontological Report was uploaded to SAHRIS on the 8th of December 2016. The DEIA&EMPR and relevant appendices were uploaded at the same time however the upload seems to have failed. The FEIA&EMPR has however been subsequently uploaded to SAHRIS. All comments received from SAHRA will be directly submitted to the DMR.	
North West Provincial Heritage Resources Authority (NWPHRA)	Mr Mosiane Mothlabane	Y	Via email: On 21 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the authority.	No comment received to date.		Concluded
			Via email: On 30 August 2016 Ms Uys contacted Mr Mothlabane and informed him that they wished to consult with him on behalf of the North West PHRA with regards to the Doornhoek Fluorspar Mine project. She asked whether he was available for a telecon and to provide her with a suitable date and time.	Via telecon and email: On 1 September 2016 the following points were discussed between Mr Mothlabane and Ms Uys: 1. Ms Uys informed Mr Mothlabane that she wished to consult with him on behalf of the Provincial Heritage Resource Agency for North West. She also requested the process to be followed in order to obtain comments from the Department on the above project. 2. Mr Mothlabane informed that the responsible case officer for mining developments in the North West Province is Natasha Higgit from SAHRA. 3. Mr Mothlabane requested that all reports be uploaded to the SAHRIS website in order for SAHRA to provide comment on the project. 4. Ms Uys informed Mr Mothlablane that the DSR was previously uploaded to SAHRIS. The DEIA&EMPR will be uploaded to SAHRIS during October/November 2016. A notification in this regard will be sent to both Mr Mothlabane and Ms Higgit.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the authority.	No comment received to date.		
SANRAL	Northern Region		Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the SANRAL.	No comment received to date.		Comments outstanding
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the SANRAL.	No comment received to date.		

			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the SANRAL.	No comment received to date.		
Eskom			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.		Comments outstanding
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to Eskom.	No comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to Eskom.	No comment received to date.		
Other NGO's, Conservancies, Resident's Associations etc.						
Molemane Eye Nature Reserve	Reserve Manager: Mr. MA Dinale (Dionne) Park Administration		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.		Comments outstanding
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Molopo Eye Private Game Reserve	Park Manager: Dionne Dinale		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.		Comments outstanding
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via email:	No comment received to date.		

			On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.			
AfriForum	Chairperson: Marcus Pawson Admin officer: Angie du Preez	Y	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.		Comments outstanding
			Via email: On 9 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.			
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
	Hendrik Oosthuizen	Y	Via email: On 20 July 2016 Ms Uys invited Mr Pawson to a focus group meeting to introduce the project and to discuss any possible issues. She informed him that they were available to meet om the 28th of July 2016.	Via email: On 20 July 2016 Mr Pawson suggested that the meeting be held with Hendrik Oosthuizen who is the coordinator for AfriForum in the area.	Via email On 20 July 2016 Ms Uys informed Mr Oosthuizen that they were at the start of the EIA and formal public participation process and wished to consult. She informed him that the DSR was currently available for comment and provided him with the relevant notification. She also invited him to a focus group meeting to introduce the project and to discuss any possible issues. She informed him that they were available to meet om the 28th of July 2016 as they were in Zeerust on that day.	Concluded
				Via email: On 25 July 2016 Mr Oosthuizen informed Ms Uys that he was unfortunately busy on that day and would gladly have met with them. He asked to be kept up to date with the progress.	Via email: On 25 July 2016 Ms Uys thanked him for the feedback and informed him that they would correspond with him throughout the process and provided him with information as the reports became available for review and comment. She informed him that the DSR was currently available for comment and provided him with the relevant notification. She requested that he contact her should he have any questions or comments. **No further comment received to date.**	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
North West Farmers Union			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.		Comments outstanding
			Via fax: On 15 July 2016 a notification with regards	No comment received to date.		

			to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.			
			Via fax: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
AGRI North West		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.		Comments outstanding
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Directly Affected Land Owners (Surface Right Owners)						
Kafferskraal 306 JP Ptn 1,5,10,29	Mondialeshelf Holdings (Pty) Ltd Mr Sandow Rossouw Shaun (Foreman)	Y	On 23 February a consultation meeting was held 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 place via Portion 6 and 7 of Knoflookfontein. 3. Source of water supply.	1. Noted 2. Noted. 3. A water supply options analysis study has been conducted and water supply options to be investigated have been included in the DEIA&EMPR which will be made available to I&AP's for comment.	Concluded
			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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Kafferskraal 306 JP Ptn 26, 27	Blue Anvil Holding (Pty) Ltd Mr Sandow Rossouw	Y	On 23 February a consultation meeting was held between the applicant and Mr	Mr Sandow registered as an I&AP on the project and raised the following concerns during the consultation		Concluded

	Shaun (Foreman)		Sandow.	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 has been conducted and water supply options to be investigated have been included in the DEIA&EMPR 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 comment received to date.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Kafferskraal 306 JP Ptn 24,25,30	ENRC/SOUTHERN PALACE (PTY) LTD (applicant)					
Knoflookfontein 310 JP Ptn 1	Fatima Green	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 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.	1. Impact relating to waste water have been assessed in the Hydrogeological Impact Assessment study. 2. See above comment. 3. Impacts relating to blasting have been assessed in the Blasting and Vibration study being undertaken for the project. 4. Socio-economic impacts have been assessed in Socio-Economic Impact Assessment study. 5. Impacts have been assessed in Ecological Impact Assessment study. 6. See comment on socio-economic impacts. 7. Impacts have been assessed in Air Quality Impact Assessment study. 8. See comment on socio-economic impacts. 9. To be negotiated with applicant after granting of authorisations. 10. Impacts have been assessed in Archaeological Impact Assessment study. 11. Existing roads have been used as far as possible. Roads have been upgraded accordingly. 12. Impact have been assessed in Traffic Impact Assessment study. 13. Noted.	Concluded
			Via registered post:	No further comment received to date.		

			On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.			
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Rhenosterfontein 304 JP Ptn 9,10	Hendrik Andreas Jacobus Grobler Tannie Marthie v/d Heever	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.		Comments outstanding.
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via registered post & sms: : On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Directly Adjacent Land Owners (Surface Right Owners)						
Knoflookfontein 310 JP Ptn 3	Hannes Mouton Elize Booysen Ester Mouton	Y	On 2 March 2016 a consultation meeting was held between Ms Elize Booysen and Ms Ester Mouton and the applicant.	Ms Booysen and Ms Mouton raised the following concerns during the consultation meeting: 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.	1. Water use and pollution impact have been assessed in the Hydrogeological Impact Assessment study and Water Supply Options Analysis study which are has been undertaken as part of the EIA process. 2. Noted.	Concluded
			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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Knoflookfontein 310 JP Ptn 6, 7	PC Boshoff Belegging CC Petrus Boshoff	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	No comment received to date.		Concluded

			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.			
			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.		
			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.	No comment received to date.		
			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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via sms: On 3 October 2016 the applicant sent an sms to Mr Boshoff requesting suitable date and time for a meeting to discuss the mining activities planned for the area with him,	Via telephone:" On 17 October 2016 Ms Uys phoned Mr Boshoff and requested a focus group meeting with him for the week thereafter. On 20 October 2016 Ms Uys phoned Mr Boshoff and provided him with two dates for the proposed meeting. On 24 October 2016 Ms Uys phoned Mr Boshoff to confirm a meeting date.	Mr Boshoff requested that Ms Uys phone him the following Monday. Mr Boshoff requested that Ms Uys phone again the following Monday. Mr Boshoff agreed to a meeting on the 25th of October 2016 at 08:00 am at his offices in Groot Marico.	
				A meeting was held between Mr Boshoff and the applicant on the 25th of October 2016. Mr Boshoff requested the location of the mine in relations to his property and when mining would start. The location of the mine was provided and it was explained that it could take up to years to obtain governmental approval whereafter the first 5 years will be construction of roads, etc. Mr Boshoff would only likely be affected in approximately 10 years' time. It was disclosed to him that water might be affected in future however the affected farmer will be compensated or provided with water. Boshoff raised	1. It is planned for labour to the mine to be housed in an established area in the town of Zeerust. Socio-economic impacts from informal housing developments are further discussed in the DEIA&EMPR. 2. Water usage impacts are assessed in Appendix 7.8: Hydrogeological Impact Assessment.	

				the following concerns during the meeting: 1. Squatters/townships on the farms close to the mine. Prefers workers be transported with busses from town. 2. Water usage Mr Boshoff did not express any other concerns with regards to the mining operations.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Kafferskraal 306 JP Ptn 8,9	ENRCENRC/SOUTHERN PALACE (PTY) LTD (applicant) Occupier: Loek van den Heever	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. 2. All projections were explained and understood. 3. The company committed to address all issues as and when they arise.	1. Noted. 2. Noted. 3. Noted.	Concluded
			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 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	1. Noted. 2. Noted. 3. Noted. 4. Noted. 5. Noted. 6. Noted. 7. This information has been provided in the DEIA&EMPR which will be made available to the public for comment. A water supply options analysis study has been conducted and water supply options to be investigated have been included in the DEIA&EMPR.	

				supply options.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Kafferskraal 306 JP Ptn RE	Paul Stephanus Snyman & E Scheepers	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 sourced 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 an established area in the town of Zeerust. 2. Socio-economic impacts relating to influx of people have been assessed in the Socio-economic study currently being conducted for the project. 3. Impacts relating to groundwater have been assessed in the Hydrogeological Impact Assessment study. 4. Socio-economic impacts have been assessed in the Socio-economic study. 5. Noted. Socio-economic impacts have been assessed in the Socio-economic study. 6. Socio-economic impacts have been assessed in the Socio-economic study. 7. Socio-economic impacts have been assessed in the Socio-economic study. 8. Noted. A heritage impact assessment study is has been undertaken for the project as part of the EIA process.	Concluded
			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.		
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post &sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Via email: On 8 December 2016 Ms Scheepers asked to receive the notification in Afrikaans.	Via email: On 8 December 2016 Ms Uys informed Ms Scheepers that they notification is translated in Afrikaans from page 5 and asked to be let know if she has any further questions.	
				Via email: On 8 December 2016 Ms Scheepers thanked Ms Uys.	No further comments received to date.	
Kafferskraal 306 JP Ptn 4,6	Mondialeshelf Holdings (Pty) Ltd Mr Sandow Rossouw Shaun (Foreman)	Y	Via email: On 8 June 2016 a notification inviting I&AP's to register on the project was sent	Refer to previous consultation noted above.		

			to the stakeholder.			
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Kafferskraal 306 JP Ptn 14	Frederik Jacobus Thorne (previously Hendrina Johanna Steyn)					No contact details currently available.
Kafferskraal 306 JP Ptn 12,28	Blue Anvil Holding (Pty) Ltd Mr Sandow Rossouw Shaun (Foreman)	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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Paardeplaats 296 JP Ptn 31 Saamgevoeg 320 JP RE	FSM Trust Frans & Wim Mouton	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. 3. Labour.	1. Water related impacts have been determined by the relevant specialist studies. 2. Air Quality related impacts have been determined by the relevant specialist studies. 3. Socio-economic impacts relating to the sourcing of labour for the mine have been assessed in the socio-economic study which is currently being conducted as part of the EIA process.	Concluded
			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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the	No further comment received to date.		

			DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.			
Knoflookfontein 310 JP Ptn RE	Martha Margaretha van der Walt **Recently sold to Petrus Boshoff**	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.		
			Via sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Knoflookfontein 310 JP Ptn 2	Elize Booysen Ester Mouton	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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Knoflookfontein 310 JP Ptn 4	Hannes Mouton Elize Booysen Ester Mouton	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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Knoflookfontein 310 JP Ptn 5	Ramapitsi Family Trust Aaron Machewane	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.	Concluded
			Via sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		

Rhenosterfontein 304 JP Ptn 2,5,17,25	Mr Hendrik Andreas Jacobus Grobler Tannie Marthie v/d Heever	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.		
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Rhenosterfontein 304 JP Ptn 6	Witkop Fluorspar Mine (Pty) Ltd Hendrik Hanekom	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.	Concluded
			Via sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Rhenosterfontein 304 JP Ptn 15	Hendrina Carolina Barnard (now Van Niekerk)		Via telephone: On 21 & 22 November 2016 Ms Uys attempted to contact Ms Van Niekerk telephonically. The cellphone number provided on the Windeed system was however not for Ms Niekerk. There was no answer at the landline provided and the other landline was for a school where a Ms Anita Van Niekerk is employed. It is unclear whether this is one and the same person. Via registered post: On 22 November 2016 a notification letter was sent to Ms Van Niekerk.	No comment received to date.		Comments outstanding
			Via registered post: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Witrand 325 JP Ptn 2	Klipveld Minerale (Pty) Ltd Jacobus Philipus De Ridder Anna Catherina Jacoba de Ridder		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.		Comments outstanding
			Via registered post: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to	No comment received to date.		

			the stakeholder.			
			Via registered post: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Strydfontein 326 JP Ptn 2	Christel Boerdery (Pty) Ltd Harry Du Preez		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.		Comments outstanding
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Other Land Owners within Mining Right Area (Surface Right Owners)						
Doornhoek 305 JP Ptn 3,7	Wanda Arabella Hamburg Monica Lombard					No contact details currently available.
Doornhoek 305 JP Ptn 10,28	Hendrik Josifus Enslin Hennie Enslin Danette	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.	Concluded
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Doornhoek 305 JP Ptn 4	Johannes Hendrik & Catharina Susanna Snyman Gerhard Snyman	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 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.	1. Noted. 2. Noted. 3. Noted. A Heritage Impact Assessment study is has been undertaken as part of the EIA process for the proposed mine.	Concluded
			Via registered post & sms: On 8 June 2016 a notification inviting I&AP's to register on the project was sent	No further comment received to date.		

			to the stakeholder.			
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Doornhoek 305 JP Ptn 5,RE(6),13,14,24,27 Kwaggafontein 297 JP Ptn 5	Gert Johannes Grobler Johan Grobler Jnr	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.	No comment received to date.		Concluded
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Via email: On 7 November 2016 Mr Grobler submitted the following comments to Ms Uys: 1. Due to personal reasons he was unable to attend the meetings. 2. He farms on Doornhoek 305 JP Portions 5, RE(6), 13, 14, 24 and 27 as well as Kwaggafontein 297 JP Portion 5. 3. His main concern is tourism. The farm is a game farm since 1993 and the land has been in possession of the Grobler family for more than 50 years. Mr Grobler is a 5th generation Grobler who is farming on the farms and hopefully his son, a 6th generation Grobler, will inherit the land. The farm has extreme sentimental value. 4. Mr Grobler expressed concern that he would suffer economical loss due to the mine in the area. He stated that no one who wants to break away for a peaceful weekend in the bush want to see mine activities with the noise, heavy vehicles driving up and down, potential crime and squatters in the area once the mine starts. The value of the property will decrease substantially. No one wants to live or run a game farm next to a mine. The mine will result in a loss of tourists as no one would wish to rest or hunt there. He wished to know how he will be compensated for his economic losses. 5. He noted that his property has many historical Matabele krale with iron smelting where spears were made. His family cemetery is also located on the farm. 6. They farmed in a water scarce area and he was afraid that his water will be influenced, There were wetlands on the farm which his father has been trying to protect for the last 40 years, to such an extent that wetland grasses and animal species have returned, The Klein Marico River flows through their property and 2 perennial fountains on the farm which were very sensitive to droughts. 7. He wished to be provided with reasons why the mine will benefit him. He stated that the Grobler	Via email: On 8 November 2016 Mr Uys thanked Mr Grobler for his comments and informed him that his comments will be included and addressed in the Comments and Response Report which will be made available for review along with the DEIA&EMPR, and of which he will be notified of in advance. She responded to his comments as follows: 1. Noted. Rest assured that the importance of your comments was in no way disadvantaged due to your inability to attend the first meeting. Written comments and comments in person carry equal weight in the process. Another public meeting will be held during the EIA Phase of which you will be informed of in advance. 2. Noted. 3. Socio-economic impacts relating to tourism and the loss thereof is assessed in Appendix 7.1: Socio-Economic Impact Assessment 4. Economical losses are assessed in Appendix 7.1: Socio-Economic Impact Assessment. The applicant aims to purchase all affected land and a surrounding buffer zone. In the case where land cannot be bought, three options are planned, namely: • Property leasing • Alternative locations to mine the minerals given that resource is expansive • Gain access to underground resources from adjoining properties 5. An Archaeological Impact Assessment has been conducted to document the heritage resources in the area and to assess the impacts on any heritage resources. The layout has been adjusted accordingly. Refer to Appendix 7.2:	

				family has fought hard to make a living over the past 150+ years and were not prepared to lose everything now due to a mine starting in the area.	Archaeological Impact Assessment. 6. Impact on groundwater and surface water resources, such as the Klein Marico River was assessed in Appendix 7.8: Hydrogeological Impact Assessment. Impacts on wetland were also assessed in Appendix 7.6: Wetland Impact Assessment and mitigation measures provided in the above mentioned reports. 7. Benefits of the mine to the local community are included in Appendix 7.1: Socio-Economic Impact Assessment.	
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Doornhoek 305 JP Ptn 8,32,29 Kwaggafontein 297 JP Ptn 7	Frans Markram & Juliana Elizabeth Markram	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.	Concluded
			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.		
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Doornhoek 305 JP Ptn 9	Emily Jacoba Swart Nicolaas Swart	Y	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.		Concluded
			Via registered post: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Via email: On 14 January 2017 Mr Swart contacted Ms Uys and informed her that he is the new owner of a portion of the Farm Doornhoek 305 JP in the Zeerust district and was not aware of the application from Doornhoek Fluorspar Mine to apply for mining rights that will include hiw newly owned property. He only heard	Via email: On 16 January 2017 Ms Uys thanked Mr Swart for his comments and informed him that he has been registered as an I&AP on the project. She informed him that his comments will also be included in the FEIA&EMPR) which will be submitted to the DMR for decision-making.	

					about the public meeting from a neighboring farm in early January 2017. He had representatives (Mr A J van Staden and Mrs E A S van Staden) attend the public hearing on the 12th January 2017 at 18:00 at the Ramotshere Moiloa Local Municipality hall on his behalf as he could not attend himself on such short notice as he is based in Johannesburg. He raised the follow concerns with regards to the public meeting held: 1. The meeting setup was very poor and unhelpful to the public as the presentation was not presented clearly. The projector was dark, unreadable and unclear. 2. The facilitator were ask numerous times through the presentation to speak up as the participants could not hear him while he was reading through the presentation. 3. Due to the fact that the presented presentation was so unclear, there were only 2 copies of the presentation printed out on paper and it was sent through the audience to try and understand what the facilitator was speaking about in the front. (Participants could not understand or hear the explanations.) 4. The facilitator did not stop during the presentation to take questions from the public participants and when a question was raised during the presentation it was not answered and according to them just noted (Clearly a public hearing/meeting is there to answer and explain to the participants what is unclear, that was not happening in this case). He also gave the following questions and concerns which he wished to raise as an I&AP that have property within the allocated area of application for mining rights. Mr Swart stated that he is in the process of setting up his property as a Game Farm to breed with rare and endangered small game species. 1. What will be the impact on the underground water tables be, as we currently have water at about 30 to 45 meter underground? What will be done to prevent my property from being impacted with shifting underwater tables? 2. We are also using this underground water sources for personal drinking water and this can be impacted and polluted? The runoff water from mining areas is usually very acidic and therefore aquatic lives, vegetation, animals and human beings are threatened by this. 3. I have the Klein Marico river running through my property and what will be the impact on the water flow as the rivers water is originating from a spring and nearby copies also within your mining	She requested that he confirm which portion of the farm Doornhoek 305 JP he is the owner of. On 19 January 2017 Ms Uys provided him with latest notification letter with regards to the availability of the DEIA&EMPR. She informed him that the report is available for comment until the 26th of January 2017 and that notification letters were sent to Ms Emily Jacoba Swart, the registered owner of Portion 9 of Doornhoek 305 JP, according to the Windeed titledeed search. Refer to Table 6 of the DEIA&EMPR. She provided him with the following response: With regards to your comments on the public meeting: 1. We apologized a number of times at the meeting for the problem with the presentation due to the sun setting later in Zeerust and the subsequent glare through the top windows of the town hall causing the presentation to be dark and hard to read. As soon as the sun set, this problem was rectified and the presenter went back to the slides which had been unclear and presented them to the attendees again. The attendees were informed that the presentation will be circulated with the meeting minutes. The presentation was subsequently circulated along with the minutes to the attendees on the 17th of January 2017. 2. The request were made to the hydrogeological specialist not the facilitator, after the request the Hydrogeological Specialist apologized and repeated what he had been saying when informed that the attendees could not hear him. The Zeerust town hall is rather large and thus distorts sound. 3. Please refer to the response in point 1 and 2 above. 4. At the start of the presentation the attendees were requested to note any questions during the presentation for the questions and answer section at the end. All agreed to this request. The chairperson therefore made notes during the presentation for this purpose. Questions were however asked and answered during the presentation. Please refer to the meeting minutes for the discussion which took place and the questions which were asked following the presentation. With regards to the questions and concerns	

					scope? The river are currently supplying drinking water to my animals and irrigation for crops in fields next to the river. (the river currently have water flow for about 6 to 8 months during the year) 4. It will impact my breading camps with the mining activity in the area and create a disturbance for the real remote bush atmosphere that it currently have. What will be done to prevent this? 5. What will be done to prevent the dust from the open mine? It will impact the air in the area and cover everything around the area in a layer of dust? This include households and plants in the area. 6. What will be done to prevent structural damage to property buildings when blasting is done in the mine, currently the existing fluorspar mine is about 10km away from my property and we still feel the ground trembling when blasting happens, this is causing cracks in the buildings and can also effect the underground tables in the long run. 7. The blasting within the mine will also impact my game species and breading patterns as the blast can travel for kilometers and disturb the quite atmosphere. 8. What will be done to prevent the loss of biodiversity in the area with the water impacting plant and animal life? 9. What specifically are your plans for the mine in the area of Farm 305? Clearly explain in details. He requested to be sent confirmation that they have received his formal concerns and supply him with all answers in detail on what will be done to prevent the impact to his property and what guarantees does he have that it will not change in the future. He further asked to be included in all communication regarding any developments as an I&AP.	raised by yourself: 1. The average depth to groundwater measured across 116 regional boreholes and spring sites is 16 m. A depth to groundwater of 30-45 m would indicate that the aquifer is already impacted on, presumably by abstraction. There are dyke bounded compartments in the dolomite that constrains flow across it. Please refer to the attached compartment map. Please note that the approximate location of your property is indicated in light green dot/rectangle on the maps. This is for indicative purposes and a more accurate map can be provided upon request. Water quantity impacts due to dewatering is foreseen to be limited to Compartment 1. Please refer to the dewatering zone of influence (ZOI) map attached. Any measured negative impact with regards to water supply in terms of water quantity and quality due to mining activities, will be mitigated. Any landowners who may be verified to be affected will be subject to compensation or purchase agreements. Please refer to the Hydrogeological Specialist Study (Appendix 7.8 of the DEIA&EMPR). 2. The potential impacts on groundwater quality was quantified in the geochemical and hydrogeological specialist studies. Due to the dolomitic nature of the orebody host rock, there will be no acid rock drainage. Fluoride, sulphate and nitrate is expected to leach from the tailings and waste rock facilities, but the impact would be, limited to Compartments 1 & 4 (Figure 4-9 in the Hydrogeological specialist study – refer to attached figure). Please refer to the mass transport simulations in the presentation (slide 42-44). The open pits will intercept any possible contaminant and contain this from a groundwater perspective. The fluoride leaching from the TSF is expected to precipitate in the dolomitic aquifer due to the calcium and magnesium in the system. In terms of run-off, all clean and dirty water will be separated and dirty water will be kept in a closed circuit and captured for re-use in the process. The Geochemical Waste Assessment found that the mine waste posed no risk for the development of AMD conditions, due to the deposit ore and host geology being		

						dominated by carbonate rocks, which have the capacity to neutralise acidity and due to the low sulphide content of the ore and host lithologies (Appendix 7.10 of the EIA&EMPR). 3. According to the hydrogeological study the development will result in a maximum simulated inflow of approximately 900 m³/d resulting in less than a 4% impact on the simulated surface water runoff in the A31D quaternary catchment (refer to attached catchment map). The impact on the smaller micro-catchment where the average annual flow is 4000 m3/d (averaged to daily flow), the impact is higher with a simulated flow reduction of ±25%. A commitment is made in the EIA on an extensive surface water and groundwater quantity and quality monitoring system that is already in place since 2013. Part of this commitment is to monitor regional and local groundwater levels, borehole yields and at least two flow measurement stations one upstream from the mining and one downstream in the Klein Marico River. Please refer to the attached monitoring map. The dewatering impact on the Klein Marico River could be mitigated by directly discharging the treated dewatered water back into the Klein Marico River. Alternatively offsets such as the purchase of existing irrigation rights or the removal of alien invasive species has also been identified to mitigate the possible impact. It is recommended that flow gauges be installed in the Klein Marico River upstream and downstream of the proposed mine site to record surface water flow. Can you please confirm the farms existing lawful water use (ELU) from both surface water and groundwater? This figure is expressed as irrigation hectare or annual flows e.g. 10 ha or 100 000 m3/annum. 4. A noise specialist study was conducted for the proposed mine development and found the noise impact to be within the limits set by the relevant standards. The noise impact was rated as low. Mitigation measures were also recommended in the study to ensure that the impact remains low. Please refer to the Noise Impact Assessment Report (Appendix 7.13 of the DEIA&EMPR). Also refer to the Visual Impact Assessment in terms of the visual	

						intrusion at your property (Appendix 7.15 of the DEIA&EMPR). According to the Visual Impact Assessment your property is located within the low significance zone of impact (3km-7.5km away from the closest mining activity). 5. All the air quality impacts are within the limits set by the National Dust Control Regulations and National Ambient Air Quality Standards, apart from PM10 which is in exceedance at the sensitive receptor in the north due to vehicle entrainment on the haul road. Water sprays have been recommended however this only allows for a 75% control efficiency and therefore it is recommended that chemical suppressant be used also to ensure a control efficiency of 80-90%. Air quality monitoring has also been recommended. Please refer to the Air Quality Impact Assessment (Appendix 7.12 of the DEIA&EMPR). Please note that your property is situated outside the zone of air quality impacts. 6. Any damages caused by blasting will be subject to compensation. Please note that a photographic survey of all structures up to 1500 m from the open pit areas has been recommended in order to assist with monitoring and claims – prior to any blasting activities taking place. 7. Blasting is highly regulated and control of blasting to protect human and animal health, equipment and infrastructure will ensure that any blasts will use minimum explosives and will occur in a controlled manner. Options available to minimise the risk to equipment, people, animals and infrastructure includes: • The use of different explosives that have a lower detonation speed, which reduces vibration, sound pressure levels as well as air blasts. • Blasting techniques such as blast direction and/or blast timings (both blasting intervals and sequence). • Reducing the total size of the blast. • Damping materials used to cover the explosives. • Blasts will be an infrequent occurrence, with a loud but a relative instantaneous character. 8. Numerous mitigation measures are recommended in the Ecological Impact Assessment to mitigate impacts on biodiversity. Refer to Appendix 7.4 of the DEIA&EMPR. Impacts will be limited to	

					the mining footprint areas and any disturbances will be subject to rehabilitation. 9. No mining activities or surface infrastructure is planned for the farm Doornhoek 305 JP. Mining activities will take place on Farm 306 (Portion 1, 5, 24, 25, 26, 27, 29, 30), Rhenosterfontein 304 (Portion 9, 10), with possible extension to Knoflookfontein 310 (Portion 1).	
				Via email: On 16 January 2017 Mr Swart thanked Ms Uys for confirming receipt of his concerns. He informed her that the portion that he recently bought is portion 9 (a portion of portion 6) of the farm Doornhoek 305 JP. On 17 January 2017 Mr Swart thanked Ms Uys for the public meeting minutes and presentation. He asked that she confirm that his concerns sent on the 14th Jan 2017 were logged and will still be responded to. He also wished to know if it will be possible to exclude portion 9 of portion 6 of farm 305 JP from the mining rights application area due to the fact that he has a game farm with breeding camps and would not be interested to negotiate for surface lease agreement if the mining right were given. He asked what can be done to exclude his property from the requested area as he is on the border for the required area.	Via email: On 19 January 2017 Ms Uys informed Mr Swart that his concerns dated the 14th of January 2017 will be included in the Comments and Response Register as part of the FEIA&EMPR to be submitted to the Department. She will also provide his with their response shortly. She informed him that it will not be possible to exclude any portions from the proposed mining right area as the application which included Portion 9 has already been submitted to the Department. However no mining activities are planned to take place on Portion 9 of the farm Doornhoek 305 JP as part of this application. The proposed open cast mining areas as well as the mining infrastructure is planned to be located on the following properties: Farm 306 (Portion 1, 5, 24, 25, 26, 27, 29, 30); Rhenosterfontein 304 (Portion 9, 10); and with possible extension to Knoflookfontein 310 (Portion 1). Therefore the applicant will not be requiring a surface lease agreement for Portion 9. Portion 9 is situated approximately 3.8 km from the closest mine activity (Resource Area A), however the potential impact have been assessed on a regional level. She informed him that an applicant representative will be in contact soon to discuss the proposed development with him.	
Doornhoek 305 JP Ptn 18	Gertruida Petronella Enslin & Hendrik Josifus Enslin	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.		
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Doornhoek 305 JP Ptn 11	Ester Smit Trust	Y	Via sms:	No comment received to date.		Concluded

			On 8 June 2016 a notification inviting I&AP's to register on the project was sent to the stakeholder.			
			Via sms and email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Via telephone: On 18 July 2016 Ms Smit contacted Ms Uys and requested to be provided with a copy of the notification as per the sms she had received. She also asked when the public meeting will be held. Ms Smit stated that her father who owned the relevant property may not be able to attend the meeting but that she would try to attend on his behalf.	Via telephone and email: On 18 July 2016 Ms Uys provided Ms Smit with the notification as requested. She also informed her that the public meeting would be held on the 28th of July 2016 at 18:00 at the RMLM Hall just behind the municipal buildings in Zeerust. She asked that Ms Smit contact her after the meeting should she be unable to attend in order for her to be provided with a copy of the meeting minutes.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Doornhoek 305 JP Ptn 12,16,33	Hendrik Andreas Jacobus Grobler Tannie Marthie v/d Heever	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.		
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Doornhoek 305 JP Ptn 15,17	Frans Jurie Nicolas Badenhorst & Martina Anna Catharina Badenhorst	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 have been assessed and indicated in the Hydrogeological Impact Assessment Report.	Concluded
			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.		
			Via sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Doornhoek 305 JP Ptn 19	George Richard Swart & Martha Susanna Johanna Swart		Via registered post & sms: On 8 June 2016 a notification inviting	No comment received to date.		Comment outstanding

			I&AP's to register on the project was sent to the stakeholder.			
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Doornhoek 305 JP Ptn 20	National Government of the RSA		Notifications were sent as presented above.			
Doornhoek 305 JP Ptn 23	Theo Ernst Rabe Magda Rabe	Y	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.		Concluded
			Via sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Via email: On 11 August 2016 Mr Rabe provided Ms Uys with a commenting sheet with the following concerns: 1. Water pollution 2. Water loss 3. Dust and noise 4. Impact on farming – especially game farming 5. Influx of people resulting in theft and poaching	Via email: On 11 August 2016 Ms Uys thanked Mr Rabe for his correspondence and confirmed receipt thereof. She informed him that he had been registered as an I&AP on the project and that his comments will be documented and addressed in the comment and response register. Via email: On 22 August 2016 Ms Uys provided Mr Rabe with the following response to his concerns: 1. Impacts relating to water pollution and water loss are being evaluated in the Hydrogeological Impact Assessment as part of the EIA phase. 2. See above comment. 3. Impacts from dust are being evaluated in the Air Quality Impact Assessment while noise impacts are being evaluated in the Noise Impact Assessment as part of the EIA Phase. 4. The impact on farming and especially game is being evaluated in the Ecological Impact Assessment as well as the Socio-Economic Impact Assessment and mitigation measures have been provided to prevent or limit the impacts. 5. Socio-economic impact is being evaluated in the Socio-economic Impact Assessment. The above issues have been forwarded to the relevant specialists to evaluate in their respective specialist studies.	
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via email: On 5 December 2016 a notification with	No further comment received to date.		

			regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.			
Doornhoek 305 JP Ptn 25,26	Catharina Magdalena Grobler		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.		Comments outstanding
			Via registered post: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via telephone: On 22 November Ms Uys contacted Ms Grobler however the cellphone number and landline number had no answer. The other landline number was for the Evander Hospital. It was confirmed that Ms Grobler is employed the Department of Health; however they could not inform as to which department/section or provide Ms Uys with a direct number.	No comment received to date.		
			Via registered post: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Doornhoek 305 JP Ptn 30,31 Kafferskraal 306 JP Ptn 8,9	ENRC/SOUTHERN PALACE (PTY) LTD (applicant) Occupier: Loek van den Heever	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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Kafferskraal 306 JP Ptn 15,16,18,19,20,23 Strydfontein 326 JP Ptn 22	ENRC/SOUTHERN PALACE (PTY) LTD (applicant)					
Rhenosterfontein 304 JP Ptn 21	AstraDeals Eighteen cc Mnr Attie Cloete	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 July 2016 Mr Cloete contacted Ms Uys to discuss the details of the public meeting. He stated that it would be difficult for him to attend the meeting as he resided in Vanderbijlpark. He informed Ms Uys that approximately 40 to 50 tons of fluorspar had been mined 20-30 years ago and was lying on the surface on his property. He asked whether the applicant was interested in purchasing his property. He requested to receive a copy of the meeting minutes and stated that he would have his daughter send an email requesting all the available documentation as he currently did not have access to email.	Via telephone: Ms Uys informed Mr Cloete that the public meeting would be taking place on the 28th of July 2016 in the Zeerust town hall behind the municipal buildings. She informed him that the applicant would be making the necessary lease/purchase agreement with the affected landowners once all authorisations have been received. She listed the properties which would be directly affected (Plaas 306 Portion 1, 5, 24, 25, 26, 27, 29, 30; Knoflookfontein 310 Portion 1 and Rhenosterfontein 304 Portion 9 & 10). Ms Uys committed to provide him with the	Concluded

					public meeting minutes and suggested that a focus group meeting be held with Mr Cloete in Pretoria after the public meeting should he wish. She stated that she would send him all the available notifications upon receipt of the email from his daughter.	
			Via sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Strydfontein 326 JP Ptn 21	Johan Botha Holdings Pty Ltd (previously Varkfontein Inv CC)					No contact details currently available.
Kafferskraal 306 JP Ptn 2, 22	Namaria Prop (Pty) Ltd Mr Sandow Rossouw Shaun (Foreman)	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 stakeholder.	Refer to previous consultation noted above.		Concluded
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Kafferskraal 306 JP Ptn 4,6	Mondialeshelf Holdings (Pty) Ltd Mr Sandow Rossouw Shaun (Foreman)	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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Kafferskraal 306 JP Ptn 7	Republic of South Africa		Notifications were sent as presented above.			
Kafferskraal 306 JP Ptn 14	Frederik Jacobus Thorne (previously Hendrina Johanna Steyn)					No contact details currently available.
Kafferskraal 306 JP Ptn 3	Willem Jacobus du Plessis		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.		Comments outstanding
			Via sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		

			Via sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Kafferskraal 306 JP Ptn 21	Vincent George Du Plessis		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.		Comments outstanding
			Via sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Kafferskraal 306 JP Ptn 17	Elsie Aletta Cecilia Evler		Via registered post: On 22 November 2016 a notification letter wat send to Ms Evler.	No comment received to date		Comments outstanding
			Via registered post: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Kafferskraal 306 JP Ptn 12, 13, 28	Blue Anvil Holding (Pty) Ltd Mr Sandow Rossouw Shaun (Foreman)	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.		Comments outstanding
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Kafferskraal 306 JP Ptn 11 Rhenosterfontein 304 JP Ptn 13	ENRC/SOUTHERN PALACE (PTY) LTD owned					
Kafferskraal 306 JP Ptn 31 Paardeplaats 296 JP Ptn 1	Thort Group Trading cc Frans Thiart	Y		Via telephone: On 2 September 2016 Mr Thiart contacted the consultants and left a message for Mr Uys to phone him back. He stated that he had received a letter in the post with regards to the Doornhoek Fluorspar Mine close to Zeerust and wished to receive more information.	Via telephone and email: On 6 September 2016 Ms Uys contacted Mr Thiart and provided him with some background on the proposed mine and the location of the closest proposed open cast area to his properties. She informed him that the DSR had already been made available for review but that the DEIA&EMPR would be made available for comment in October/November 2016. She invited Mr Thiart to review the DSR and provide comment even though the timeframe has lapsed. She provided him with the notification letter in this regard as well as an electronic copy of the DSR.	Concluded

					She informed him that his comments will be included and addressed in the DEIA&EMPR. She stated that the initial potential impacts of the mine and the proposed mitigation measures are included in the DSR, and that a public meeting will again be held during the EIA phase. She informed him that they would appreciate it if he could provide comments before or on the 7th of October 2016.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Paardeplaats 296 JP Ptn 25	Elsie Hendrika Jacoba Palmer Snyman	Y	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 an established area in the town of Zeerust. 2. Socio-economic impacts relating to influx of people have been assessed in the Socio-economic study currently being conducted for the project. 3. Impacts relating to groundwater have been assessed in the Hydrogeological Impact Assessment study. 4. Socio-economic impacts have been assessed in the Socio-economic study. 5. Socio-economic impacts have been assessed in the Socio-economic study. 6. Socio-economic impacts have been assessed in the Socio-economic study. 7. Socio-economic impacts have been assessed in the Socio-economic study. Also refer to Table 23 of the EMPR with regards to the relevant mitigation measures.	Concluded
			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.		
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Paardeplaats 296 JP Ptn 26	Jacobus Johannes Smit		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.		Comments outstanding
			Via registered post & sms: On 15 July 2016 a notification with regards	No comment received to date.		

			to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.			
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Paardeplaats 296 JP Ptn 27, 28	Magrietha Wilhelmina Aletta van Niekerk & Johannes Hendrik Philippus (Hannes) van Niekerk	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.	No comment received to date.		Comments outstanding
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Via telephone: On 7 January 2017 Mr van Niekerk contacted Ms Uys and requested more details of the project. He also requested to be provided with a copy of the DEIA&EMPR and selected appendices, namely Appendix 7.8 Hydrogeo Report and Appendix 7.18 SLP. The report and appendices was couriered to the Postnet in Zeerust for collection by Mr van Niekerk on the 13th of December 2016.	Via telephone: On 17 December 2016 Ms Uys phoned Mr van Niekerk and informed him that the report was at the Zeerust Postnet for collection.	
Paardeplaats 296 JP Ptn 29	Petronella Katrina (Karien) Botha Jan Nel Etienne Schoeman	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 18 July 2016 Ms Botha contacted Ms Uys and requested to be provided with a copy of the notification via email.	Via email: On 18 July 2016 Ms Uys thanked Ms Botha for her email and provided her with a copy of the notification as requested.	Concluded
			Via email: On 18 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Via telephone: On 21 July 2016 Mr Nel contacted Ms Uys and asked her to please also forward all notifications to Mr Etienne Schoeman. He expressed his interest in the waste from the mining process, being the silt which is usually stored in a silt dam. Mr Nel informed Ms Uys that he they are located on Rhenosterfontein and close to the old Marico Mine and that there is an old silt dam on their property. Mr Nel confirmed that they would be attending the public meeting.	Via telephone: Ms Uys informed Mr Nel that she had provided him with a copy of the notification on the 18th of July as per the request received from Ms Karien Botha. She would however also send a copy of the notification to Mr Schoeman (a notification was sent to Mr Schoeman on the 21st of July 2016). Ms Uys stated that tailings will be stored in a tailings storage facility and invited Mr Nel to attend the public meeting on Thursday, the 28th of July 2016.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Via email: On 5 December 2016 Mr Schoeman asked for a solid analysis of the tailings or to be referred to the relevant document as Appendix 7.10 related more to the leachates.	Via email: On 8 December 2016 Ms Uys replied that the mineral composition of the ore material which represents the tailings was analysed and provided Mr Schoeman with the analyses. These results were taken into account in the geochemical study (Appendix 7.10). She informed him that there are no actual tailings analyses yet as the mine is not yet in production. Once pilot plant test work commences, a tailings fraction will be produced which will be suitable for analyses. It is anticipated that the properties of the tailings will be exactly the same as that of the Witkop Mine as an extension of the now depleted Witkop orebody will be mined. The Witkop	

					tailings dams are currently being processed by African Lime who sell the product for agricultural lime.	
Paardeplaats 296 JP Ptn 2,24,32,33	Magdalena Jacoba (Martie) van den Heever		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.		Concluded
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.			
Paardeplaats 296 JP Ptn 34	Robert Frank McComb Taylor	Y	Via telephone: On 21 November 2016 Ms Uys contacted Mr Taylor and informed him that she had recently obtained his contact details and wished to inform him of the proposed Doornhoek Mine development. She gave his a brief description of the project and the process and requested his email address in order to provide him with a notification letter in this regard. Via email: On 22 November Ms Uys provided Mr Taylor with the said notification letter.	No comment received to date.		Comments outstanding
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Paardeplaats 296 JP Ptn 40	Klopper Langoed (Pty) Ltd		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.		No contact details currently available.
			Via registered post: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Via email: On 17 January 2017 Ms Marie from Jonker & Vennote informed Ms Uys that they had received her letter for Klopper Landgoed (Pty) Ltd but that there were not clients of Jonker & Vennote. On 18 January Ms Marie stated that is was a pleasure	Via email: On 18 January 2017 Ms Uys thanked her for the feedback and informed her that the postal address on the title deed for the company had their address on and therefore the letters were posted to them. She thanked her for confirming that they were not their clients.	

				and that she understood why the letter had been sent to them.		
Paardeplaats 296 JP Ptn 31	FSM Trust Mr Wim Mouton Mr Frans Mouton	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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Kwaggafontein 297 JP Ptn 2	Kobus Snyman (Kowie)	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.	Concluded
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Via email: On 29 July 2016 Ms Snyman asked to be provided with the presentation which was given at the public meeting.	Via email: On 2 August 2016 Ms Uys informed Mr Snyman that the meeting minutes and the presentation will be provided to all the attendees who attended the meeting. The draft meeting minutes were provided to the meeting attendees on the 11th of August 2016 for review along with the agenda, presentation and attendance register.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Kwaggafontein 297 JP Ptn 4	Pieter Daniel (Piet) Boeyens		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.		Comment outstanding
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Kwaggafontein 297 JP Ptn 3,13	Dietmar Carl Jurgen Rassow & Dalziel Josephine Rassow		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.		Comment outstanding

			Via registered post: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Kwaggafontein 297 JP Ptn 1,5,6,8,9,11,12,15,17	Paul Stefanus Snyman	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.		
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Rhenosterfontein 304 JP Ptn 1,2, 5, 7,8, 9, 10, 17, 19, 23, 24, 25	Hendrik Andreas Jacobus (Hennie) Grobler Tannie Marthie v/d Heever	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 to farmers. 2. He was of the opinion that the farmers would welcome a mining operation in the area.	1. Noted. All water related impacts have been assessed in the hydrogeological impact assessment study. 2. Noted.	Concluded
			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.		
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Via fax: On 2 August 2014 Mr Grobler provided the following comments: 1. Waste Rock Dumps (WRD) rehabilitate extremely difficult and he doubted whether a new mining group's rehabilitation would be better than the rehabilitation done previously. He noted that it seemed that rehabilitation is done as poorly as possible. 2. Damage to buildings due to vibration from blasting due to large charges. 3. A prospecting borehole which would have been sealed or equipped for use was left as is which lead to a swamp. This incident made him doubt whether the company was truly serious in considering the farmer. 4. Should the mining right be obtained, whereafter it	Via email: On 5 August 2016 Ms Uys thanked Mr Grobler for his comments and confirmed receipt thereof. She informed him that his comments will be included and addressed in the comments and response register, which would be made available for comment along with the DEIA&EMPR. On 25 August 2016 Ms Uys provided the following response to concerns raised by Mr Grobler: 1. Rehabilitation is a legal requirement and have been addressed in the Closure and Rehabilitation Plan as part of the EIA. 2. Potential impacts relating to blasting is being assessed in the Vibration and	

				is it is transferred/sold to another company, it leaves the landowner in a position where the new buyer may not hold to the previous arrangements with eh current prospecting company. 5. Terms and amount for compensation will need to be reviewed in depth. 6. The fiasco with the test of boreholes and the attitude with which it was done raises more than just eyebrows.	Blasting Study. 3. Could you please provide more detail with regards to this statement so that rectification measures (if required) can be determined? 4. The mining right and its associated conditions remain in place independent of ownership and is therefore legally binding to the project. 5. Commercial arrangements need to be determined/ negotiated once the right is awarded. 6. Could you please provide more detail with regards to this statement so that rectification measures (if required) can be determined?	
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Rhenosterfontein 304 JP Ptn 3	Catharina Magdalena Grobler			Refer to previous consultation noted above.		
Rhenosterfontein 304 JP Ptn 4,18	Hendrik Andreas Jacobus (Hennie) Grobler & Catherina Magdalena Grobler	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.		
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Rhenosterfontein 304 JP Ptn 27 Strydfontein 326 JP Ptn 18	Witkop Fluorspar Mine (Pty) Ltd Hendrik Hanekom	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.		
Rhenosterfontein 304 JP Ptn 28	Hanekom Boerdery en Konstruksies Hendrik Hanekom		Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Rhenosterfontein 304 JP Ptn 20	Johannes Hendrik (Hansie) Snyman Gerhard Snyman (Son)	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.		

			Via sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Rhenosterfontein 304 JP Ptn 26	Gertruida Petronella Enslin & Hendrik Josifus (Hennie) Enslin	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.		
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
Witrand 325 JP Ptn RE,2, 3	Klipveld Minerale (Pty) Ltd, Jacobus Philipus De Ridder Anna Catherina Jacoba de Ridder		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.		No contact details currently available.
			Via registered post: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via registered post: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Via email: On 17 January 2017 Ms Marie from Jonker & Vennote informed Ms Uys that they had received her letter for Klopper Landgoed (Pty) Ltd but that there were not clients of Jonker & Vennote. On 18 January Ms Marie stated that is was a pleasure and that she understood why the letter had been sent to them.	Via email: On 18 January 2017 Ms Uys thanked her for the feedback and informed her that the postal address on the title deed for the company had their address on and therefore the letters were posted to them. She thanked her for confirming that they were not their clients.	
Witrand 325 JP Ptn 1	Johannes Hendrik Snyman & Susanna Catharina Snyman	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.		
			Via registered post & sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		
			Via registered post & sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Refer to previous consultation noted above.		

Strydfontein 326 JP Ptn 3,9,13	Johan Botha Holdings Pty Ltd (previously ASC Saayman Testementary Trust)					No contact information available.
Strydfontein 326 JP Ptn 6,8	Thathana Farms cc Paul Mogotlhe	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 14 July 2016 Mr Mogotlhe contacted Ms Uys and informed her that he was the owner of portions 6 and 8 of Strydfontein 326. He provided her with his contact number and requested to be sent the information and reports.	Via email: On 15 July 2016 MS Uys thanked Mr Mogotlhe for his email. She provided him with the notifications with regards to the availability of the DSR for review as well as the proposed public meeting.	Concluded
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comment received to date.		
Strydfontein 326 JP Ptn 7	Dawid Johannes (Jan) Jacobs		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.		Comments outstanding
			Via sms: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			Via sms: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Strydfontein 326 JP Ptn 15,17	Maria Aletta (Marika) du Toit Ms Jeanne du Toit	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 have been made available in the Draft EIA&EMPR) 5. An application have been 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	Concluded

					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.	
			On 19 July 2016 a consultation meeting was held between the applicant and Ms Du Toit.	Ms Du Toit raised the following concerns during the meeting: 1. Water 2. Pollution 3. Noise 4. Dust 5. Visual Impact 6. People walking across land 7. Traffic 8. Information updates on latest plans/problems	1. Water impacts have been addressed in Appendix 7.8: Hydrogeological Impact Assessment. 2. Water, air and soil pollution have been assessed in the respective specialist studies (Appendix 7: Specialist Reports) 3. Noise impacts have been addressed in Appendix 7.13: Noise Impact Assessment. 4. Air quality impacts relating to dust have been addressed in Appendix 7.12: Air Quality Impact Assessment 5. Visual impacts have been addressed in Appendix 7.15: Visual Impact Assessment. 6. The mine will implement strict access control measures. 7. Traffic impacts have been addressed in Appendix 7.14: Traffic Impact Assessment. 8. Please note that the social baseline has been assessed in Appendix 7.1: Socio-Economic Impact Assessment, social monitoring will take place and the SLP in Appendix 7.18: Social and Labour Plan (SLP) will be updated annually.	
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Via email: On 28 July 2016 Ms du Toit contacted Ms Uys and informed her that she had forgotten to take some cd's with the DSR at the public meeting. She asked if they could leave some cd's at the Postnet in Zeerust for her the next day.	Via email: On 2 August 2016 Ms Uys informed Ms du Toit that they had unfortunately left Zeerust the evening following the public meeting and were therefore unable to leave the electronic copies of the report at the Postnet. She asked if she could courier the cd's to her and the amount.	
				Via email: On 2 August 2016 Ms du Toit requested 10 cd's be couriered to her.	Via email: Ms Uys confirmed that she will courier the cd's and asked that Ms du Toit inform to which parties she will be distributing the electronic copies for record purposes.	
				Via email: Ms du Toit replied to farmers who were not present at the meeting.	Via email: On 4 August 2016 Ms Uys informed Ms du Toit that she had couriered 10 electronic copies of the DSR to the Postnet in Zeerust marked for her attention and attached the waybill. She informed her that the copies should reach her in 2 to 3 working day and asked that she please acknowledge receipt.	
				Via email:	Via email:	

				On 4 August 2016 Ms du Toit confirmed receipt.	On 4 August 2016 Ms Uys thanked her for the acknowledgement and asked her to kindly forward her the list of people to whom an electronic copy was provided once this is available.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		
			Meeting: On 12 December 2016 a focus group meeting was held with Ms du Toit. Please refer to the meeting minutes in Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers. Via email: On 13 December 2016 Ms Uys referred Ms du Toit to the focus group meeting and stated that she understood that she owned the Postnet in Zeerust. She asked whether she could send a document for Mr Hannes van Niekerk via Postnet to Postnet for him to collect. She also offered to courier an electronic copy of the report as well to Ms du Toit should she wish. On 14 December 2016 Ms Uys informed Ms du Toit that she had couriered the document for Mr Hannes van Niekerk as well as two cd's of the DEIA&EMPR the previous day for her attention. She asked that she please confirm receipt thereof so that she can inform Mr van Niekerk to collect it. On 17 January 2017 Ms Uys asked Ms du Toit to please confirm receipt of the above correspondence. Via sms: On 17 January Ms Uys asked Ms du Toit for confirmation of receipt of the above two emails.	Via sms: On 17 January 2017 Ms du Toit confirmed receipt of the two emails and the DEIA&EMPR. **No further comments received to date.**		
Strydfontein 326 JP Ptn 19	National Government of the RSA		Notifications were sent as presented above.			
Strydfontein 326 JP Ptn 20	Willrich Adventures CC Piet du Toit Wildbedryf Carlize Vorster	Y		Via telephone and email: On 18 August 2016 Ms Vorster provided Ms Uys with their company details.	Via email: On 19 August 2016 Ms Uys thanked Ms Vorster for her correspondence and confirmed receipt thereof. She informed her that the company had been registered as an I&AP on the project and that her comments will be documented and addressed in the comments and response register. She asked her to contact her if she had any questions or required any information.	Concluded

			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Via email: On 13 December 2016 Mr du Plessis requested confirmation of which company in their group of businesses were affected by the project.	Via email: On 14 December 2016 Ms Uys thanked his for his correspondence and responded that Ms Carlize Vorster from the company, Willrich Adventures CC, registered on the project as an I&AP on the 18th of August 2016, She provided him with the relevant correspondence. **No further comments received to date.**	
Strydfontein 326 JP Ptn 21	Johan Botha Holdings Pty Ltd (previously Varkfontein Inv CC)					No contact details currently available.
Strydfontein 326 JP Ptn 22	ENRC/SOUTHERN PALACE (PTY) LTD					
Other Interested and Affected Parties						
SA Lime and Gypsym Witkop Fluorspar Mine (Pty) Ltd	Jaco Erasmus	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.	Concluded
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No comment received to date.		
			On the 30th of August 2016 a consultation meeting was held between the applicant and Mr Erasmus at the Witkop Fluorspar Mine head office in Stellenbosch.	The following comments were raised by Mr Erasmus during the consultation meeting: 1. Water use is problematic. 2. Mr Erasmus was not familiar with any cultural or historical issues. 3. The proposed mine was good for job creation. 4. It was agreed in principle to explore/discuss other options of collaboration, such as the consolidation of the various applicable rights (existing and in process) to the benefit of all parties. 5. Witkop Fluorspar Mine Pty Ltd undertook to discuss such option at the next Exco meeting and to provide Mr Saad with feedback by mid-September 2016. 6. Mr Saad also undertook to discuss the matter with his fellow shareholders and revert back. 7. The mechanism agreed on (potential protocol) was a section 102 amendment of MR 145 and 149 to include the prospecting right owned by SA Fluorite Pty Ltd and Southern Palace Pty Ltd. Please refer to the consultation results in Appendix 8.5 I&AP Correspondence.	Subsequent to the meeting on the 30th of August 2016, ongoing consultation has taken place between the applicant and the management team of Witkop Mine (2nd to the 26th of September), discussions with Witkop is expected to take place in a similar ongoing manner, with specific reference to business matters. All environmental and water related comments are being addressed as part of the EIA/MRA and have been concluded in the EIR and supporting specialist studies.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		

Mr Joffrey Joubert	Portion 1 of the farm Doornplaats 340 JP (farm is adjacent to MRA)	**Y**	On 26 May 2016 a consultation meeting was held between the applicant and Mr Joubert.	Mr Joubert raised the following concerns during the consultation meeting: **1.** Visual Impact	**1.** A Visual Impact Assessment has been conducted as part of the EIA process for the project.	Concluded
			Via email: On 15 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	No further comment received to date.		
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		
SepFluor	Loek van den Heever	**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.		Concluded
	Chris Mulder Legal and Contracts Manager	Y		Via email: On 25 July 2016 Mr Mulder provided Ms Uys with a commenting sheet with his contact details requesting to be registered as an I&AP on behalf of Sepfluor Ltd and asked to be provided with any future correspondence via email.	Via email: On 25 July 2016 Ms Uys thanked Mr Mulder for his comments and informed him that he has been registered as an I&AP on the project on behalf of Sepfluor Ltd. She stated that he would be kept informed of any progress on the project as well as the availability of reports for review, of which he will be notified in advance.	Concluded
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		
Rietvaly 311 JP Ptn 46, 47 & 48	Mrs Palmer	Y	Via email: On 19 July 2016 a notification with regards to the availability of the DSR and an invitation to the public meeting was sent to the stakeholder.	Via telephone: On 19 July 2016 Mrs Palmer contacted Ms Uys to inform her that her property is located adjacent to the mining right area but that she had not been directly consulted with. Mrs Palmer expressed concern with the establishment of a mine so close to her proprieties, however she wished to first review all the available documentation prior to formally submitting her concerns and/or questions.	Via telephone and email: On 19 July 2016 Ms Uys provided Mrs Palmer with a notification with regards to the public meeting and availability of the DSR. She further informed her that although the mining right application included numerous farms and portions thereof, that the proposed open mine resource areas and mining infrastructure would only be located on the following properties: • Plaas 306 (Portion1, 5, 24, 25, 26, 27, 29, 30) • Knoflookfontein 310 (Portion 1) • Rhenosterfontein 304 (Portion 9, 10) She informed her that her property falls outside the proposed mining right area and is located approximately 3 km's away from the closest open pit mining area. She informed that the DSR is currently available for review and requested that all comments be received before or on the 15th of August 2016. The report included the initial potential impacts of	Concluded

					the mine as well as the initial proposed mitigation measures, as discussed. She provided Mrs Palmer with the DSR in 4 parts in 3 separate emails due to the size of the document. Ms Uys also informed Mrs Palmer that a company representative would be contacting her shortly in order to consult with her.	
			On 20 July 2016 a consultation meeting was held between the applicant and Ms Palmer.	Ms Palmer raised the following concerns during the meeting: 1. Water 2. Noise 3. Dust 4. Roads 5. Workers/people/security 6. Cracks from explosions (especially dams) (value of land/properties declining)	1. Water impacts have been addressed in Appendix 7.8: Hydrogeological Impact Assessment. 2. Noise impacts have been addressed in Appendix 7.13: Noise Impact Assessment. 3. Air quality impacts relating to dust have been addressed in Appendix 7.12: Air Quality Impact Assessment. 4. Traffic impacts have been addressed in Appendix 7.14: Traffic Impact Assessment. 5. Socio-economic impacts have been addressed in Appendix 7.1: Socio-Economic Impact Assessment. 6. Impacts from blasting and vibration have been assessed in Appendix 7.16: Blasting and Vibration Study. Any damages caused by blasting will be subject to compensation. Please note that a photographic survey of all structures up to 1500 m from the open pit areas has been recommended in order to assist with monitoring and claims.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		
Grasland (Pty) Ltd	Etienne Schoeman	**Y**		Via telephone: On 25 July 2016 Ms Uys was contacted by a company representative who wished to register the company as an I&AP on the project. The following comments was provided: 1. It is a water scarce area. 2. They are interested to understand how the waste will be handled.	Via email: On 25 July 2016 Ms Uys thanked Mr Schoeman for the completed comment sheet and comments. She informed him that he had been registered on behalf of Grasland as an I&AP on the project. She stated that they would be kept updated on progress on the project as well as the availability of reports for comment of which they will be notified of in advance. She stated that their comments will be addressed in the comments and response register which would be made available for comment with the DEIA&EMPR. She asked that in terms of his comment on the waste, that he please expand on which waste he was referring to. She stated that the upper layer (overburden) of the open cast mine areas will be stored in dumps next to the open cast mine pits. The tailings will be stored in a tailings storage facility (TSF). General	Consluded

					waste, such as household waste, will be disposed-off at a licenced waste facility. The silt on the site will be managed by means of dirty water channels which will transport water to a silt trap prior to it reaching the stormwater dam. The TSF will have a return water dam which will capture any water seeping from the facility from where it will be transferred back to the processing plant.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	Via email: On 5 December 2016 Mr Schoeman asked for a solid analysis of the tailings or to be referred to the relevant document as Appendix 7.10 related more to the leachates.	Via email: On 8 December 2016 Ms Uys replied that the mineral composition of the ore material which represents the tailings was analysed and provided Mr Schoeman with the analyses. These results were taken into account in the geochemical study (Appendix 7.10). She informed him that there are no actual tailings analyses yet as the mine is not yet in production. Once pilot plant test work commences, a tailings fraction will be produced which will be suitable for analyses. It is anticipated that the properties of the tailings will be exactly the same as that of the Witkop Mine as an extension of the now depleted Witkop orebody will be mined. The Witkop tailings dams are currently being processed by African Lime who sell the product for agricultural lime.	
				Via email: On 8 December Mr Schoeman stated that he might have a solution for the tailings. He asked whether a waste management license was required for this process and requested that they let him know if they are interested to discuss alternatives to a tailings dump.	Via email: On 9 December 2016 Ms Uys informed Mr Schoeman that they are always looking for ways to reduce potential environmental impacts and footprints. They have applied for a waste management licence as part of the EIA process, specifically relating to the storage and disposal of waste. She stated that she will forward his correspondence to the applicant contact person to get in touch with him directly to discuss alternatives. Mr Schoeman thanked Ms Uys.	
Rietvaly 311 JP Ptn 54	Mr Jan Hendrik Badenhorst Mrs Melanie Badenhorstt	Y		Via email: On 10 August 2016 Mrs Badenhorst provided Ms Uys with a commenting sheet with the following comments: According to the mining sequence map portion 54 of the farm Rietvaly 311 JP falls under the area earmarked for mining right application. They wished to know if this is the case and what the impact is with regards to ownership.	Via email: On 11 August 2016 Ms Uys thanked Ms Badenhorst for her correspondence. She confirmed receipts of the comments and informed Mrs Badenhorst that they had been registered as I&AP's on the project and that their comment will be documented and addressed in the Comments and Response Report.	Concluded
					On 19 August 2016 Ms Uys provided Mr and Mrs Badenhorst with feedback on their comments. She informed them that their property falls outside the mining right area to be applied for and is approximately 2 km away from the closest open cast mining area. She provided him with a map in this regard.	

					She informed him that the proposed open cast mining areas as well as the mining infrastructure is planned to be located on the following properties: • Farm 306 (Portion 1, 5, 24, 25, 26, 27, 29, 30) • Knoflookfontein 310 (Portion 1) • Rhenosterfontein 304 (Portion 9, 10)	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		
Doornhoek 298 JP Ptn 3	Jaco Naude Bernadette Naude	Y		Via email: On 15 August 2016 Mr Naude provided Ms Uys with a letter indicating their opposition to the granting of authorisation for the fluorspar mine in Doornhoek, Zeerust, North West. He stated that they could not find the forms on Exigo's website to fill to lodge their concerns and to register them apposing these developments in their area, but by sending the written correspondence, it has to be accepted and noted. He further asked that Ms Uys please confirm receipt of the correspondence by return mail. He noted the following concerns: 1. Lack of meaningful public consultation in the local community 2. Risk posed to groundwater in the region 3. Inability of agencies to govern, monitor and enforce legislation and hold companies accountable in the in the mining sector and the resulting social and environmental impacts 4. Lack of research into various critical areas surrounding the potential mining area including but not limited to the fields of social, environmental and economic sciences 5. Previous studies on the area indicated high geological and ecological sensitivity with reference to the Doornhoek Mine DSR. 6. Even though my property falls just outside the area planned for the mining development, it will still have a huge impact to my own property and wellbeing. He noted the following direct impact to his property: 7. Mining activities tend to be water intensive and thus has a direct impact on groundwater in the area which will have a direct impact on: a) Domestic water use- We are solely reliant on the borehole on the property to supply all the water for domestic use- any impact on the water table will have a direct impact on us which could also lead to water shortages and	Via email: On 16 August 2016 Ms Uys thanked Mr Naude for his comments and confirmed receipt thereof. She informed him that he has been registered as an I&AP on the project and that his comments will be included and addressed in the Comments and Response Register, which will be made available with the DEAI&EMPR for review and comment, of which he will be notified in advance. She informed him that the results of the consultation and public participation process conducted to date are included in the DSR which was made available for review and comment. Please take note of the response below sent to Mr Naude on the 23rd of August 2016: 1. Please refer to the section 10 of the DSR for the consultation and public participation conducted to date. NEMA, the MPRDA and the EIA Regulations of 2014, amongst other, have been consulted regarding the consultation process followed to date. Consultation is ongoing and will continue during the EIA Phase. 2. Groundwater impacts will be assessed in the Hydrogeological Impact Assessment as part of the EIA Phase. 3. Impacts will be assessed in detail in the EIA Phase and mitigation measures will be provided in the EIA&EMPR to mitigate these impacts. The EMPR and subsequent Environmental Authorisation (EA) is a binding document and will be audited by the relevant authorities. 4. Could you please be more specific Baseline studies of the surrounding area have been undergoing since 2013 however the project is currently in the Scoping Phase and detailed specialists studies are underway as part of the EIA Phase. 5. The mine layout alternatives have been planned taking the geological and	Concluded

						polluted water- violation of our human rights to have access to water b) The water from our borehole is also used for agricultural activities on the farm- water shortage and or pollution will have a negative impact on the use of our land for agricultural activities and shortage of food production for ourselves, farm workers and others reliant on such for sustainability. 8. Security of our property and person becomes a huge risk- increase activity in this area due to mining activities, migrant workers and supporting services and contractors' leads to the risk increase in criminal activities. This is supported by various reports, investigations and historic data from all over SA and abroad in association with mining and similar activities to the direct and adjacent areas. 9. Pollution- as the main activity of the mine will be around open pit mining, this will generate huge amount of dust which will lead to air pollution. It should be noted that the land in the region compose of fine sand and material, which disturbed, will result in continuous dust being generated from the mining activities. Needless to say this leading to health concerns. 10. Property Damage- As it is standard practice for mining to use explosives during excavations, my concern is around the damage to property I will sustain during these activities. Unfortunately my property is close to the open mine area and any blasting will cause tremors in the region far reaching the 3km radius in which my property is situated. Not to mention the noise pollution generated from such. 11. The area still has a lot of wildlife and a unique flora, the mining activities will destroy such with no rehabilitation within our life time or our children's causing irrevocable damage to the area. 12. Property Value- being so close to the mining activities will lead to my property drastically devaluating causing financial loss. 13. No consideration was given to the socio and economic impact these activities will have to immediate property owners and the long term losses they will sustain. The lack of inclusion in democratic decision making and clearly just ticking the boxes as to conclude the process without really taking into consideration the legitimate concerns of residents and other stakeholders is a violation of human rights and democracy. 14. In conclusion, there are still too many unanswered questions and "if and buts". Until these are addressed conclusively, it will be	ecological sensitivities of the area into account. 6. Regional impacts have been assessed as part of the EIA. 7. Various options as listed in the DSR are being considered for water supply. A water supply options analysis study has been undertaken. Water impacts have been assessed in the Hydrogeological Impact Assessment during the EIA phase. 8. Socio-economic impacts have been assessed in the Socio-economic Impact Assessment. 9. Dust and air pollution impacts have been addressed in the Air Quality Impact Assessment. Safety and security impacts have been noted for assessment. 10. Noise pollution and blasting impacts have been addressed in the Noise Impact Assessment and Blasting and Vibration Study respectively. Structures that may be impacted upon, as identified by the blasting specialist, will be documented prior to any blasting taking place in order to assist with compensation claims, if relevant. 11. Impacts relating to fauna and flora have been addressed in the Ecological Impact Assessment. Concurrent rehabilitation will be undertaken. 12. Socio-economic impacts relating to depreciating property values have been addressed in the Socio-Economic Impact Assessment. 13. Please refer to Appendix 7 of the DSR for the Socio-economic Scoping Report. A detailed Socio-Economic Impact Assessment is has been undertaken as part of the EIA phase. 14. Please note that we are currently in the Scoping Phase of the project and all unanswered questions and uncertainties will be addressed in the DEIA&EMPR which will be made available for comment to I&AP's. All concerns raised by I&AP's have been documented here and will be addressed in more detail in the EIA&EMPR, which will be made available for review and of which you will be notified in advance.		

				unprofessional and irresponsible to grant any rights to mining in such a delicate environment having far-reaching effects than just the immediate. Consideration should be given to the above points raised, as it is not just concerns raised by myself, but numerous other stakeholders in the same area. To ignore or brushing aside these legitimate concerns and financial impact will be short-sighted.		
			On 22 August 2016 a consultation meeting was held between the applicant and Mr Naude.	Mr Naude raised the following concerns during the meeting: 7. Water pollution 8. Dust pollution 9. Water usage 10. Crime 11. Environmental impact	7. Impacts from water pollution have been addressed in Appendix 7.8: Hydrogeological Impact Assessment. 8. Air quality impacts relating to dust pollution has been addressed in Appendix 7.12: Air Quality Impact Assessment. 9. Water usage impacts have been addressed in Appendix 7.8: Hydrogeological Impact Assessment. 10. Socio-economic impacts, such as crime, have been addressed in Appendix 7.1: Socio-Economic Impact Assessment. 11. Please refer to Table 19 for a list of the potential environmental impacts of the project and the significance of these impacts.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		
	Bonni van Tonder	Y		Via email: On 2 August 2016 Ms van Tonder requested the dropbox link to the DSR.	Via email: On 2 August 2016 Ms Uys thanked her for the correspondence and provided her with the dropbox link.	Concluded
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		
Doornhoek 298, Portion 12 & 13	Mr Gert Johannes van Tonder Snr Mrs Mariana van Tonder	Y		Via email: On 5 August 2016 Mr and Mrs van Tonder provided the following comments and concerns for the proposed mine: 5.1 Water: impacts on groundwater as water flows from direction of mine. Totally dependent on borehole on property. Abstraction of approximately 5000 m3 water supply per day. Pollution of ground and surface water, e.g. the Klein Marico River 5.2 Sink holes: Dolomitic area and acid water from mine waste may lead to sink hole formation. 5.3 Air pollution & noise pollution impacting on people living in the area as well as game and bird species. 5.4 Vegetation: damage to bushveld vegetation and exterminate rare and unique species	Via email: On 5 August 2016 Ms Uys thanked Mr and Mrs van Tonder for their correspondence and informed them that they had been registered as an I&AP on the project and that their comments have been addressed in the comments and response register, which will be made available with the DEIA&EMPR for review and comment. She informed them that although the mining right application included all the farms mentioned that the proposed open cast mining areas and mine infrastructure will be located on selected properties and that their property falls outside the mining right area and is approximately 3 km away from the closest open cast mining area. She informed them that	Concluded

				6.1 Damage to infrastructure: Use of explosives will cause cracks due to vibrations from blasting. 6.2 Economic value: depreciation of value of property adjacent to mine 6.3 Crime: influx of people leading to increase in crime, poaching, stock theft and construction of illegal housing. Housing of workers in area leading to shebeens and bars leading to drunkenness, noise, fighting and crime. 6.4 Right to exist: deprived of peace, quiet and natural beauty as well as right to farm as farming without water or with polluted water is impossible. Deprived of dignified existence on land which was bought and developed with great difficulty. 7.1 Foreign labours: employment of foreigners leading to conflict with people who traditionally occupy the area. Farm and murders by foreigners. 7.2 Neighbours: Buying out neighbouring farms will lead to loss of neighbours, social support network and friends. Mr van Tonder expressed concern that as a directly adjacent landowner he was not directly contacted or consulted.	a representative of the company would contact them to consult further with them. On 25 August 2016 Ms Uys provided them with the following response to their comments: 5.1 Groundwater and surface water impacts are being assessed in the Hydrogeological Impact Assessment as part of the EIA Phase. Water supply options are in the process of being assessed including the water usage figure. 5.2 Geochemical study is has been undertaken to determine the acid mine drainage potential of the mine. 5.3 Air and noise pollution have been assessed in the Air Quality Impact Assessment and Noise Impact Assessment. 5.4 Potential impacts to vegetation and flora is being addressed in the Ecological Impact Assessment as part of the EIA Phase. 6.1 Potential impact is being assessed in Blasting and Vibration Study. 6.2 Potential impacts have been assessed in the Socio-Economic Impact Assessment. 6.3 Refer to point 6.2 above. It is planned for workers to be housed in the town of Zeerust and immediate surrounding residential areas. 6.4 Socio-economic impacts relating to sense of place have been addressed in the Noise and Visual Impact Assessments. Water impacts have been addressed in the Hydrogeological Impact Assessment. 7.1 It is the intention of the mine to employ as much local labour as possible. This is also a requirement in terms of the Mining Charter and commitments in this regards have been made in the Social and Labour Plan. 7.2 Although the regional socio-economic impacts have been assessed in the Socio-Economic Impact Assessment, it is each landowner's prerogative to sell or not sell their property. With regards to the comment about consultation, please refer to the section 10 of the DSR for the consultation and public participation conducted to date. NEMA, the MPRDA and the EIA Regulations of 2014, amongst other, have been consulted regarding the consultation process followed to date. Consultation is ongoing and will continue during the EIA Phase.	
			On 17 August 2016 a consultation meeting was held between the applicant and Mr van	Mr van Tonder raised the following concerns during the meeting:		

			Tonder.	1. Water 2. Dust 3. Roads maintenance 4. Crime 5. Housing of workers	1. Water impacts have been addressed in Appendix 7.8: Hydrogeological Impact Assessment. 2. Air quality impacts relating to dust have been addressed in Appendix 7.12: Air Quality Impact Assessment. 3. Traffic impacts have been addressed in Appendix 7.14: Traffic Impact Assessment and road upgrades have been recommended. 4. Socio-economic impacts, such as crime, have been addressed in Appendix 7.1: Socio-Economic Impact Assessment. 5. It is planned for labour to the mine to be housed in an established area in the town of Zeerust.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		
Doornhoek 298 Ptn 12 & 13	Dr Yolandi Rautenbach (van Tonder)	Y		Via email: On 8 August 2016 Dr Rautenbach informed Ms Uys that she had heard with great shock of the proposed development of the fluorspar mine in the Doornhoek area. She asked that she be provided with all the necessary information as a matter of haste (planned development information, any information on the proposed ecological impact of the planned mine) as well as the official commenting sheet on which she could document her total opposition against the project. She also asked to be registered as an affected party.	Via email: On 8 August 2016 Ms Uys thanked Dr Rautenbach for her correspondence and informed her that she had been registered as an I&AP on the project and that her comments will be addressed in the comments and response register. She provided her with a notification and informed her that the DSR is currently available for comment and can be downloaded from the Dropbox website as mentioned in the notification. She stated that the project description and initial impacts as well as initial mitigation measures are provided in the report. The notification also includes a comment sheet on which any comments could be submitted. She asked her to contact her should she have any further questions or wished to receive the report via an alternative method in order to make the necessary arrangements.	Concluded
				Via email: On 10 August 2016 Dr Rautenbach stated that although the farm, Doornhoek 298, fell outside the proposed mining right area, as well as being located 3 km away from the closest open pit area, it does not lessen the cumulative negative impact on the surrounding farming activities. She provided Ms Uys with a comment sheet with her most important concerns, which in no way covered the entire spectrum of all the (cumulative) negative impacts which the open cast mining would have on the direct and surrounding nature, and thus farming and farmer's right of existence. She stated that she would appreciate it if a representative of the mining company could contact her at a suitable time to further consult with her. She stated that she trusted and hoped that when the comment is reviewed during the compilation	Via email: In 11 August 2016 Ms Uys thanked Dr Rautenbach for her correspondence and confirmed receipt thereof. She informed her that she had been registered as an I&AP on the project and that her comments will be documented and addressed in the comment and response register. Noted. Regional impact will be assessed as part of the EIA.	

				of the Draft EIR that attention would focus on the terrible devastating impact which the proposed project would have on nature. She stated that in her point of view, this was a very high premium for a so-called economical injection into the surrounding area for an industry that has previously failed in the Doornhoek area due to various reasons. She stated that she would appreciate confirmation of receipt of her correspondence. Her concerns were noted as follows: 1. Planned area for mine development is located in area which is ecologically very sensitive with a wide spectrum of fauna and flora. The area also contains species which are ecologically very sensitive. 2. Underground water (a scarcity in the area) will be polluted in spite of planned treatment process which is supposed to take place. 3. The economic value of adjacent farms will depreciated due to the planned development, resulting in heirs' birthplace being reduced to useless pieces of land. Thereby destroying the inheritance of heirs and preventing descendants from farming there and transferring the farming culture to the next generation. 4. Due to pollution (water, air, noise) the adjacent farms, e.g. Doornhoek 298, will become unproductive and will directly affect the quality of life of the current owners and heirs. 5. Due to cheap labour (foreigners) which are usually appointed by mines, crime on the adjacent farms will in all likelihood increase and may also lead to more farm murders. 6. In the past the same area was mined for fluorspar, but due to poor purity percentages which was obtained from the product, as well as the fact that the product was very deep, the enterprise was not successful (also surely due to economic reasons). Based on the above, how long will the new enterprise be sustainable at the cost of nature and the right to exist of surrounding farming.	1. Ecological impact of mine development have been assessed in Ecological Impact Assessment as part of the EIA Phase. 2. Groundwater impact relating to water pollution have been assessed in the Hydrogeological Impact Assessment as part of the EIA Phase. A Storm Water Management Plan has been developed for the development in order to separate clean and dirty water. 3. To be assessed in Socio-Economic Impact Assessment. 4. Impacts have been assessed in the Hydrogeological, Air Quality and Noise Impact Assessments respectively during the EIA Phase. 5. Socio-economic impacts have been assessed in the Socio-Economic Impact Assessment. 6. To be assessed in the Socio-Economic Impact Assessment. The above issues have been forwarded to the relevant specialists to evaluate in their studies.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		
Doornhoek 298 Ptn 12 & 13	Mr Johan van Tonder Jnr	**Y**		Via email: On 14 August 2016 Mr van Tonder provided Ms Uys registered as an I&AP on the project and provided Ms Uys with his comment sheet with the following concerns: 1. Groundwater: Impact on groundwater surety of supply and impact on people/livestock dependent on the same resource a) Water quality and groundwater and surface water contamination 2. Air, dust and noise pollution	Via email: On 8 August 2016 Ms Uys thanked Mr van Tonder for his comments and confirmed receipt thereof. She informed him that the relevant parties have been registered as Interested and Affected Parties (I&AP's) on the project and that his comments will be included and addressed in the Comments and Response Register, which will be made available with the DEIA&EMPR for review and comment, of which he will be notified in	Concluded

				3. Wildlife and sensitive flora: deforestation resulting in loss of flora and fauna, loss of habitat, impact on biodiversity 4. Sense of place: disruption of quietness, privacy, friendships and culture 5. Influx of people: crime, safety 6. Socio-economic: depreciation of existing properties 7. Damage to existing properties 8. Approach of applicant to consultation 9. Formation of sinkholes 10. Degradation of soil quality and fertility, toxicity 11. Loss of land: land not being suitable for industrial use or agricultural purposes following mining 12. Loss of landscape and beauty of surroundings. 13. Impacts on rivers and wetlands. 14. Existing mine located next to proposed mine – market conditions, cheap labour and profit margins, viability of new mine 15. Uncertainty with regards to impact of mine on underground aquifer and unanswered geological questions - more clarity is required 16. Environmental sensitive aspects are mentioned, but mitigating and resolving plans are not presented.	advance. She further informed him that the results of the consultation and public participation process conducted to date are included in the DSR which was made available for review and comment. On 24 August 2016 Ms Uys provided Mr van Tonder with the following response: 1. Groundwater and surface water impacts are being assessed in the Hydrogeological Impact Assessment as part of the EIA Phase. Water supply options are in the process of being assessed including the water usage figure. 2. Air, dust and noise pollution have been assessed in the Air Quality Impact Assessment and Noise Impact Assessment. 3. Potential impacts relating to fauna and flora and biodiversity have been assessed in the Ecological Impact Assessment. 4. Socio-economic impacts relating to sense of place have been addressed in the Noise and Visual Impact Assessments. 5. Potential impacts have been assessed in the Socio-Economic Impact Assessment. 6. See point 5 above. 7. Potential impact is being assessed in Blasting and Vibration Study. 8. Please refer to the section 10 of the DSR for the consultation and public participation conducted to date. NEMA, the MPRDA and the EIA Regulations of 2014, amongst other, have been consulted regarding the consultation process followed to date by the EAP. Consultation is ongoing and will continue during the EIA Phase. 9. Potential impact is being assessed in the Hydrogeological Impact Assessment. 10. Potential impact is being assessed in Soils and Land Capability Assessment. 11. Concurrent rehabilitation will be undertaken. More detail have been provided in the Closure and Rehabilitation Plan being undertaken as part of the EIA Phase. 12. Potential impact is being assessed in the Visual Impact Assessment. 13. Potential impact is being assessed in the Wetland Delineation Study and Aquatic Impact Assessment, 14. A preliminary Economic Assessment and Pre-feasibility Study have been undertaken for the project. In light of the determined feasibility of the project,	

					regional socio-economic impacts are in the process of being assessed including the need and desirability associated with this application. Also refer to section 7 of the DSR. 15. Please note that we are currently in the Scoping Phase of the project and all unanswered questions and uncertainties will be addressed in the DEIA&EMPR which will be made available for comment to I&AP's. 16. Mitigation measures for the initial identified impacts are provided in Table 23.	
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No further comments received to date.		
Committee Mmutlwa wa Noko	Mr Brian Sheer Ms Jeanne Kumack	Y		Via email: On 15 August 2016 the Mmutlwa wa Noko registered as an I&AP on the project. They gave an overview of their involvement in the Groot Marico catchment as per points 1-5 of their letter. They noted their objection to the project for the following reasons: 1. Potential impact on the Groot Marico River which is a vital water resource to the North West Province: a) The Klein Marico River drains in to the Groot Marico River south of the large traditional communities of Pella, Koffiekraal, Uitkyk, Brakkuil and Pachsdraai, whose residents number some 80 000, all of whom are dependent on the water from the river for household use and cattle and subsistence farming. b) In this area there are also commercial and restituted crop farmers as well as game farms. c) Thereafter the river passes through the internationally renowned Madikwe Big 5 Reserve to the Molatedi Dam. d) At Molatedi Dam the Tswasa Weir pumps water via the international Tswasa agreement to Gaberone. e) The river flows further North, then east to start the Limpopo. The river provides not only water but a dilution effect on the Limpopo River. 2. Potential impacts on ground water: the perennial source of the Groot Marico River is a series of dolomitic eyes. Any impacts on the aquifers which are widespread and linked would be detrimental to this strategic water supply. The Klein Marico River runs through the project area and it too is fed from the aquifer. These impacts are even more relevant at present as NW province has been declared a drought disaster	Via email: On 16 August 2016 Ms Uys thanked the association for their comments and confirmed receipt thereof. She informed them that they have been registered as an I&AP on the project and that their comments will be included and addressed in the Comments and Response Register, which will be made available with the DEIA&EMPR for review and comment, of which they will be notified in advance. She further informed them that the consultation and public participation process conducted to date are included in the DSR. She asked whether they would like to conduct a focus group meeting to discuss the above project. On 24 August 2016 Ms Uys provided Mmutlwa Wa Noko with the following response to their concerns: 1. Potential impacts on the Groot Marico and Klein Marico Rivers is in the process of being assessed as part of the Hydrogeological Impact Assessment and have been reported on in the DEIA&EMPR. 2. Potential impacts on groundwater and the dolomitic eyes in the area, most notably the Molopo Eye and Molemane Eye, are being assessed as part of the Hydrogeological Impact Assessment. 3. Potential air pollution, soil pollution, loss of biodiversity and socio-economic impacts such as property depreciation, have been addressed in the Air Quality Impact Assessment, Soils and Land Use Capability Assessment, Ecological Impact Assessment and Socio-Economic Assessment being undertaken for the EIA	Dispute

				area. Water allocations for NWP are complete. 3. Associated impacts, including air pollution, degradation of soil quality, loss of biodiversity, loss of value to adjacent properties etc. 4. The existence of a fluorspar mine in the area. They requested acknowledge of receipt of their registration and objection and to be provided with the relevant documentation including notification and consultation with the above mentioned affected downstream communities.	Phase of the project. 4. Please note that the existing Witkop Fluorspar Mine is not currently mining any fluorspar as it is re-mining its tailings for lime and gypsum. Please refer to the section 9 of the DSR for the consultation and public participation conducted to date. NEMA, the MPRDA and the EIA Regulations of 2014, amongst other, have been consulted regarding the consultation process followed to date. Consultation is ongoing and will continue during the EIA Phase. She provided them with the dropbox link to the DSR. She requested the association to inform her should they wish to meet to discuss the project.	
			Via email: On 24 August 2016 Mr Grobler informed Mr Sheer that they will notify him once the water assessment are done, if he would like, he would propose to have a consultation meeting at that point in order to go through the findings.	No response received.		
			Via email: On 21 October 2016 Ms Uys emailed Mr Sheer and informed him that the consultants would like to afford him the opportunity to meet with them in the form of a focus group meeting to discuss the project. She asked that he indicate his availability for such a meeting	Via email: On 10 November 2016 the I&AP contacted Ms Uys and informed her that due to a family loss they have not been available up to now. The also noted that their system crashed and they are not yet able to send emails from their Mmutlwa wa Noko email address (info@mwnoko.co.za), however they are still able to receive emails at that address. For this reason they have sent this email from their secretary's personal email address. They accepted the consultants' offer to meet. They stated that they are finalising the availability of Dr Shan Holmes to attend the meeting with them as well as a representative of RESILIM who has done extensive surveys of the aquifers in the area. Witkoppen Fluorspar Mine's owners have confirmed that they wished to have a representative attending. They stated that they will suggest a date and venue as soon as the position of all parties concerned is finalised.	Via email: On 11 November 2016 Ms Uys replied that they take note of the reasons for the delayed response, and offered their condolences. She requested that they please confirm two to three dates in order to also diarise with their team as soon as possible and in light of the DMR timelines.	
			Via email: On 16 November Ms Uys followed-up and again requested that the I&AP confirm availability for the proposed focus group meeting in order to coordinate diaries timeously in light of the DMR timelines.	No further comments or response received to date.		
			Via email: On 28 November 2016 Ms Uys again followed up with Mr Sheer and Jeanne. She referenced the previous correspondence on the 11th and 16th November with regards to their request for a focus group meeting. She requested that they kindly confirm their availability for a focus group meeting and provided them	No further comments or response received to date.		

				with the following dates which were available on the consultant's side: • 12 December 2016; or • 13 December 2016 She stated that they looked forward to receiving their feedback.		
				Via telephone: On 30 November 2016 Ms Uys contacted Mr Sheer. There was no answer so a voice message was left for Mr Sheer.	Via email: On 1 December 2016 Ms Uys was contacted by the Mmutlwa wa Noko committee who stated that they have agreed to a meeting with the consultants which the consultants offered but they have no idea what a focus group meeting is. The asked that this please be clarified. They further requested that in the meantime she send available information regarding the application to Mr Steve Collins at RESILIM (stevecollins@iafrica.com). The stated that they would confirm which date is suitable by the Friday.	Via email: On 1 December 2016 Ms Uys thanked them for the feedback. She clarified that a focus group meeting is a term they use for a focused meeting with individual I&AP's or a group where specific matters raised by the respective I&AP's are discussed. She stated that they were identified as a key I&AP in the area thus the reason for their requests to meet with them previously. She stated that a public meeting will also be held during the review period of the DEIA&EMPR. She took note of their request and informed that that they will provide Mr Collins with the relevant notifications as requested. The DEIA&EMPR and the relevant specialist studies will also be provided to the committee and Mr Collins. She stated that they looked forward to their response and requested to be provided with preliminary items or agenda they wish to discuss so that they can suitably prepare for the meeting.
					Via email: On 2 December 2016 the committee confirmed the meeting date of Monday 12 December 2016. They suggested 'Wag n Biekie' restaurant in Groot Marico as a venue. They stated that they would provide the aspects they wished the consultants to deal with the following week. They requested to be provided with hard copies of all the documentation, specifically the date on which the EA application was to DMR and a copy of DMR's acceptance of the application.	Via email: On 2 December 2016 Ms Uys thanked them for their email and staed that she would send the requested document the following Monday. She stated that she will confirm the date asap, after checking with the rest of the team and informed them that Wag n biekie would serve well. She also stated that they had communicated with Mr. Collins as per the committees' request. On 5 December 2016 Ms Uys confirmed the meeting date for Monday 12 December 2016 at 'Wag n Biekie' restaurant in Groot Marico'. She asked that the meeting be scheduled for 09:00 am. She informed them that the DMR confirmed receipt of the EA application form on the 13th of July 2016 and provided the Acknowledgement of Receipt. Also the DEIA&EMPR is available for review and comment from the 5th of December and a notification will be provided in this regard. The report will be available electronically on dropbox and hard copies will be available at the Lichtenburg and Zeerust Libraries. She offered to send them a CD of the report as hard copies are only being made available on an as need basis as the report is very large (4

						large files) and therefore the environmentally friendlier option is the e-copy. She asked that they advise. She further stated that the notification of the availability of the DEIA&EMPR will also be made available to Mr Collins as well as an electronic copy of the report. They also indicated the availability of the hydrogeological specialist to meet with Mr Collins should he so wish.
					Via email: On 7 December the committee informed Ms Uys that Wag 'n Biekie is not open the Monday morning and confirmed an alternative venue in Zeerust. They suggested 9:30a.m as this venue requires extra travelling. She stated that from their side there will be an estimated 6 people and asked that refreshments be provided. She also requested the following information: 1. Full listing of the directors and shareholders and committee members of SA Fluorite (Pty) Ltd and Southern Palace 398 (Pty) Ltd (see s113 of the Companies Act) 2. A hard copy of the documentation and not a disc. They further confirmed that this meeting was called at Exigo's instance which they have agreed to attend.	Via email: On 8 December 2016 Ms Uys asked that they meet at 10 am In light of the roadworks between Zeerust and Groot Marico. She proposed that they meer at the prospecting site office, as maps and other documentation as well as facilities for refreshments are already readily available there. She stated that the company related info as per their email has been requested from the applicant. She informed them that a hard copy of the report is available at the Zeerust and Lichtenburg Libraries. She stated that they trust that the committee value the environmental cost associated with printing a hard copy and therefore propose that they provide them with an electronic copy in addition to the hard copies available at the libraries? Alternatively they can provide them with hard copies of relevant requested sections of the report? The report and annexures are approximately 2000 pages. She asked that they advise. She stated that the meeting was mutually agreed upon during previous email correspondence. She further requested that the committee disclose any direct business, financial, personal or other interest which they as an Interested and Affected Party, may have in the approval or refusal of the application (as per Regulation 43(1) of the EIA Regulations GNR 982).
					Via email: On 9 December 2016 the committee informed that they are fully aware of the provisions of reg 43(1) of the EIA Regs, but that their request falls outside the ambit of the provisions of this section. Never- the-less their interest is in ensuring that the law is scrupulously adhered to and that all material facts are placed before the regulator in proper fashion in order that the decision making process is done with full disclosure. For more information please see our website: www.mwnoko.co.za In terms of s113 of the Companies Act any person may apply to a company for a copy of the members of a company and a refusal to provide this is a criminal	Via email: Ms Uys took note of their interest and thanked them. She stated that they had requested the information from the applicant and are awaiting feedback. She stated that they definitely did not object to providing a hard copy of the report and asked that they refer to the previous email again. She stated that she will start preparing a hard copy for them for Monday. Ms Uys informed that Exigo was not involved with the prospecting phase and proposed that this is discussed on Monday with the project geologist. She provided the google coordinates for the

					offence. Their request falls pertinently within this section which obliges Exigo's clients to provide this information. Since Exigo is handling this application on behalf of their clients the committee considered it appropriate to make this request of them. Further, all searches either by way of internet and company search show no information whatever of the two client companies. In addition the claimed parent company of SA Fluorite became defunct in 2009. They asked that this be clarified at the meeting. As regards a hard copy they do not understand the objection to providing this on environmental grounds. Two thousand pages cannot compare with the environmental impact of a vast open cast mine. The committee do not ask for this copy for idle reasons. This is the only way they can properly analyse the documentation as their computer system does not allow for the opening of a large document. Also one hard copy in Zeerust is not sufficient to allow various I&APs to study these with the necessary thoroughness that is required. They thanked the consultants for the invitation to attend the meeting at the prospecting offices in Zeerust and confirmed the time for 10 am. They were unaware that a Prospecting Right had been required in this matter and requested access to the application and granting documents. They further requested the address and directions to the office and asked whether there are steps at the office.	gate to the site office and stated that the gate will be unlocked. She asked that once through the gate they follow the road down to the farm house and kindly close the gate behind them. She further informed that there are 1 to 2 low steps at the entrance to the farm house however no security/procedures are required to gain access.	
					Via email: On 9 December the committee noted that from the wording in the email of 8/12/2016 they had understood that the meeting was in Zeerust. They stated that the GPS co-ordinates are inadequate and asked to be provided with full directions.	Via email: On 11 December 2016 MS Uys provided a Google maps dropped pin and gave detailed directions to the site office.	
					Via email: On 11 December 2016 the committee thanked her for the direction and stated that they were targeting 10 am.	Via email: Ms Uys thanked them for the response and provided her mobile number in case of they experience any difficulty.	
				Meeting: On 12 December 2016 a focus group meeting was held with the committee. Please refer to the meeting minutes in Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers. On 13 December 2016 Ms Uys provided the attendance register for the meeting to the committee for their records and stated that they are busy finalising the meeting minutes which will be provided in due course. She asked whether they could assist with an attendees surname who failed to sign the attendance register for minute purposes.	No response received to date.	Via email: On 12 January 2017 Ms Uys provided feedback following a question raised during the meeting with regards to applying again for something which had been proven to not be conducive to the environment or feasible, as follows: Regulation 46 of the EIA Regs state that "Resubmission of similar applications - 46. No applicant may submit an application which is substantially similar to a previous application which has been refused unless the appeal on such refusal has been finalised or the time period for the submission of such appeal has lapsed." However any other applicant may lodge an application which is then subject to	

		consideration by the competent authorities.
Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder. Meeting: On 12 January 2017 a public meeting was held which the committee attended. Please refer to the meeting minutes in Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers. On 17 January 2017 Ms Uys provided the committee with the respective strategic documents requested during the public meeting, namely: • Department of Trade and Industry's ("DTI") Fluorochemical Expansion Initiative ("FEI") in 2009 referred to in the DTI annual report AND the Address by Minister Mosibudi Mangena at the launch of the Fluorochemical Expansion Initiative (FEI) - 24 March 2009 • DMR Beneficiation Strategy for the Minerals Industry of South Africa, June 2011 • The North West Provincial Development Plan (PDP) 2030 • Address by Minister Naledi Pandor, opening the Department of Science and Technology's Budget Vote Debate - 15 May 2012	During the public meeting Mr Sheer raised the following points and provided the consultants with his hard copy with the following highlighted sections and notations: **DEIA&EMPR** 1. Page 34, Paragraph 2 "The proposed Doornhoek fluorspar mine will predominantly mine fluorspar along with associated minerals (copper ore, diamond, lead, tin ore, vanadium ore and zinc ore)." 2. Page 36, Bullet 2 "The average tonnes of ore processed at full production 123 750 tonnes per month. The average water use per tonne of ore processed was calculated at 1.04m3/tonnes of ore which is within the expected range of between 0.7m3/t to 1.2m3/t for similar mining developments." 3. Page 37, Figure 1: Water reticulation and average monthly flow rates Notation reads: Water abstraction per ton of ore 4. Page 75, Table 2: Need And Desirability Table, Point 31) e) "The opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.)." Notation reads: Opportunity costs 5. Page 363, Section 28, Aquatic, Bullet 5 "For this reason, reference conditions are largely hypothetical, as based on professional judgment and/or inferred from limited data available." Notation reads: Aquatic Guesswork 6. Page 364, Bullet 7 • "Recharge to the aquifer units is unknown and has been assumed from data collected in similar hydrogeological settings." **Doornhoek Socio-Economic Impact Study** 1. Page 53, Section 5.2.6: Export Earnings "The Doornhoek Fluorspar Project may have a positive impact on export earnings as R23.8 billion will be earned by the country over the 25 year production period." Notation reads: Impact on earnings from mine and contributors 2. Page 54, Section 5.2.8: Improved Quality of Life and Service Delivery "The mine specifically plans to assist in addressing the local water-related shortages by allocating over R2 million during the first five years of its operation towards the Water Project as part of its Local Economic Development contribution." 3. Page 56, Section 6: Conclusion, Bullets 1 and 2 • "Firstly, the mine could have a negative effect on the local supply of water, which is currently a major service delivery challenge for the local government." • "It would also impact on the sense of place and transform the rural agricultural areas into an	On 26 January 2016 Ms Uys provided the following response: **DEIA&EMPR** 1. Agreed. Please refer to DMR correspondence in Appendix 5. 2. The average water use per tonne of ore processed was calculated in more detail as indicated in the Regional Water Balance report at 0.94 m3/tonnes of ore. This results in an average calculated make-up water demand of 116 654m3/month (3830 m3/day). Refer to Appendix 7.9. 3. Refer to point 2 above. 4. Refer to the explanation provided under point 31) e). This impact was assessed in the Socio-economic Impact Assessment Section 5.1.7 (Appendix 7.1). 5. This point was made in light of the assessment having been performed in the low flow winter season of 2016, following severe nation-wide drought conditions. The Aquatic Specialist does however go on to inform that the information available is deemed adequate and recommends an assessment under summer/high flow conditions as best-practice. Should be read with aquatic monitoring requirements prior to and during construction included in Table 26. 6. Recharge was qualified in the study based on (also refer to section 2.6.3 Recharge): • Reference values for dolomitic aquifers in South Africa (Department of Water Affairs and Forestry, Groundwater Assessment: Dolomitic Aquifers Dec 2006). • Model Calibration Process. • Model sensitivity analyses and influence of recharge on calibration correlations. • According to the Vegter recharge map, recharge in the area is on the order of 65 mm/a in the 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. **Doornhoek Socio-Economic Impact Study** 1. Noted and Agreed. 2. Agreed. Refer to the Social and Labour Plan (SLP) in Appendix 7.18 for more details. This value was calculated based on a percentage of the estimated nett

					industrial area." 4. Page 57, Bullets 1 and 2 • "The people who work and reside on the farms where some of the project infrastructure will be located, as well as people residing and working one the adjacent farms are likely to be the recipients of this change in the sense of place." • "Linked to the change in sense of place is the possibility of negative effect on the local tourism activities represented by game hunting operations. Moreover, some of the farm portions where the majority of the mine's footprint will be located are currently used for game hunting activities and are unlikely to be able to proceed if the mine is built." Notation reads: -ie effect of mine **Doornhoek Fluorspar Geochemical Risk Assessment** 1. Page i, Disclaimer "The opinions expressed in this Report have been based on the information supplied to GeoDyn by Exigo. The opinions in this Report are provided in response to a specific request from Exigo to do so. GeoDyn has exercised all due care in reviewing the supplied information. Whilst GeoDyn has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. GeoDyn does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them". **Air Quality Impact Assessment for the proposed Fluorspar Mine at Doornhoek in the North West Province** 1. Page 19, Section 3.4.3: Fugitive Dust Sources, Paragraph 5 under heading Open Cast Mining "Open cast mines are associated with significant dust emissions, sources of which include land clearing, blasting and drilling operations, materials handling, vehicle entrainment, crushing, screening (etc.)." Notation reads: Dust Emissions **Visual Impact Assessment Report : Proposed Doornhoek Fluorspar Mine Project, Zeerust, North-West Province** 1. Page 34, Section 10.1: Landscape Impact "The landscape impact (i.e. the change to the fabric and character of the landscape caused by the physical presence of the intervention) of the Doornhoek Fluorspar project is predicted to be high due to effect of the project's activities as described in Section 4 on the site. The activities will be extensive and although there are similar mining infrastructure in the area the existing mining infrastructure is screened due to the topography of the area. The proposed Doornhoek Fluorspar will therefore be in contrast to the surrounding land use and will appear 'out of	profit after tax according to best practice. It should be noted that this amount is allocated for projects during the first 5 years of the life of mine (construction phase) and the mine would not yet have been commissioned nor generate an income. Subsequent SLP's will be updated every 5 years thereafter. 3. Noted. Yes these impacts were specifically identified, assessed and mitigated. Therefore they were deliberately stated by the relevant specialists as highlighted here. These impacts are assessed in detail in the Hydrogeological Impact Assessment (Appendix 7.8) and Visual Impact Assessment (Appendix 7.15). 4. Sense of place impacts are assessed in the Visual Impact Assessment (Appendix 7.15). Section 5.1.7 contains the relevant context with regards to the tourism impacts mentioned and were duly quantified – refer to the Socio-economic Impact Assessment Section 5.1.7 (Appendix 7.1). It is important to note place the potential job losses in context of the potential benefits. The following extracts from page 45 of the above the report: "In the case of the land that is currently used for game hunting and that comprises Portion 1 (r/e), 5 (r/e), 10 (ptn of 4), 29 (ptn of 1), 2+ (ptn of 6), 27 (ptn of 6) of the Farm Kafferskraal 306 JP, the situation may be different, though… it is likely that the owner of these farm portions will no longer be able to continue with game hunting and will have to close and/or move his businesses somewhere else. This could result in the loss of substantial revenue to the owner, reduced agricultural production in the region, and the loss of seven jobs". "It is not possible to determine with certainty whether the local game farms will lose their tourist customers, but the possibility does exist and its likelihood will depend on the extent to which construction activities and following it operations will impact the surrounding farms. Based on the studies conducted by the visual and noise specialists, the visual and noise effects on the adjacent farms used for commercial game hunting and breeding are expected to be notable; therefore, the risk of losing tourists and subsequently employment (around 100

					place'. The proposed project will have a negative landscape impact." Notation reads: Landscape impact –ie 2. Page 56, Table 7: Intensity of visual impact – construction, operation and decommissioning phases 3. Page 62, Section 13: Significance of Impact, Paragraph 2 & 3 "The unmitigated impact for the Construction and Decommission Phases is rated high significance. This is when there will be major movement and activities on the site as the structures and infrastructure are being built or decommissioned. Mitigation will be difficult during this period and the rated impact would not drop significantly even with management measures." "During the Operation Phase the significance of unmitigated impact is rated high. Due to the rolling topography most of the project components will be located on elevated areas which make mitigation very difficult. Even if the mitigation measures are implemented successfully it will only partially screen the project components and therefore the significance of the Project after mitigation measures are implemented will remain high." 5. Page 68, Paragraphs 4 and 6 "Landscape Value – all encompassing (Aesthetic Value)" "Sense of Place" "Central to the concept of a sense of place is that the place requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape together with the cultural transformations and traditions associated with historic use and habitation. According to Lynch (1992) sense of place "is the extent to which a person can recognize or recall a place as being distinct from other places - as having a vivid, or unique, or at least particular, character of its own". **Blast Impact Assessment Doornhoek Fluorspar Mine Project** 1. Page 19, Section 11: Sensitivity of Project, Bullets 1, 2 and 3 • "A highly sensitive area of 500 m around the mining area. Normally, this 500 m area is considered an area that should be cleared of all people and animals prior to blasting. Levels of ground vibration and air blast are also expected to be higher closer to the pit area. • An area 500 m to 1500 m around the pit area can be considered as being a medium sensitive area. In this area, the possibility of impact is still expected, but it is lower. The expected level of influence may be low, but there may still be reason for concern, as levels could be low enough not to cause structural damage but still upset people. • An area greater than 1500 m is considered low sensitivity area. In this area it is relatively certain	people) is possible. However, it should be noted that not all owners of these commercial activities have raised concerns related to the loss of tourists and the possibility of business closure, which means that some of the local businesses are not envisioning any loses. Various mitigation measures have been proposed by the respective specialists in order to reduce the expected impacts relating to the stated impacts." **Doornhoek Fluorspar Geochemical Risk Assessment** 1. Noted, this is a standard disclaimer. Exigo has significant and statistical defensible baseline hydrogeological data and it is therefore to the benefit of the geochemical risk assessment to utilize this data, as it is deemed a worthy baseline data set. All the data has been generated using international sample collection techniques and all samples were analysed at SANAS accredited laboratories. The data provided to Geodyn by Exigo was as follows: • Distilled water leach test data – ICP-MS analysis (Exigo, 2014) • Total analysis data – ICP-MS analysis (Exigo, 2014) • Mineralogical analysis – XRD (Exigo, 2014) • Mineralogical analysis – QEMSCAN (SGS, 2011; Mintek, 2014) • Total analysis – XRF (SGS 2011; Mintek, 2014) • 2016 hydrocensus data (Exigo, 2016) • 2014 baseline monitoring data (Exigo, 2014) Refer to Section 3 and 5 of the Geochemical Risk Assessment (Appendix 7.9). **Air Quality Impact Assessment for the proposed Fluorspar Mine at Doornhoek in the North West Province** 1. Note that this extract is from a Section that describes the receiving environment and types of fugitive dust sources that could occur, and not an impact statement for the proposed mine/activities. Dust emissions were assessed in the Air Quality Impact Assessment. This study found that all the mitigated impacts were within the limits set by the National Dust Control Regulations and the National Ambient Air Quality Standards, apart from PM which was in exceedance if modelled based on a 75% control efficiency from water sprays. Chemical suppressants

					that influences will be low with low possibility of damages and limited possibility to upset people." 2. Page 31, Section 13.10: Blast operations impacts on farm animals, Paragraph 6 "Noise affects wildlife differently from humans and the effects of noise on wildlife vary from serious to non-existent in different species and situations. Risk of hearing damage in wildlife is probably greater from exposure to nearby blast noise from bombs and large weapons than from long-lasting exposure to continuous noise or from muzzle blast of small arms fire. Direct physiological effects of noise on wildlife, if present, are difficult to measure in the field. Behavioural effects that might decrease chances of surviving and reproducing could include retreat from favourable habitat near noise sources and reduction of time spent feeding with resulting energy depletion. Serious effects such as decreased reproductive success have apparently been documented in some studies. Decreased responsiveness after repeated noises is frequently observed and usually attributed to habituation. Military and civilian blast noise had no unusual effects (beyond other human-generated noise) on wildlife in most studies, although hearing damage was not an issue in the situations studied and animals were often probably habituated to blasts." Notation reads: Blast Impacts **Doornhoek Fluorspar Mine: Final Rehabilitation, Decommissioning and Mine Closure Plan** 1. Page 30, Bullets 1-4 "Other impacts to be mitigated concurrently and/or at closure stage would be: • Soil compaction on all areas where vehicle movement takes place, laydown areas, etc. This compaction process and other hardened areas also increases runoff during rainfall and will increase the possibility of erosion; • Soil erosion and sedimentation if stormwater is not controlled correctly. This includes runoff from overburden dumps and the tailings storage facility walls; • Soil pollution by possible oil/diesel spillage from vehicles as well as sewage produced by the administrative, washing and ablution facilities on site. Failure of the dirty water containing infrastructure also has the potential to pollute the soil, surface and sub-surface water; • Soil destruction through the opencast mining and removal of topsoil, even if partially backfilled and re-vegetated." 2. Page 33, Section 8.4: Aquatic Assessment, Paragraph 3 "The cone of depression formed by the opencast mining process should be closely monitored as this will have an effect on the groundwater flow patterns which might have some impact on the flow in the river as well as surface recharge. Post closure impacts on water quality, with special mention of the groundwater	however allow for an 80-90 % control efficiency and it is recommended that chemical suppressants be used along with water sprays where and when required. Refer to Appendix 7.12. **Visual Impact Assessment Report : Proposed Doornhoek Fluorspar Mine Project, Zeerust, North-West Province** 1. The Visual Impact Assessment stated that the mine development will have a high significance impact on the landscape. Mitigation will be difficult and creative measures, such as vegetation berms and vegetation screens must be considered. It should be noted that even though these mitigation measures are implemented it will not fully screen views towards the proposed Project. Four layout alternatives were assessed and layout 4 was chosen as the most preferred in terms of the visual impact. Refer to Section 14 of the Visual Impact Assessment (Appendix 7.15). With mitigation the specialist stated that these impacts will be reduced to medium. 2. Refer to point 1. 3. The Doornhoek Fluorspar project will have a high significance during the construction, operation and decommission phase of the project. This is mainly due to the intrusiveness of the project and the sensitivity of the visual receptors in the area. During the closure phase the TSF will remain on site while the rest of the structures and infrastructures will be removed. The significance will reduce to medium. The construction phase and operational visual impacts although high, can be mitigated to moderate with mitigation. The closure and decommissioning impacts have all been rated low to moderate without mitigation. The post-closure phase visual impact is high but can be reduced to moderate with implementation of mitigation measures. Refer to Table 19 of the EIA&EMPR. 4. Noted, this is however part of the methodology statement included in Appendix A of the VIA. **Blast Impact Assessment Doornhoek Fluorspar Mine Project** 1. These points should be read in conjunction with Figure 3 and 4 and Table 12 and 13 of the Blasting and Vibration Study Report. A ruin and a heritage site (remains of a large opencast mine pit) occur within the 500 m high sensitive zone around Resource Area A. These will be	

					resources present are of concern- extensive mitigation measures must be employed to negate this potential disturbance." Notation reads: Aquatic assessment 3. Page 35, Section 8.6: Hydrogeological Assessment, Paragraph 1 "The aquifer is likely compartmentalized by diabase dykes structures which cross cut the country rocks." 4. Page 35, Section 8.6: Hydrogeological Assessment, Paragraph 3 "The groundwater levels could take a substantial time to recover post operations and this should be confirmed with monitoring for at least 12 months post closure." 5. Page 35, Section 8.6: Hydrogeological Assessment, Paragraph 4 "There is a possibility of the possible inflow of water from the Klein Marico River into the open pit mine." 6. Page 35, Section 8.6: Hydrogeological Assessment, Paragraph 5 "Additional water supply boreholes should be drilled to supplement the current wellfield to supply in the majority of the mines water demand. Additional sources of groundwater should be identified and explored in the future to supply the required make up water demand." 7. Page 35, Section 8.6: Hydrogeological Assessment, Paragraph 6, Bullet 2 • "The construction of roads, pipelines and the buildings on site may impact the amount of water that infiltrates the soil, through the removal of natural vegetation and the soil layer." 8. Page 36, Bullet 1 • "Explosives will be used in the open pit development which might contribute nitrates to the groundwater." 9. Page 43, Section 8.13: Geochemical, Bullets 3 and 4 • "The contamination of groundwater by fluoride and sulphate from the tailings material is significant and mitigation measures should be implemented as the dolomite groundwater is a sensitive receptor; and • "If ammonium nitrate based explosive products are to be used in the mining proses, then nitrate needs to be included as potential groundwater and surface water contamination risk." 10. Page 47, Bullet 1 and 2 • "Year 1 – 5 2.97 Ha" • "Year 6 – 30 37.07 Ha" 11. Page 47, Section 9.5: Rehabilitation of Processing Waste Deposits, Bullet 1 • "The TSF at Doornhoek will remain post-closure;" **Appendix A: Rehabilitation Cost Summary** 1. Page 63, Section 3.3: Negative impact of the mining operations, Bullet 2 "Once fully operational the mine will initially employ a mere 190 people."	directly impacted by mining operations. A farm buildings/structure, an old shaft, heritage sites and boreholes occur within the 500 m buffer zone around Resource Area C and D. The predicted impact was found to be acceptable for the farm building/structure, old shaft and boreholes. The heritage sites will however be impacted. Mitigation measures are provided in the Archaeological Impact Assessment in Appendix 7.2. 2. Air blast predicted for the maximum charge ranges between 116.2 and 138.1 dB for Resource Area A and 116.1 and 135.0 dB for Resource Area C & D for all the POI's considered. The predicted air blasts translate to 0.003 to 0.029 pounds per square inch (psi). Studies have shown that larger animals showed threshold of petechial haemorrhage was near 10 psi to 15 psi (68.9476 kPa to 103.421 kPa) at long durations. Ear damage recorded in sheep showed 38% rupture were recorded at 21.4 psi (147.548 kPa) for long durations and severity of damage increased with the intensity of the blast. The impacts associated with blasting were all rated low and negligible without mitigation, the only moderate impact was associated with Fly Rock Impacts on houses, which can be reduced to negligible with mitigation. Refer to Section 13.10 of the Blasting and Vibration Study Report (Appendix 7.16). **Doornhoek Fluorspar Mine: Final Rehabilitation, Decommissioning and Mine Closure Plan** 1. All soil impacts are assessed in the Soils, Agricultural Potential and Land Capability Assessment (Appendix 7.5). 2. Refer to Section 6.4.1 of the Hydrogeological Impact Assessment (Appendix 7.8) for the dewatering impact. Mitigation measures for the post closure phase are provided in Section 6.5.2 of the above report. 3. The simulated dewatering impact is limited to compartments 1 and 2 for Resource C and Resource D and Compartment 3 for the 5 – 10 Year pit (Resource A) due to the dykes crossing the project area. The dykes are assumed to be semi-impermeable/leaky and act as natural mitigation measures to contain the zone of influence. However, cross compartmental leaking is possible and should form part of the follow up phase of investigations as follows:	

					Notation read: Rehab Summary	• Detailed geophysics on the dykes separating compartment 1 and 2 as well as compartments 1 and 4. The geophysics should be perpendicular to the dykes as well as along the dykes to site suitable drilling targets. Drilling should take place both sides of the dykes as well as in the most permeable section of the dyke. • Drilling and testing to confirm dyke integrity. The dykes could act as natural mitigation measures i.e. to limit and secure possible impacts to certain compartments. The cross-dyke testing in paired boreholes (opposite the dyke from each other) will confirm possible leakage and influence. Testing within the dyke, if possible, will confirm upper permeability value of the dyke material for model update and management scenario measures. 4. Refer to Appendix B of Appendix 7.8 for details on the proposed monitoring. Monitoring results during the operational phase will be used to verify the post-closure monitoring term. 5. According to the hydrogeological study the development will result in a maximum simulated inflow of approximately 900 m³/d resulting in less than a 4% impact on the simulated surface water runoff in the A31D quaternary catchment. The impact on the smaller micro-catchment where the average annual flow is 4000 m3/d (averaged to daily flow), the impact is higher with a simulated flow reduction of ±25%. A commitment is made in the EIA on an extensive surface water and groundwater quantity and quality monitoring system that is already in place since 2013. Part of this commitment is to monitor regional and local groundwater levels, borehole yields and at least two flow measurement stations one upstream from the mining and one downstream in the Klein Marico River. Please refer to Appendix B and Figure 5-1 and 10-1 of Appendix 7.8. The dewatering impact on the Klein Marico River could be mitigated by directly discharging the treated dewatered water back into the Klein Marico River. Alternatively offsets such as the purchase of existing irrigation rights or the removal of alien invasive species has also been identified to mitigate the possible impact. It is recommended that flow gauges be installed in the Klein Marico River upstream and downstream of the	

						proposed mine site to record surface water flow. Based on follow-up studies proposed the model should be updated and re-calibrated to reduce uncertainties. 6. Other water supply options were also identified (refer to Section 8.4.1 of the EIA&EMPR). Subsequent to the hydrogeological assessment and supporting regional water balance it is proposed that water supply be conducted from groundwater resources as the preferred option. Groundwater resources will be developed in Compartment 1 and 2 with the possibility of compartment 8 should sufficient resources not be available in the first two mentioned. The applicant understands that groundwater development may have a negative impact with regards to water supply in terms of water quantity and quality due to mining activities and water supply to the mine, and will implement mitigation measures such as monitoring to mitigate and limit any impacts in this regard. Any landowners who may be verified to be affected will be subject to compensation or purchase agreements. 7. The hardened surfaces and compacted soils of the development area will lead to less precipitation infiltrating the ground on the footprint areas and an increase in surface run-off during storm events. Dirty and clean water will be separated as per GN 704. Dirty water will be re-used in the process while clean water will be discharged in order to recharge the groundwater resources. 8. This impact was assessed in Table 6-2 of the Hydrogeological Report (Appendix 7.8) as moderate and can be reduced to low with mitigation measures. Monitoring is recommended to confirm and quantify nitrate concentrations and should be included in the monitoring protocol. 9. It should be noted that the baseline groundwater quality fluoride values average 1.8 mg/L already exceeds the SANS drinking water limits of 1 mg/L. For the operational phase, the model results indicated that sulphate values in the tailings pore water exceed regulatory values and groundwater baseline values. Additionally, fluoride values in the tailings will range from 0.9 mg/L to 2.7 mg/L, with the later value the maximum (Hansen, RN 2016). The waste rock results associated with the overburden dumps indicated sulphide to be below detection limits and	

						fluoride similar to the baseline values. During the operational phase nitrate, sulphate and fluoride is captured by the mine dewatering and should be kept in a close circuit system as part of the water management commitments according to GN704. This impact should be verified by an extensive monitoring programme by independent external consultants and laboratories. The impact was rated as moderate during the operational phase and can be reduced to negligible with the implementation of mitigation measures (refer to Table 6-2 of Appendix 7.8). Refer to point 8 above with regards to nitrate impact. 10. The overburden facility for Resource A will have a footprint of 1.72 Ha while the footprint of the overburden facility for Resource Area C will have a footprint of 25.86 Ha. The Rehabilitation, Decommissioning and Mine Closure Plan has allowed for slightly larger footprints for purposes of rehabilitation. The overburden facilities will not remain post-closure and will be rehabilitated. Refer to Section 9.4 of Appendix 7.17. 11. The TSF will remain post-closure. Please refer to the rehabilitation criteria provided in Section 9.5 of Appendix 7.17. **Appendix A: Rehabilitation Cost Summary** 1. The mine will create at least 222 sustainable employment opportunities on site. Approximately, 133-155 jobs will be made available for the labour from local communities. The Socio-Economic study calculated and presented this number in more detail Refer to Section 5.2.2 of the Socio-economic Impact Assessment (Appendix 7.1). This info is also included in table 2 and section 15.1, and 35.1.1 of the EIA&EMPR.
				Via email: On 19 January 2017 the committee submitted a response to the minutes of the meeting held on the 12th of December 2016 as follows: 1. We note that certain matters are omitted from your transcript, namely Mr Saad Snr's statement at the outset that he is the independent geologist, and his outburst when he was asked about his interest in the application. Please indicate why these aspects were omitted. Please also supply us with an audio copy of the recording of the meeting. 2. Please clarify the following: Mr Saad Snr stated that the majority shareholder in both applicant	Via email: On 20 January 2017 Ms Uys thanked the committee for their comments on the focus group meeting minutes which took place on the 12th of December 2016. She provided them with a dropbox link to the audio copy of the recording due to the size of the audio file. She responded to their comments as follows: 3. The meeting minutes are as a summary of key issues discussed during the meeting. Detailed introductions by all attendees were not included in the minutes however Mr Saad Snr introduced himself as a geologist who started the project. He

					companies is ERG, a Luxembourg registered company, which was confirmed by Mr Michael Grobler, but the shareholder register supplied to us by Mr Allan Saad Jnr shows that the majority shareholder is ENRC Africa Holdings Ltd, registered in London. Also Mr Saad Snr stated that the 23% shareholding in SA Fluorspar was owned by 'other' when the shareholder register shows that he owns all 23%.	clarified that he is a consulting geologist who in his private capacity works for various companies. This is reflected in the minutes. It was also clarified that Mr Saad Snr is not an independent geologist employed by Exigo but was employed by the applicant as a consultant. Mr Saad Snr has shareholding in the project which he did disclose. He also acted as the applicant representative during the meeting. Refer to page 10 of the meeting minutes. 4. We have followed up with the applicant representative and have confirmation that ENRC Africa is a wholly owned subsidiary of ERG. With regards to Mr. Saad's shareholding, we have confirmed that the 23% is held by a trust of which he is the trustee.
					Via email: On 26 January 2017 the committee thanked Ms Uys for clarifying the points raised in their letter as well as for providing them with the dropbox link to the audio recording. They further stated that their query did not emanate from Jeanne Kemack, who is merely an administrator, but emanated from the committee of Mmutlwa wa Noko, as stated at the bottom of their emails. They stated that as the Mmutlwa wa Noko emailing system was being repaired Jeanne kindly allowed them to make use of her private email address. They informed Ms Uys that the Mmutlwa wa Noko email address is now functioning and asked that all future correspondence to the committee is sent via this address.	Via email: On 26 January 2016 Ms Uys took note of this and thanked them informing her of the repairs to their emailing system. She stated that they will make use of this address going forward.
					Via email: On 26 January 2017 the committee acknowledged receipt of the strategic documents sent on the 17th of January 2017. They stated that with regards to the minutes of the public meeting of 12 January 2017 they wished to point out that Mr Brian Sheer established from Exigo's experts that CFCs destroy ozone to which Mr Sheer commented that it is ironic that a company that has O3 (ozone) in its name should be facilitating an application which will produce a product that destroys ozone. It was to that that Mr Michael Grobler responded that he was unaware that O3 at the end of their name could equal ozone	Via email: On 26 January 2017 Ms Uys thanked them for acknowledging receipt and informed them that Mr Grobler explained that the company name "Exigo" is derived from Greek, meaning to examine, weigh, assess and settle or complete. It was noted during the meeting that the interpretation with ozone in the Exigo3 name is incorrect and that no one has previously made such a connotation. It probably has something to do with the fact that the scientific connotation for ozone is O3 with the 3 as a subscript and not a superscript. The 3 as a superscript refers to "cubic" in scientific notation which means three-dimensional and in this case to the 3 pillars of sustainability.
					Via email: On 27 January 2017 the committee submitted a letter with the following comments: 1. We thank you for your detailed response to our oral comments on your EIA and EMPR raised at	Via email: On 27 January 2017 Ms Uys responded as follows: 1. It's a pleasure. The email was sent 04:46 PM.

				the public meeting of 12 January 2017 and which we received by email at approximately 19h30 this evening 26 January 2017. 2. We reiterate that to assist you in responding to our oral comments, we made our flagged and highlighted copy of the EIA/EMPR available to you after the meeting in order that you could deal with the number of issues raised by us which were based on your own experts' reports. These were returned to us last Wednesday 18 January 2017, a date that was convenient for you. 3. While in the process of finalizing our written comments which would have been submitted this evening, we received your above mentioned email which would require some attention to do it justice. Unfortunately the timing of your email prejudices our timeous response to your 26 January 2017 deadline and accordingly we will be submitting our suitably amended written response either by tomorrow 27 January 2017 or Monday 30 January 2017. 4. Meanwhile we stand by the experts reports regarding the impacts on the environment and water. We emphasise the sense of shock that we, as well as those that we have communicated with and those attending the meeting, experienced, on hearing of open pits up to 90m deep and covering some 174ha in what is now bushveld and grasslands. together with tailings storage facilities of 150ha, all of which will remain after closure, as well as the massive water usage which will require additional boreholes and the reallocation of agricultural water quotas. While fluorspar was declared a strategic mineral in 2009 water has exceeded all as a strategic resource in modern times. This application borders on the Molemane Eye Nature Reserve and is accordingly close to the Molopo Eye and not that distant geographically from the Groot Marico Eye (Kaaloog) and includes the Klein Marico River which flows into the Groot Marico River. 5. As indicated a full comment will follow.	2. Noted, during the meeting numerous requests were made for the committee to please provide the comments on the Draft EIA&EMPR in writing. However upon the insistence of Mr. Sheer and in order to assist the committee the hard copies were received at the meeting and as a gesture of assistance typed out by the EAP which took a considerable amount of time. The date of providing the hard copy back to yourselves were agreed to by both parties at the meeting. 3. Noted. It is not clear why the comments supplied by yourselves at the meeting and those which should have been submitted yesterday could disadvantage each other? It is not clear how your own submissions could prejudice you, as I&AP's can submit comments during the review period as frequently as they prefer. Note the closing period for comments was yesterday 26th of January 2017 as communicated from the outset, and as no comments had been received from the committee at the close of business on the 26th of January 2017, the EAP proceeded to provide you with their response. 4. Yes these sizes and depths have been part of the application from the outset and the impacts were assessed in light of these specified dimensions. The closest mining activity to the respective eyes referenced is as follows: • Molopo Eye: approximately 22 km • Marico Eye: approximately 16 km 5. Noted, however reference is made again to the closure period which was yesterday, the 26th of January 2017.	
				Via email: On 31 January 2017 the committee submitted a letter of objection directly to the Regional Manager, Mr Pieter Swart, at the DMR for consideration.	The objection is noted herein and a copy of the letter attached in Appendix 8.5 I&AP Correspondence. This submission was made outside of the review period dated 5 December 2016 to 26 January 2017 as communicated to the committee. The content of the letter was however previously responded to respectively, amongst other, in the email to the Agri-Marico Bosveld Farmers Association (dated 31 January 2017) and the MWN response letter (dated 26 January 2017).	
				Via email: On 31 January 2017 the committee provided Ms Uys with the following response to the minutes of the	Via email: On 2 February 2017 Ms Uys provided the following response:	

				public meeting: 1. The minutes of this meeting are incomplete and must include the following points: a) The specific points of concern raised by Mr Brian Sheer at the meeting as well your written responses to these comments. These are part and parcel of the meeting. Mr Sheer's input at the meeting was entirely to point out significant elements extracted from your draft EIA/EMPR document and specifically from the expert reports contained therein which covered water, visual and blast impacts - potential negative effect on local supply and groundwater levels, negative effects of blasting to water and to game, negative landscape impact and environmental degradation of the open pits together with tailings storage facilities, all of which will remain after closure. Mr Sheer specifically stated that in view of the number and length of the issues he raised and given the lengthy duration of the meeting and the lateness of the hour he did not expect that a response could be given to all the issues raised and that he accepted that Exigo would need an opportunity to consider the issues. It was suggested to Mr Sheer that he put the issues in writing but this was unnecessary as these points were already recorded at the meeting and were extracts from Exigo's own documentation. Mr Sheer volunteered Mmutlwa wa Noko's copy of the documents to Exigo which were both flagged and highlighted at all the relevant points. Accordingly all responses that followed are part and parcel of the meeting and must be included in the minutes. b) Mr David de Waal introduced himself as the convener of the meeting but did not disclose to the I&APs who were present that he was also working for Golder in a De Beers application in the Zeerust area until much later when the De Beers application was raised by Mr Trevor Dowdle (also omitted from your minutes) Mr De Waal stated that he was not sure where the De Beers application areas were. We note the omission of these comments from your minutes and require these to be included as we find it relevant to all present, including Exigo and the applicant since Mr De Waal personally sent Mr Brian Sheer the email containing the information of the Zeerust application which Ms Jeanne Kemack forwarded to Mr Allan Saad Jnr as per his request after the meeting. This is also especially relevant as we have since realised that there is also a Zeerust A application which shows that two of the farm areas over which De Beers has applied for overlap with your application. Please inform us if you need us to forward this application information to you. c) Lack of visibility of power point presentation at	a) Your comment in this regard is duly note. As per the previous email response on the 27th of January 2017 during the meeting numerous requests were made for the committee to please provide the comments on the Draft EIA&EMPR in writing. However upon the insistence of Mr. Sheer and in order to assist the committee the hard copies were received at the meeting and as a gesture of assistance typed out by the EAP which took a considerable amount of time. The notations and highlighted sentences/paragraphs in the hard copy and our response thereto will be submitted along with the FEIA&EMPR to the DMR for decision-making. However the meeting minutes have been updated to refer to this correspondence which will be attached. b) Mr Trevor Dowdle's question and Dr. De Waal's response in this regard has been included to the minutes. Subsequent to receiving this comment from the committee Exigo has confirmed that the two areas do not overlap in view of the notices that the committee sent to Mr. Saad Jnr. on the 13th of January 2017. Dr. De Waal did disclose to Exigo beforehand that the company he is part of (Golders) is busy with prospecting right applications in the larger area. Mr. Grobler also confirmed this during the meeting and responded to state that Exigo had used Dr de Waal over a number of years to facilitate and chair meetings. This was Dr de Waal's occupation, and he has been around for approximately 30 odd years and as mentioned he did disclose his involvement with the De Beers application to the project team before the meeting. c) Apologies were made a number of times at the meeting for the problem with the visibility of the presentation due to the sun setting later in Zeerust and the subsequent glare through the top windows of the town hall causing the presentation to be dark and hard to read. As soon as the sun set, this problem was rectified and the presenter went back to the slides which had been unclear and presented them to the attendees again. The attendees were informed that the presentation will be circulated with the meeting minutes. The presentation was subsequently circulated along with the minutes to the attendees on the 17th of January 2016.	

					the meeting requiring the few copies of the draft EIA/EMPR to be handed out to I&APs as well as inability to hear Dr Koos Vivier's comments and a request by Ms Kemack for him to repeat certain information and to face the I&APs when he spoke. This necessitated our reading of the minutes to be sure of the experts' comments. 2. Please note that according to the definitions contained in the Mineral and Petroleum Resources Development Act 28 of 2002: 'a " day" means a calendar day'. Therefore the deadline for response to minutes of the meeting is midnight of 31 January 2017. 3. As an association which exists to preserve the threatened and vital water resource of the Groot Marico River and its catchment in the arid North West Province for the benefit of people and the environment and after deliberation of the information provided, including and especially the experts comments as recorded in the minutes of the meeting we are obliged to object to this application. a) The Klein Marico River is a feeder for the Groot Marico River which it joins N of Bushveld Dam. Dr Buks Henning's information that the Klein Marico River is the most important wetland in the study area and the presence of the vulnerable Marico Barb (Barbus motebensis) and the threatened Waterberg Barb are relevant. Dr Koos Vivier stated that the proximity to the Molemane Eye is 12 kms. The proximity to the three eyes is great cause for concern- the Marico Eye, the Molemane Eye and Molopo Eyes, as well as the fact that the area overlays the highly significant Ramotswa Aquifer. b) The severe drought has led to water being regarded as an extremely strategic resource. The proposed mine not only consumes huge quantities of water but in our view poses high risk levels to the precious and strategic ground and surface water resources. c) We stand under correction but we cannot find any assessment on the risk of damage to the aquifer from the vertical vibration forces emanating from the blasting processes.	After the request to the Hydrogeological Specialist (Dr. Koos Vivier) he apologized and repeated what he had been saying when informed that the attendees could not hear him. The Zeerust town hall is large and thus distorts sound. 2. This date is correct. The date was also communicated as such in the email sent by Ms. Uys on the 17th of January 2017. The 31st of January 2017 was the official date for receipt of comments on the meeting minutes. 3. The committee's objection is again noted as has been communicated previously. a) Correct the Klein Marico River is a feeder for the Groot Marico River which it joins north, in other words downstream of the Marico Bosveld Dam. Yes agreed the Critical Biodiversity Areas (CBA) & Ecological Support Areas (ESA) of the project area are described fully in section 10.5.7 of the EIR&EMPR. The system is also defined as an aquatic Critical Biodiversity 2 (CBA 2) due to the clean, free-flowing nature of the Marico River and the presence of the Vulnerable Marico barb (Enteromius motebensis) and the Near Threatened Enteromius sp. 'Waterberg barb' which is considered near threatened and occurs in the upper reaches of the Klein Marico River system as well as the Groot Marico and Koster River systems. No specimens of E. motebensis were collected from assessed sites, such populations may exist on a regional scale. Any potential impacts on the quaternary catchment (A31D) was assessed and relevant mitigation measures provided for in the following specialist studies: Hydrogeological Impact Assessment; Wetland Impact Assessment; Aquatic Impact Assessment. The mentioned sensitive receivers (Malmani and Molopo Eyes) are located in excess of 15km from the boundary of the simulated area of influence and compartmentalised by various semi-impermeable dykes limiting cross compartmental flow and thus reducing possible impacts. The Malmani Eye is the closest and located in Compartment 11. The simulated zone of influence for the Resource A open pit is contained within compartment 3 and the steady state drawdown contours indicated a maximum drawdown potential up to 5 m. A maximum drawdown of 52 m i.e. change in current calibrated water levels, were	

					simulated within compartment 1 for Resource C and D and confined to Compartment 1 with possible leakage across compartment boundaries i.e. 2 and 4. From the various information sources available in this regard it is clear that this project falls outside the Transboundary Ramotswa Aquifer (International Groundwater Resources Assessment Centre; RESILIM; International Water Management Intitute) b) The hydrogeological modelling has been done in order to take flood and drought conditions into consideration. The lower 5th percentile upper 95th percentile of rainfall data was utilized, the lower 5th and upper 95th percentiles equate to the one in twenty year flood and drought conditions respectively. A safety factor was also applied to the water balance in order to accommodate drought periods where storm water and fissure water may not be adequate to supplement the demand. Water supply from groundwater resources is currently preferred. Other water supply options have also been identified as described in Section 8.4.1 of the EIA&EMPR. According to the hydrogeological study the development will result in a maximum simulated inflow of approximately 900 m³/d from the Klein Marico River resulting in less than a 4% impact on the simulated surface water runoff in the A31D quaternary catchment. The impact on the smaller micro-catchment where the average annual flow is 4000 m3/d (averaged to daily flow), the impact is higher with a simulated flow reduction of ±25%. A commitment is made in the EIA on an extensive surface water and groundwater quantity and quality monitoring system that is already in place since 2013. Part of this commitment is to monitor regional and local groundwater levels, borehole yields and at least two flow measurement stations one upstream from the mining and one downstream in the Klein Marico River. Please refer to the monitoring map in the Hydrogeological Study. The dewatering impact on the Klein Marico River could be mitigated by directly discharging the treated dewatered water back into the Klein Marico River. Alternatively offsets such as the purchase of existing irrigation rights or the removal	

					of alien invasive species has also been identified to mitigate the possible impact. It is recommended that flow gauges be installed in the Klein Marico River upstream and downstream of the proposed mine site to record surface water flow. The Crocodile (West) Marico Water Management Area Internal Strategic Perspective (ISP) concludes that groundwater management in the catchments are of utmost importance. The current water balance indicates a deficit in supply versus demand and little to no possibility of surface water resources being established. Groundwater resources is the only viable option, provided the development is accompanied by a detailed analyses and license application process. Additionally, certain strategies such as alien vegetation eradication along the Klein Marico riparian zones will increase the water balance and possibly off set negative impacts. c) The Blast and Vibration Assessment considered the impact of blasting on boreholes. Five boreholes were identified for Resource Area A and Eight for Resource Area C & D that was evaluated for possible influence from blasting operations. One borehole at Resource Area C & D, Shaft (D/BH 12) were identified within the pit area but were classified as not in use. The expected levels of ground vibration were found to be within acceptable limits. Table 20 shows the identified boreholes. Figure 27 and Figure 28 in this report shows the location of the boreholes in the area. The impact on the aquifer as a whole was not specifically assessed.	
RESILIM	Steve Collins		Via email: On 2 December 2016 Ms Uys informed Mr Collins that they received his contact details from the Mmutlwa wa Noko Committee. She informed him that Exigo is the Environmental Assessment Practitioner for the project and is conducting the Scoping and Environmental Impact Assessment Process. She further informed him that he has been registered as an Interested and Affected Party (I&AP) on the project and provided him with a notification in this regard. She stated that the Draft Environmental Impact Assessment and Environmental Management Programme Report (EIA&EMPR) will shortly be made available	No comment received to date.		Comments outstanding

			for public review and comment, of which he will be notified in advance. She also offered to put him in contact with the hydrogeological specialists on the project should he wish to discuss any groundwater technical issues.			
			Via email: On 5 December 2016 a notification with regards to the availability of the DEIA&EMPR and an invitation to the EIA public meeting was sent to the stakeholder.	No comment received to date.		
Trevor Dowdle		Y	Meeting: On 12 December 2016 and 12 January 2017 Mr Dowdle attended a focus group meeting and the EIA public meeting respectively.	Via email: On 1 February 2017 Mr Dowdle asked Ms Uys if the mine will cease operations when their precious water supply is compromised by mine usage and or contamination. He stated that all those that have bought land involving the mine must go and live there and that the timeframe given us ordinary country folk to examine, absorb and understand the frightful implications of a mine in our area is hopelessly inadequate.	Via email: On 2 February 2017 MS Uys thanked Mr Dowdle for his email and informed him that the DEIA&EMPR was subjected to a public participation process of 30 days with the review period of 30 days now closed (from 5 December 2016 until 26 January 2017). However as he may well know the Committee Mmutlwa wa Noko and Agri-Marico Bosveld Farmers Association lodged an objection with the Regional Manager of the DMR on the 31st of January 2017. The matters raised by him have also been presented to the DMR by the committee. They have collated and included all the previous meetings and responses received to be submitted as part of the FEIA&EMPR, they will also be in communication with regards to the decision the Department may have in the future.	Dispute
Endangered Wildlife Trust	JP le Roux Marico Catchment Conservation Project Co-ordinator Source to Sea Programme	Y		Via email: On 19 January 2017 Mr le Roux asked to be included on the emailing list as an IAP, and to be kept updated on the dates of public participation meetings.	Via email: On 19 January 2017 Ms Uys thanked him for his correspondence and informed him that he has been added to their I&AP database. She provided him with a notification with regards to the availability of the EIA&EMPR) and stated that they would appreciate his comments. She informed him that all comments should reach them on or before the 26th of January 2017. She further stated that a public meeting was held on the 12th of January 2017 and provided him with a copy of the meeting minutes and presentation. **No further comments received to date.**	Concluded
Berne Nightingale		Y		Via email: On 19 January 2017 Mr Nightingale stated that he wished to be registered as an I&AP, as this mine does not sound like a good idea due to ground water effects.	Via email: On 23 January 2017 Ms Uys thanked Mr Nightingale for his comments and informed him that he has been registered on the project as an I&AP, and that his comments will be included in the Comments and Response Register as part of the EIA&EMPR. She informed him that with regards to his	Concluded

					concern regarding groundwater effects, a Specialist Hydrogeological Impact Assessment Study was conducted in this regard.	
Agri-Marico Bosveld Farmers Association	Mr SJ Pretorius Manager: Agri Marico Bosveld/Zeerust	Y		Via email: On 24 January 2017 Mr Pretorius sent a letter objecting to the mining application to both Exigo and the DMR. He also registered the Agri – Marico Bosveld Famers Association as an I&AP in the application. The association submitted the following comments: 1. The farm portions in the Zeerust part of your application fall within the heart of a strategic water resource to South Africa - the sensitive Groot Marico River Catchment, a Freshwater Ecosystem Priority Area (FEPA) which provides vital water to thousands of people. 2. Our organisation responds to any application which has the potential to impact on our water resources. The farmers downstream are dependent on the water from the Catchment and we object to any activity in the Catchment which can interfere with its functioning. Furthermore the water from the Groot Marico River has already been allocated for users. Approving this application does not make sense for long term sustainability. 3. This is even more relevant at the moment as South Africa is in the grip of severe drought, and North West Province has been declared a drought disaster area. The Marico Bosveld Dam is down to only 40% and farmers depending thereon for irrigation purposes are in a predicament. This is after Water Affairs allocate a session allocation (quota) of 85%, the farmers realize that the official allocation is incorrect and by them decide to use only 50% of the allocated quota. 4. Only immediate good rains will save these farmers from losing their crops. Also boreholes are drying up at a high rate. 5. The Marico Bosveld Dam is a 100% irrigation dam, providing for thousands of people. 6. Our organisation objects Exigo3 strategy of running the PPP during peak holiday season many directly affected people are unlikely to be available to participate and comment. This is in direct conflict with the principles of consultation which require engaging in good faith and seeking out I & APs responses. 7. The existing Fluorspar mine, Witkoppen within the same vicinity of application can still be mined. There is no reason to establish a new mine.	Via email: On 24 January 2017 Ms Uys thanked the association for its comments and informed them that they have been registered on the project as an I&AP. She stated that they will respond to the comments in due course and that the comments will also be included to the FEIA&EMPR to be submitted to the DMR for decision-making purposes.	Dispute
				Via email: On 26 January 2017 Mr Pretorius stated that their registration has been send already on the 23rd January 2017 and receipt thereof were not admitted yet.	Via email: On 26 January 2017 Ms Uys informed Mr Pretorius that they received a letter from the Marico Bosveld Farmers Union on the 23rd of January 2017. They acknowledged receipt thereof on the 24th of January 2016. The letter	

					was received from vdMerweEM@saps.gov.za and the response was sent to the same address. She provided him with the response. She pointed out the following with regards to the email and letter received that morning: • The letter received today is on a different letterhead, namely that of Agri Marico Bosveld; however the content is the same; • The fax numbers are the same but the cell phone numbers and email addresses on the letters differ; • None of the email addresses in the letters correspond to the email address from which the letter on the 23rd of January 2017 was sent. She asked that he please clarify his position as noted above in order to avoid confusion going forward and in order to respond soonest. She informed him that this email is sent to all email addresses previously used and contained in the letters (3 email addresses).	
				Via email: On 26 January 2017 Mr Pretorius asked that Mr Uys make use of the Bloekomsrus@vodamail.co.za address in future as reception in the area is not always as it should be and therefor it is necessary to make use of other means.	Via email: On 31 January 2017 Ms Uys responded to the Association's comments submitted on the 24th of January 2017 as follows: Your objection is noted and will be submitted as such to the competent authority. The registration as an I&AP is also noted. 1. Agreed, the Critical Biodiversity Areas (CBA) & Ecological Support Areas (ESA) of the project area are described fully in section 10.5.7 of the EIR&EMPR. The system is also defined as an aquatic Critical Biodiversity 2 (CBA 2) due to the clean, free-flowing nature of the Marico River and the presence of the Vulnerable Marico barb (Enteromius motebensis) and the Near Threatened Enteromius sp. 'Waterberg barb' which is considered near threatened and occurs in the upper reaches of the Klein Marico River system as well as the Groot Marico and Koster River systems. Whilst no specimens of E. motebensis were collected from assessed sites in the systems under investigation, such populations may exist on a regional scale. Any potential impacts on the quaternary catchment (A31D) was assessed in the following specialist studies: • Hydrogeological Impact Assessment; • Wetland Impact Assessment; • Aquatic Impact Assessment. Also please refer to point 2 below.	

					2. Water supply from groundwater resources is currently preferred. Other water supply options have also been identified as described in Section 8.4.1 of the EIA&EMPR. According to the hydrogeological study the development will result in a maximum simulated inflow of approximately 900 m³/d from the Klein Marico River resulting in less than a 4% impact on the simulated surface water runoff in the A31D quaternary catchment (refer to attached catchment map). The impact on the smaller micro-catchment where the average annual flow is 4000 m3/d (averaged to daily flow), the impact is higher with a simulated flow reduction of ±25%. A commitment is made in the EIA on an extensive surface water and groundwater quantity and quality monitoring system that is already in place since 2013. Part of this commitment is to monitor regional and local groundwater levels, borehole yields and at least two flow measurement stations one upstream from the mining and one downstream in the Klein Marico River. Please refer to the attached monitoring map. The dewatering impact on the Klein Marico River could be mitigated by directly discharging the treated dewatered water back into the Klein Marico River. Alternatively offsets such as the purchase of existing irrigation rights or the removal of alien invasive species has also been identified to mitigate the possible impact. It is recommended that flow gauges be installed in the Klein Marico River upstream and downstream of the proposed mine site to record surface water flow. The Crocodile (West) Marico Water Management Area Internal Strategic Perspective (ISP) concludes that groundwater management in the catchments are of utmost importance. The current water balance indicates a deficit in supply versus demand and little to no possibility of surface water resources being established. Groundwater resources is the only viable option, provided the development is accompanied by a detailed analyses and license application process. Additionally, certain strategies such as alien vegetation eradication along the Klein Marico riparian zones will increase the water balance and	

					possibly off set negative impacts. 3. Your reference to allocation are noted. Please refer to item 2 above with regards to groundwater being considered as preferred water supply and item 4 below with regards to the methodology followed in the specialists assessments. 4. Your reference to good rains is noted. However the hydrogeological modelling has been done in order to take flood and drought conditions into consideration. The lower 5th percentile upper 95th percentile of rainfall data was utilized, the lower 5th and upper 95th percentiles equate to the one in twenty year flood and drought conditions respectively. A safety factor was also applied to the water balance in order to accommodate drought periods where storm water and fissure water may not be adequate to supplement the demand. 5. Refer to the previous response under Item 2. The proposed Doornhoek Mine is situated close to the Klein Marico River which joins the Groot Marico River downstream from the Marico Bosveld Dam. 6. The Draft EIA&EMPR was subjected to a public participation process of 30 days with the review period of 30 days running from 5 December 2016 until 26 January 2017. In accordance with regulation 3(2) of GNR 982 which states that for any action contemplated in terms of the EIA Regulations 2014 for which a timeframe is prescribed, the period of 15 December to 5 January was excluded in the reckoning of days. It should be noted that the approach to the public participation was also subjected to the legal required timeline for submission of the EIA&EMPR to the DMR thus necessitating the review period to run over the holiday. It is therefore presented that the above time period did not prejudice I&APs and provided sufficient time for the review of the EIA&EMPR. 7. The Witkop Fluorspar Mine (Witkop Mine) occurs to the north-west 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 for lime and gypsum, but not mining fluorspar according to the team's knowledge. The Doornhoek deposit has significantly higher grade fluorspar. Witkop has been mining since the 1970's and therefore their higher grade fluorspar is mostly depleted. Talks between Witkop and Doornhoek are ongoing with regards to potential future collaboration. A preliminary Economic Assessment and Pre-feasibility Study has been undertaken for the project. In light of the determined feasibility of the project, regional socio-economic impacts have been assessed including the need and desirability associated with this application.	
Scoping Phase Public Meeting			On 28 August 2016 a public meeting was held for the project at the Zeerust Town Hall.	The following attendees raised comments and concerns at the public meeting: • Ms Jeanne du Toit • Mr Loek van den Heever • Mr Herman Peters • Ms Imaan Suliman • Mr Geo Booysen Please refer to Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers for the comments and concerns raised.	Please refer to Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers for the responses given during the meeting.	
EIA Phase Public Meeting			On 12 January 2017 a public meeting was held for the project at the Zeerust Town Hall.	The following attendees raised comments and concerns at the public meeting: • Mr Trevor Dowdle • Mr Brian Sheer • Ms Jeanne Kumack • Arend & Esther van Staden Please refer to Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers for the comments and concerns raised.	Please refer to Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers for the responses given during the meeting.	

10. THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT FOOTPRINT ALTERNATIVES (The environmental attributes described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

10.1. TYPE OF ENVIRONMENT AFFECTED BY THE PROPOSED ACTIVITY.

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

10.1.1. CLIMATE

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

10.1.1.1. 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 17 indicates the monthly climatic averages of the project area, while Table 7 indicate the temperature, precipitation and humidity levels for the Zeerust and Mafikeng weather stations:

Monthly Minimum, Maximum and Average Temperatures (°C)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	17.4	17.3	15.7	12.0	10.2	6.5	6.0	8.2	11.9	14.0	15.1	17.7
Average	22.6	22.3	20.3	16.4	13.8	10.1	9.6	12.4	16.5	19.0	20.7	22.7
Maximum	27.0	26.8	24.8	21.0	18.1	14.6	13.9	17.1	21.3	23.9	25.7	27.1

Figure 17 Monthly minimum, maximum and average temperatures for the project areas (Airshed, 2016)

Table 7: 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

10.1.1.2. 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 18 indicates wind direction and speed. The wind direction in the area is predominantly north-easterly. Day-time and night-time flow fields are similar with winds predominantly from the north-eat.

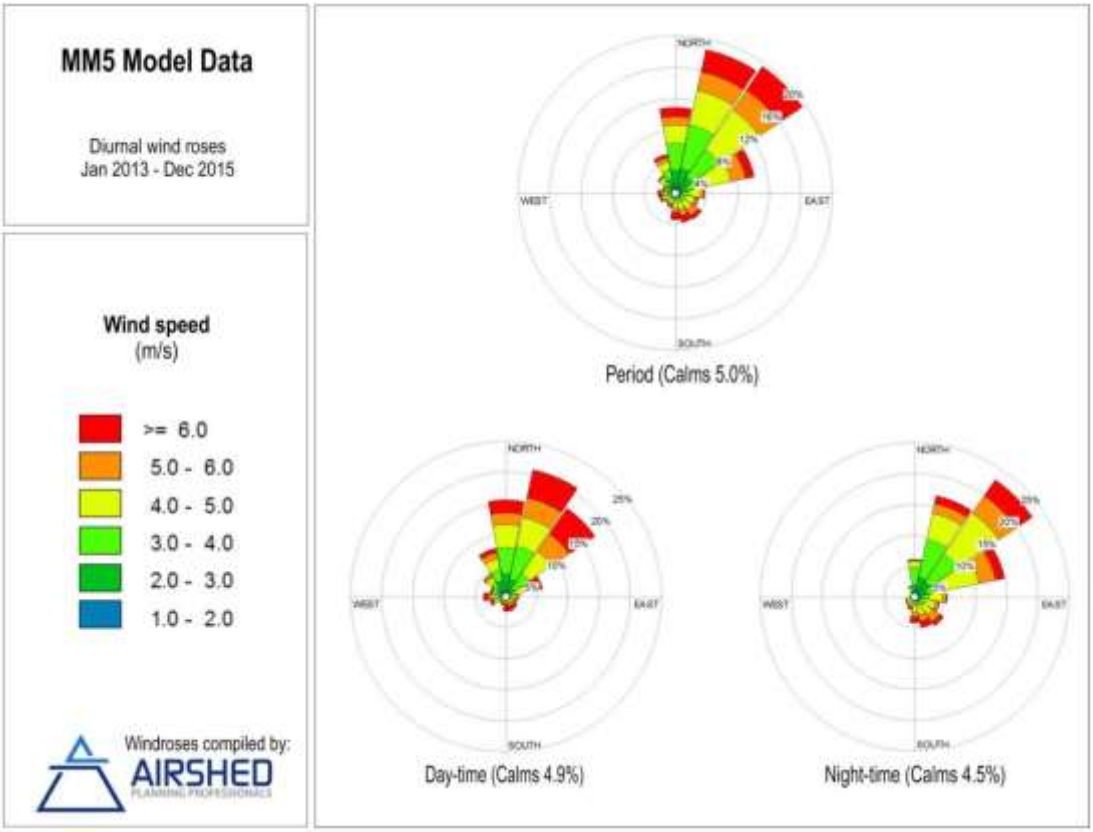


Figure 18 Period, day-, and night-time wind roses for the project area (Airshed, 2016)

10.1.2. 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 19 and Figure 20 for elevation profiles of the study area and Figure 21 for a map of the terrain.

Figure 19: West-East Elevation Profile (exaggerated)

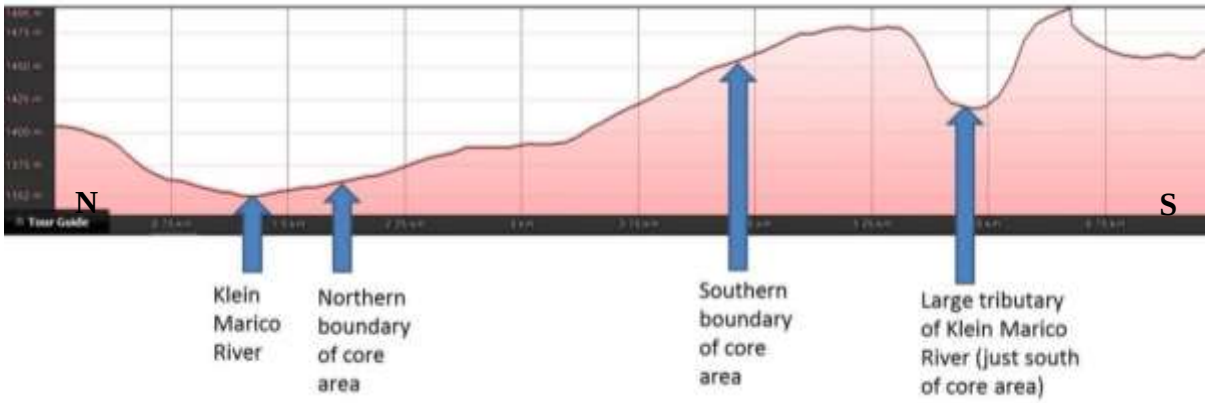


Figure 20: North-South Elevation Profile (exaggerated)

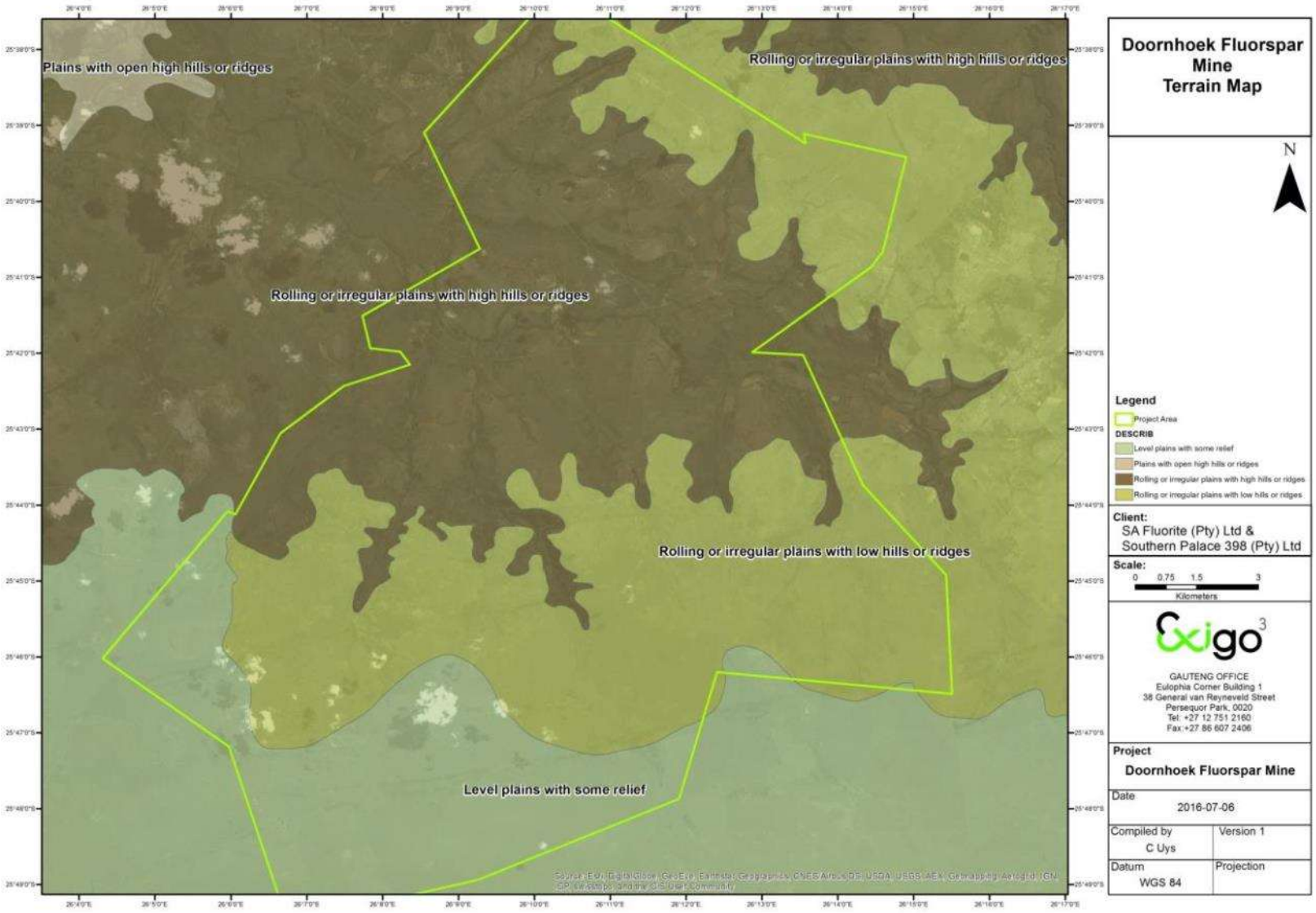


Figure 21: Terrain map

10.1.3. GEOLOGY

The following section describes the regional geology as depicted in the 1:250 000 geological maps sheets of Rustenburg (2526) and Mafikeng (2426) (Figure 22). Geological cross sections and slice positions are indicated in Figure 23.

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.

The fluorspar deposits are large bedded replacement deposits of the classical Mississippi Valley type. Fluorspar mineralisation occurs mainly associated with stromatolites 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 stromatolites and these are expected to be mined.

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 stromatolitic 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 dolerite dyke 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. 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 10-35 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 (Meyer et al, 2016).

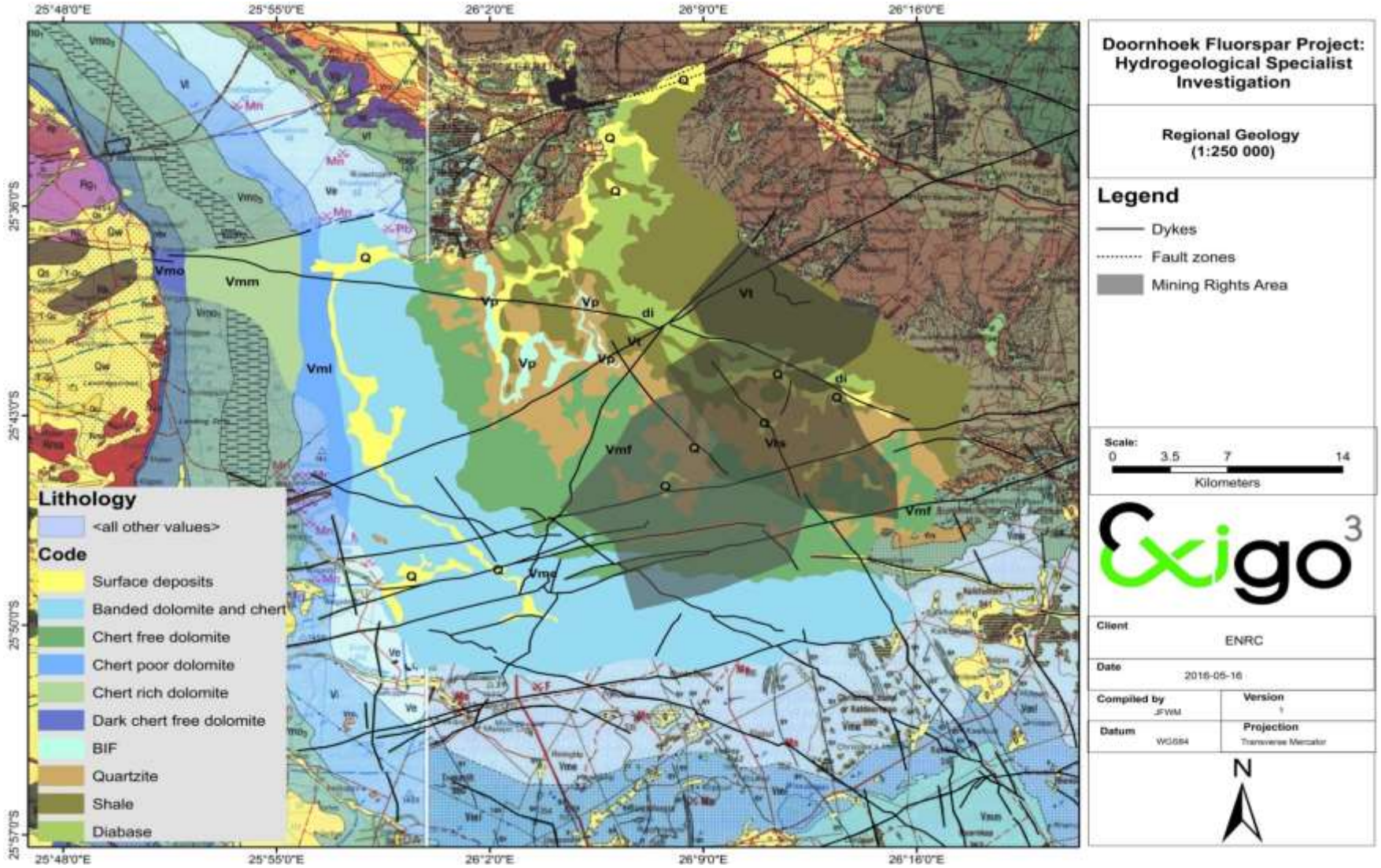


Figure 22 Regional Geology Map (Rustenburg 2526 and Mafikeng 2426)

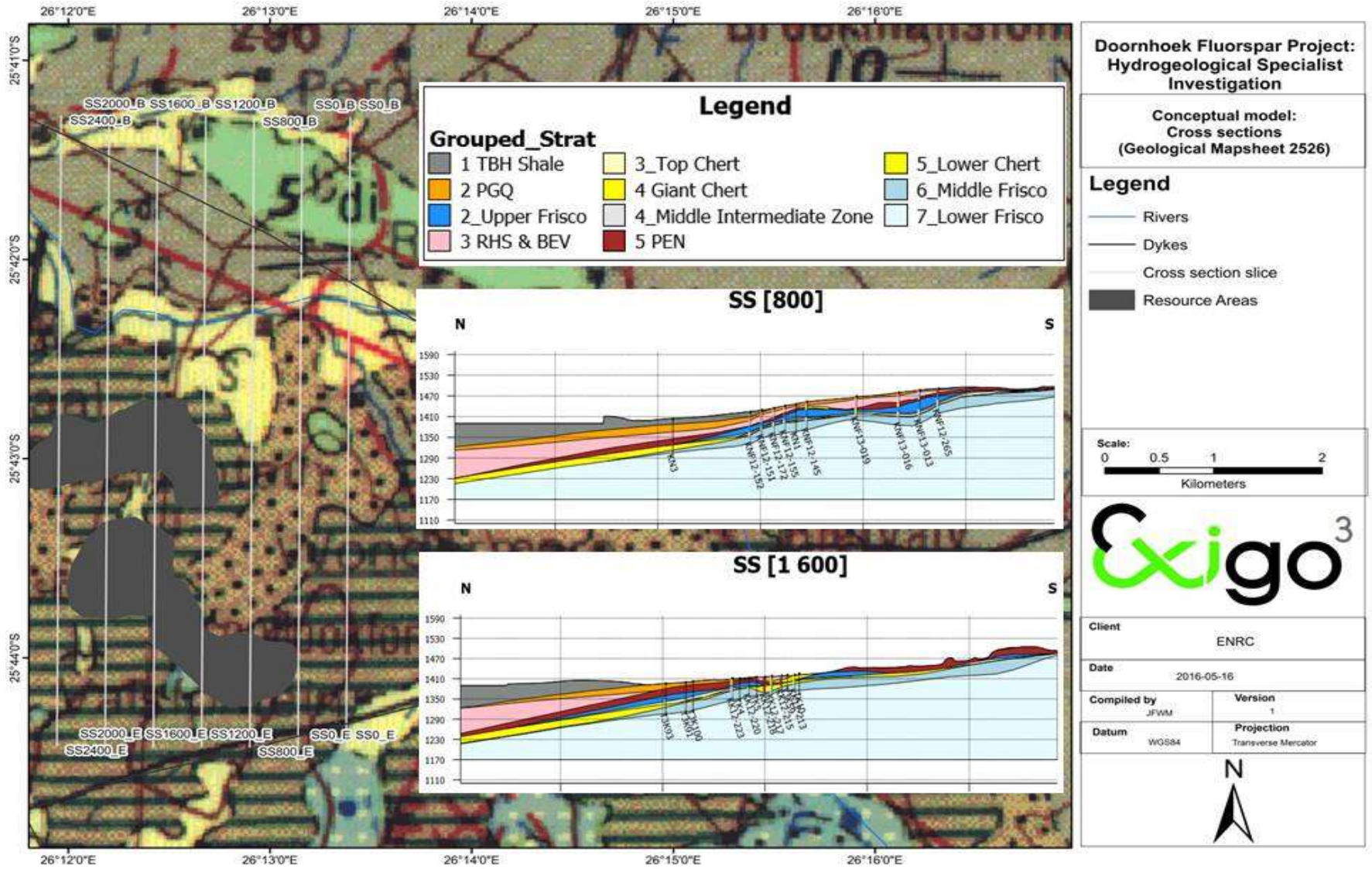


Figure 23 Geological cross sections of resource areas C and D

10.1.4. 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 8 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 24) 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 8: 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; dolerite dykes 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 dolerite dykes in places. Dolomite and chert of the Chunniespoort Group in the south-west.

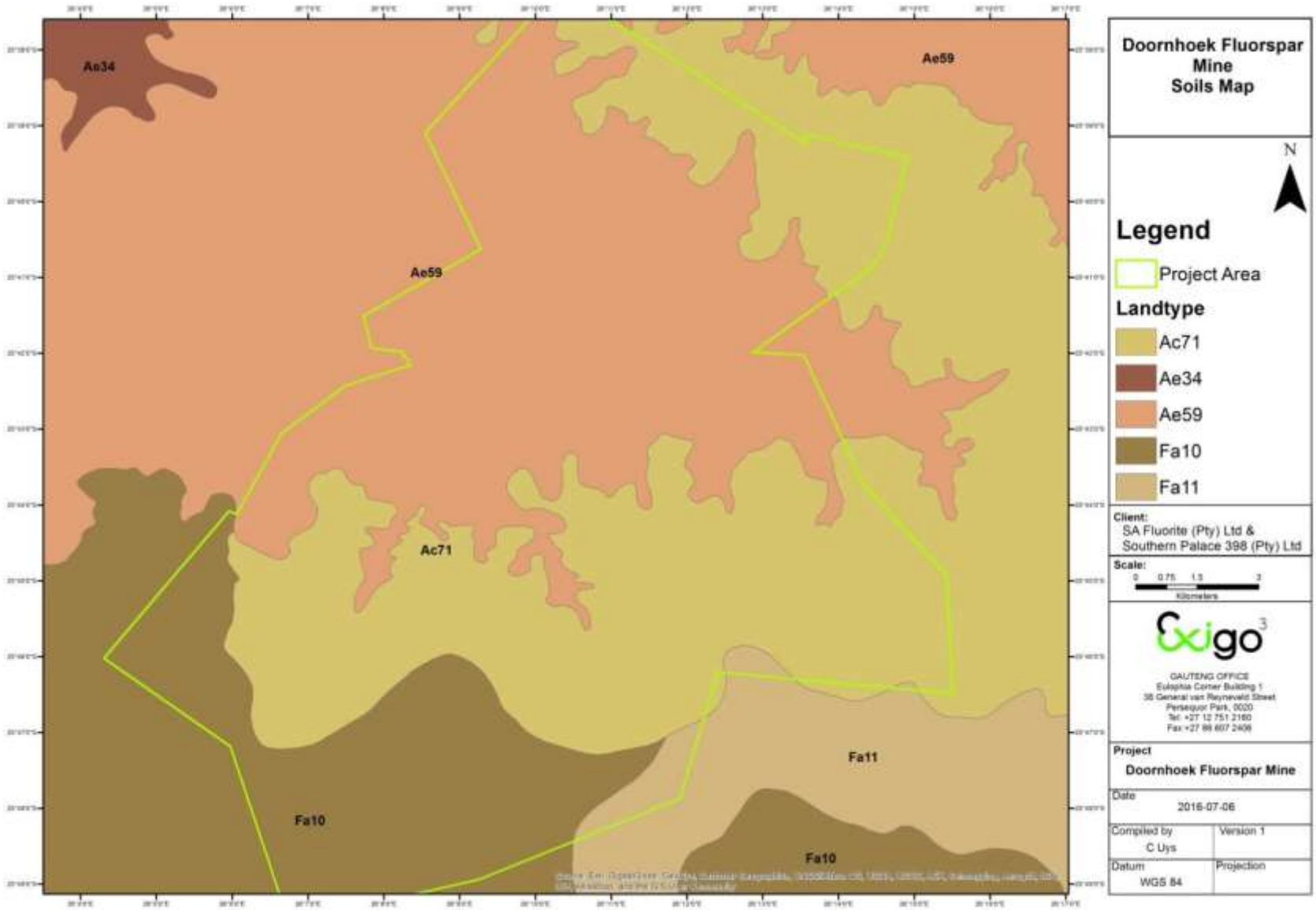


Figure 24: Soil types

10.1.5. BIODIVERSITY

10.1.5.1. 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).

Although the site is classified mainly as Moot Plains Bushveld, representations of the Carletonville Dolomite Grassland was also observed in the area and subsequently this vegetation type is included as part of the focus area (Henning, 2016).

10.1.5.2. 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*

10.1.5.3. 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 9):

Table 9: Red data species found during the vegetation survey

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

10.1.5.4. 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 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 10: 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

Listed protected tree species in terms of the National Forest Act of 1998, may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold – except under license granted by Department of Agriculture, Forestry and Fisheries (DAFF) or a delegated authority. Obtaining relevant permits are therefore required prior to any impact on the above protected trees.

10.1.5.5. 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 11:

Table 11: 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

Species	Indigenous / exotic	Status	Habitat of species
			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, 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

Species	Indigenous / exotic	Status	Habitat of species
			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 12 below:

Table 12: 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
Grewia flava	Localized	Bushveld on floodplains / sandy soils
Terminalia sericea	Widespread	Deep sandy soils on plains

10.1.5.6. Vegetation Units of the project area

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

The vegetation communities identified in the area 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 topographical differences, previous land-use and soil differences that had the most definitive influence on the vegetation units. Each unit is described in terms of its characteristics.

The broad classification identified 6 vegetation units as indicated in Figure 27 as follows:

1. *Loudetia simplex – Urelytrum agrypyroides* rocky grassland;
    - Plateaus;
    - Undulating footslopes / plains;
2. Loudetia simplex rocky outcrops;
3. Mountainous woodland:
    - *Open Strychnos - Acacia caffra* woodland
    - *Olea – Strychnos – Combretum* woodland
    - *Strychnos – Combretum* woodland;
    - *Protea caffra* woodland
4. *Acacia karroo – Ziziphus mucronata - Olea europaea* woodland on valleys / plains:
    - Undulating terrain & valleys;
    - Bushclumps (stonewalls);
5. Degraded terrain
    - Degraded grassland / old fields
    - Degraded woodland
    - Old mining quarries / farmsteads
6. Drainage features
    - Mixed *Searsia lancea - Acacia karroo* riparian woodland & water courses
    - Floodplains.
    - Hillslope Seep wetlands

10.1.5.7. Critical Biodiversity & Ecological Support Areas (ESA) of the project area

The North West Biodiversity Conservation Assessment (NWBCA) identifies specific Critical Biodiversity Areas (CBAs) in the North West Province. Critical Biodiversity Areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services (North West Department of Agriculture, Conservation, Environment and Rural Development, 2009).

In terms of section 52 of the NEMBA the Minister or an MEC may publish in the Gazette a list of ecosystems that are threatened and in need of protection. On 9 December 2011 a National List of threatened ecosystems in need of protection was published in GNR 1002. Section 5.2 of the national list provides for the implications of the listing on environmental authorisation applications. The

aforesaid section refers to Listing Notice 3 and activities proposed in critically endangered or endangered ecosystem listed In terms of section 52 of the NEMBA. Under section 5.2 of the national list it is stated that "if any other development that requires environmental authorisation impacts on a threatened ecosystem, that impact should be avoided, minimised, mitigated and/or offset as appropriate. To date the North West province has not listed critical biodiversity areas or ecosystems – the only gazetted list that exists is the above National List published in 2011. The Province's technical report states that the provincial list will not be developed until the National List has been finalised (this is so that confusion / contradictions are avoided).

It follows from the above that the fact that an area has been listed as an ecosystem in terms of the NEMBA does not prohibit the undertaking of development activities but an environmental impact assessment will have to be undertaken and environmental authorisation obtained. Furthermore, mitigation measures must be identified and possible offsets.

The proposed site does not fall within any of the listed ecosystems as per GNR 1002.

In terms of the SANBI 2015 terrestrial CBA dataset, the majority of the terrestrial areas on site, especially with regards to the locality of the plant and TSF as well as Resource Area C and D are classified as ESA 1 with small occurrences of ESA 2 (refer to Figure 25). The terrestrial areas for the location of Resource Area A are classified as CBA 2.

ESA 1 areas are semi-natural ecologically functional landscapes that retain basic natural attributes:

- Ecosystems are still in a natural, near-natural or semi-natural state, and have not been previously developed;
- Ecosystems are moderately to significantly disturbed but are still able to maintain basic functionality;
- Individual species or other biodiversity indicators may be severely disturbed or reduced;
- These are areas with low irreplaceability with respect to biodiversity pattern targets only.

ESA 2 areas which have been substantially modified and where ecological functionality must be maintained as much as possible with the following attributes:

- Maintain current land use or restore area to a natural state;
- Ecosystems are NOT in a natural or near-natural state, and has been previously developed (e.g. ploughed);
- Ecosystems are significantly disturbed but are still able to maintain some ecological functionality;
- Individual species or other biodiversity indicators are severely disturbed or reduced and these are areas that have low irreplaceability with respect to biodiversity pattern targets only;
- These are areas with low irreplaceability with respect to biodiversity pattern

CBA 2 areas are near natural landscape with the following attributes:

- Ecosystems and species largely intact and undisturbed;
- Areas with intermediate irreplaceability or some flexibility in terms of area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising the ability to achieve targets, although loss of these sites would require alternative sites to be added to the portfolio of CBAs.
- These are landscapes that are approaching but have not passed their limits of acceptable change (READ, 2015).

According to the North West Biodiversity Sector Plan (READ, 2015) the Marico River system, including its associated tributaries is a highly ecologically significant aquatic ecosystem as highlighted by them being designated as priority rivers (FEPA Rivers). The system is also defined as an aquatic Critical Biodiversity 2 (CBA 2 due to the clean, free-flowing nature of the Marico River and the presence of the Vulnerable Marico barb (Enteromius motebensis) and the Near Threatened Enteromius sp. 'Waterberg barb' which is considered near threatened and occurs in the upper reaches of the Klein Marico River system as well as the Groot Marico and Koster River systems. Whilst no specimens of E. motebensis were collected from assessed sites in the systems under investigation, such populations may exist on a regional scale.

The upper reaches of the Marico River are in a natural or near-natural ecological state (ecological category A/B: largely natural) and are important as they represent a representative sample of the diversity of freshwater ecosystem types in the province that should remain in a good ecological state.

According to the North West Biodiversity Sector Plan (READ, 2015) a Marico River Conservation Association has been established by landowners whom are striving for Biosphere Reserve status. The upper Groot Marico River and tributaries are also important for species evolutionary processes as the different catchments support three genetically distinct populations of the Vulnerable Marico barb (Enteromius motebensis). Diversification of fish and other aquatic organisms is likely to be a phenomenon common to all upper catchments of rivers arising in the Swartruggens and Magaliesberg mountains. The rivers and associated catchments that support threatened fish species are Fish Sanctuary Areas, which are designated as Freshwater Ecosystem Priority Areas if in a good ecological condition (A or B ecological category) or Fish Support Areas (lower than A or B ecological category). The Present Ecological State (PES) of the Klein-Marico River is categorised as a Class B: Largely Natural.

The CBA Map categories, in particular Protected Areas, CBAs and ESAs, should inform the development of municipal land use schemes in terms of the Spatial Planning and Land Use Management Act (Act. 6 of 2013) (SPLUMA) schedule 2 land use purposes (or other land use zones developed in terms of municipal bylaws), as well as land use change applications (e.g. rezoning). The guidelines also give the evaluators of EIAs an indication of appropriate land uses within each category. Importantly, the North West Biodiversity Sector Plan provides guidance on appropriate land

uses but does not grant or remove existing land use rights or take the place of development application authorisation processes.

The following land management objectives apply to ESA 1 and CBA 2 areas and should guide land use planning and decision-making:

- ESA 1: Maintain in at least a semi-natural state as ecologically functional landscapes that retain basic natural attributes.
- CBA 2: Maintain in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process.

It is noted that a section of the road between Resource Area A and the plant runs through a CBA 1 area, however as noted in the Appendix 7.11: Floodline Study & SWMP, it is recommended that the road be re-aligned to be located outside the 1:100 year floodline thus limiting the ecological and aquatic impact.

The following land use zones and associated activities are recommended for ESA 1 and CBA 2 areas (READ, 2015): (Y = Yes, N = No, R = Restricted)

Land Use Zone	Associated Land Use Activities	Allowance/Status
Environmental Conservation	Conservation management, low intensity eco-tourism activities and sustainable consumptive activities	Y
Environmental Management Overlay Zone	These are areas that are designated as priority areas for protection, namely CBA's and ESA's, and can include ONA's	Y
Tourism and Accommodation	Low Impact Tourism / Recreational and Accommodation	R
	High Impact Tourism / Recreational and Accommodation (e.g. golf estates)	N
Rural Residential	Low density rural housing or eco-estates	R
	Tradition Areas (existing) and Rural Communal Settlement (New)	N
Agriculture	Extensive Game Farming	Y
	Extensive Livestock Production	Y
	Game Breeding	N
	Arable Land – Dryland and Irrigated Crop Cultivation	N
	Agricultural infrastructure – Intensive Animal farming (e.g.) feedlot, dairy, piggery, chicken battery)	N
Municipal Commonage	Local Agri-economic Development	R

Open Space	Public or Private Open Space, including recreational areas, parks, etc.	R
Residential	Low, low-medium and medium-high, and high density urban residential development (Urban & Business Development)	N
Urban Influence	An amalgamation of land use zones, including institutional, urban influence, general mixed use, low impact mixed use, suburban mixed use and general business (Urban & Business Development)	N
Low or High Impact and General Industry	Low impact, general industry and high impact industry (Urban & Business Development)	N
Transport Services	Transportation service land uses e.g. airports, railway stations, petro-ports and truck stops, bus and taxi ranks and other transport depots (In NW – Linear Engineering Structures)	R
Roads and Railway	Excising and planned linear infrastructure such as hardened roads and railways, including activities and buildings associated with road construction and maintenance, e.g. toll booths, construction camps and road depots sites (Linear Engineering Structures)	R
Utilities	Linear engineering structures, such as pipelines, canals and power lines (Linear Engineering Structures)	R
	Small scale infrastructural installations, including wastewater treatment works and energy sub-stations	R
	Large scale infrastructure installations, including bulk water transfer schemes, impoundments (Water Projects & Transfers), and energy generation facilities (power stations)	N
	Renewable Energy (PV farms and solar arrays)	N

	Renewable Energy (wind farms)	R
Quarrying and Mining	Prospecting and Underground Mining	R
	Quarrying and open cast mining (includes surface mining, dumping & dredging)	N
	Hydraulic Fracturing (fracking)	N

It is important to note that land development applications may require environmental authorisations and town planning permission irrespective of the CBA Map category; and that these processes must be followed. Where development applications other than the preferred biodiversity-compatible land uses are submitted in terms of the NEMA EIA Regulations, integrated environmental management tools or land use legislation (SPLUMA regulations/municipal bylaws), the following is recommended:

- A screening exercise should be undertaken by a biodiversity or ecological specialist appointed by the Environment Assessment Practitioner (EAP), to verify the CBA Map category on site
- If the site is verified as a CBA 1, CBA 2, ESA 1 and/or ESA 2, land development applications other than the preferred biodiversity-compatible land uses should be investigated in detail and the mitigation hierarchy applied in full.
- If the application is pursued, the application should be informed by the specialist biodiversity or ecological assessment as undertaken during the screening phase (READ, 2015).

In the Province's Technical Report of March 2009 (which precedes the gazetting of the National List) it is stated that mining is not permitted. However, the aforesaid report does not supersede the National List (2011) and remains a guideline to be taken into account by Government when considering applications for development, including mining, in such areas.

Section 48 of the MPRDA contains certain statutory prohibitions on mining on land, read with section 48 of the National Environmental Management: Protected Areas Act prohibiting mining in protected areas. In all other areas the application for a mining right must be considered together with the impacts identified and mitigation measures proposed.

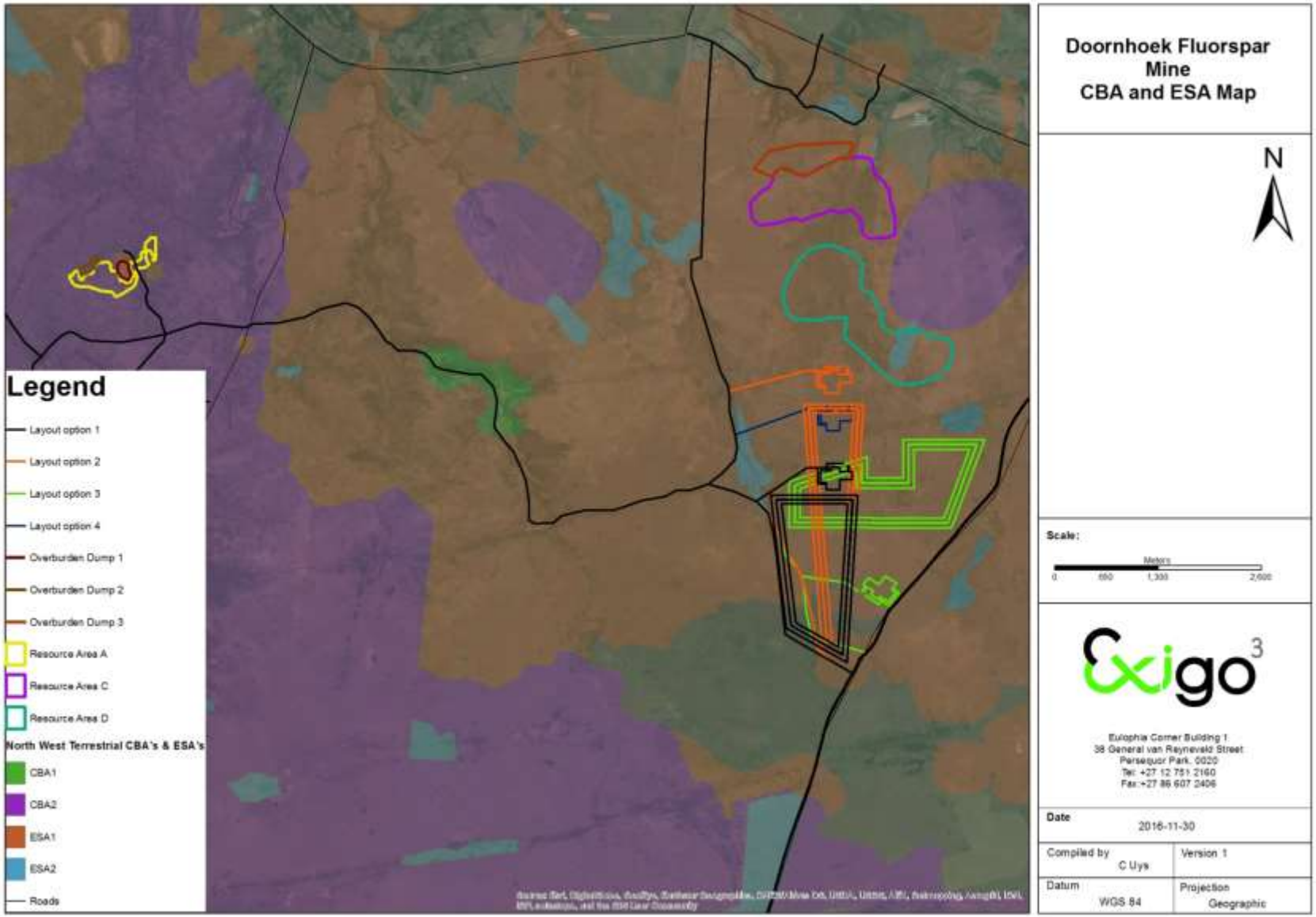


Figure 25 Terrestrial CBA and ESA areas of the study area (2015)

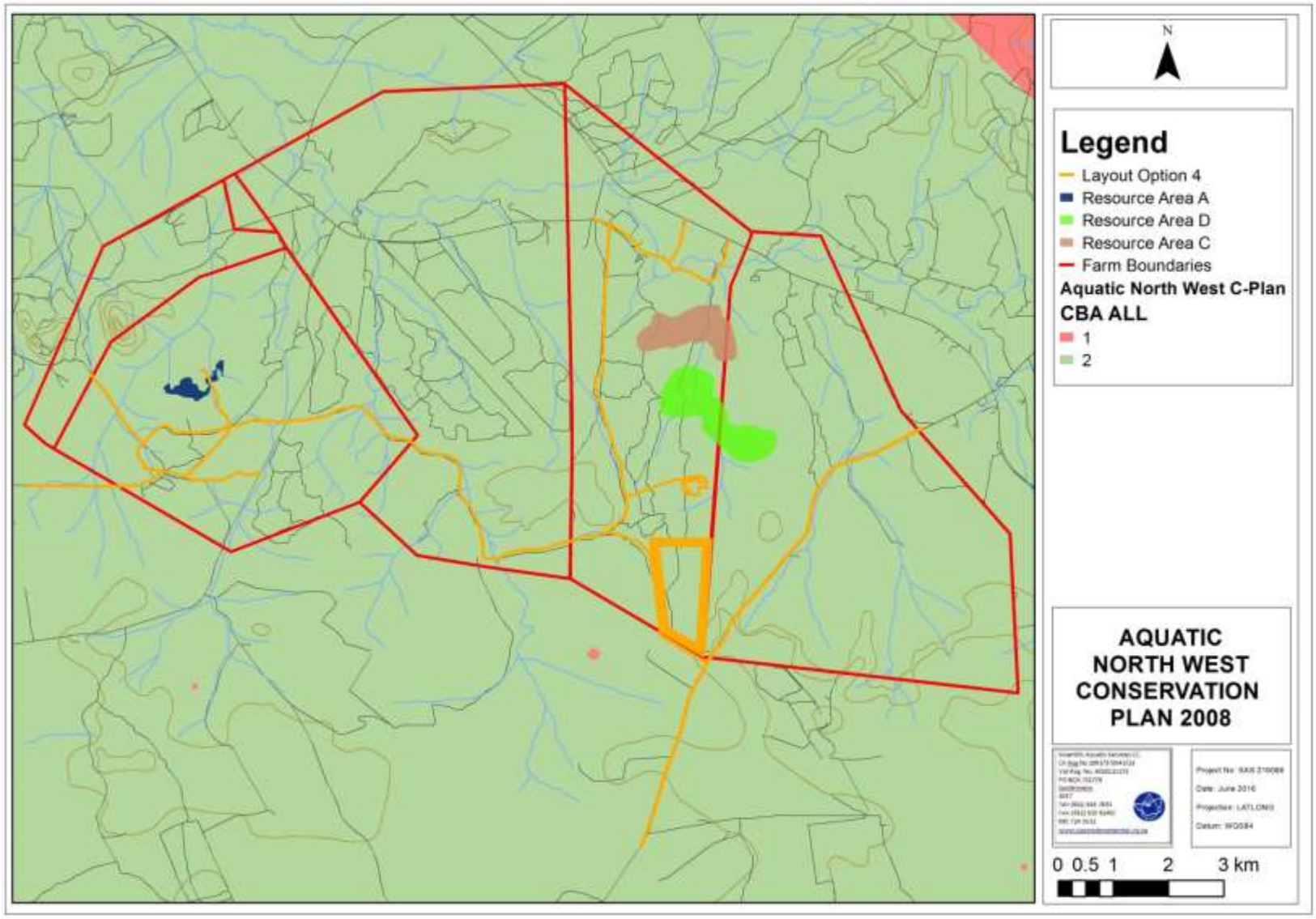


Figure 26 **Aquatic CBA areas of the study area (2008; 2015 aquatic CBA dataset is not currently available for download)**

Figure 27: Biome Map of the project area

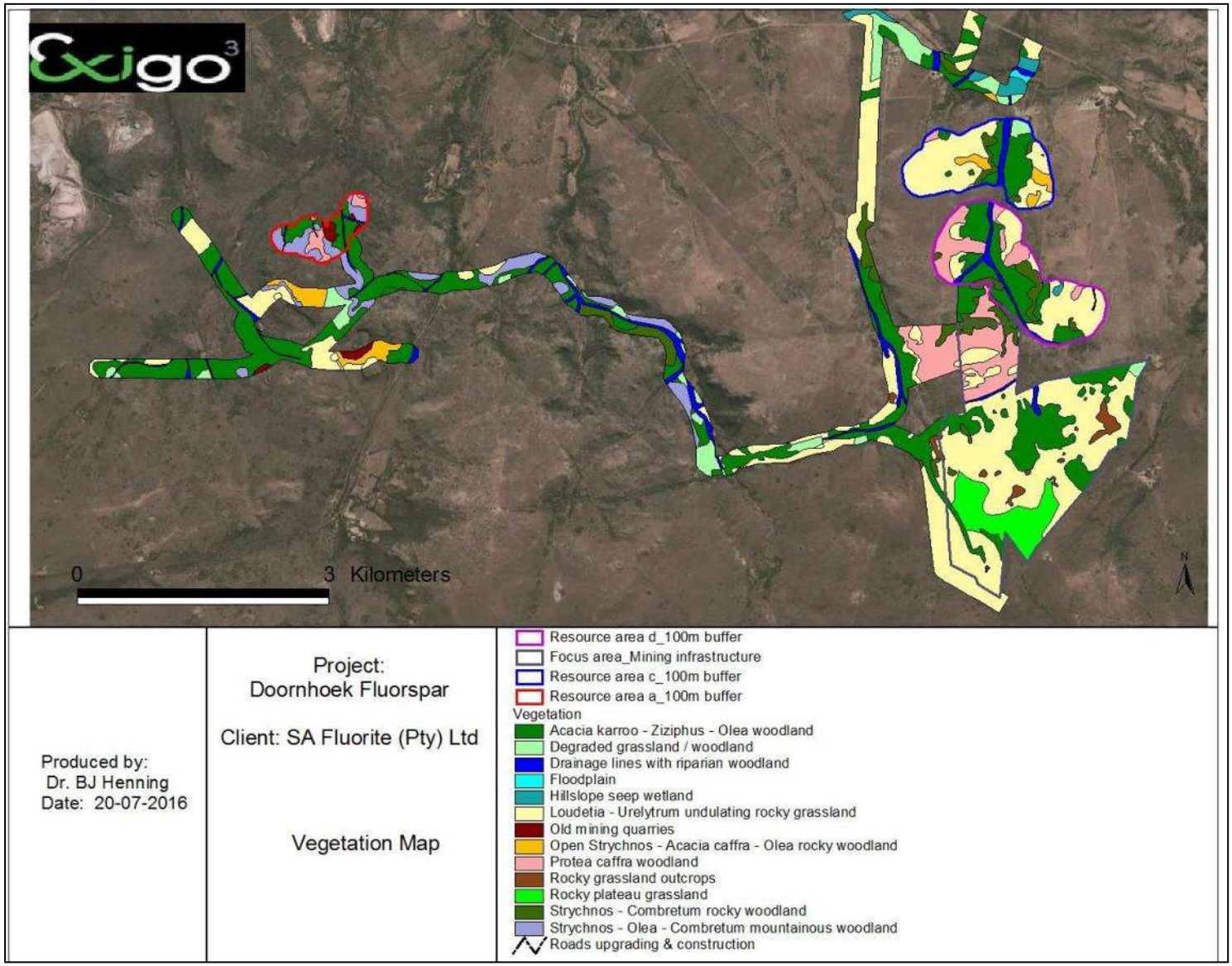


Figure 28 Vegetation Map of the Project Area

10.1.5.8. 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 29). 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 29: 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%.

Common fauna documented and potentially occurring in the project area:

As a result of anthropogenic disturbance in the larger area and the limitations created by game fences, only the most tolerant generalists of the larger vertebrates still occur in the project area outside the nature reserves. Examples are grey duiker, bushbuck, steenbok and baboon. The more sensitive habitat-specialist species like honey badger, leopard, brown hyena and caracal have retreated into areas of lower disturbance such as the surrounding ridges and riparian woodland.

Most mammal species are highly mobile and will move away during construction. The most important corridors that need to be preserved for free-roaming mammal species in the area include the perennial Klein Marico River (optimal habitat for the red data species cape clawless otter), rocky ridges, rocky grasslands and riparian woodland.

There is a long list of red data bird species that have a geographical distribution that includes the site. The presence of the habitat of these species is mostly confined to the open water habitat, riparian woodland and rocky habitats observed on site. These habitat types will be avoided during the proposed development and it is therefore highly unlikely that species utilizing these habitat types will be impacted on.

The only reptile species listed in the IUCN red data categories that could potentially be impacted on is the South African python. The proposed mining activities should allow the species to still have optimal living conditions on the remainder of the area (specifically the rocky outcrop areas and tall grassland floodplains that represent optimal habitat for the species). Although highly charismatic, individuals could be killed by workers when encountered on the construction site, since P. natalensis is highly valued in the "muthi" trade (Branch, 1988).

Red data fauna

The table below indicates the potential and confirmed red data species occurring in the project area for each of the major groups:

English Name	Conservation status
BIRDS	
African Marsh Harrier	Vulnerable
Black Harrier	Near threatened
Black Stork	Near threatened

English Name	Conservation status
BIRDS	
Blackwinged Pratincole	Near threatened
Blue Crane	Vulnerable
Cape Vulture	Vulnerable
Caspian Tern	Near threatened
Chestnutbanded Plover	Near threatened
Greater Flamingo	Near threatened
Halfcollared Kingfisher	Near threatened
Kori Bustard	Vulnerable
Lanner Falcon	Near threatened
Lappetfaced Vulture	Vulnerable
Lesser Flamingo	Near threatened
Lesser Kestrel	Vulnerable
Marabou Stork	Near threatened
Martial Eagle	Vulnerable
Melodious Lark	Near threatened
Pallid Harrier	Near threatened
Peregrine Falcon	Near threatened
Pinkbacked Pelican	Vulnerable
Redbilled Oxpecker	Near threatened
Secretarybird	Near threatened
Shortclawed Lark	Near threatened
Tawny Eagle	Vulnerable
White Pelican	Near threatened
Whitebacked Vulture	Vulnerable
Whitebellied Korhaan	Vulnerable
Yellowbilled Stork	Near threatened
MAMMALS	
Cheetah	Vulnerable
South African Hedgehog	Near threatened
Reddish grey musk shrew	Data deficient
Tiny musk shrew	Data deficient
Lesser red musk shrew	Data deficient
Swamp musk shrew	Data deficient
Lesser grey-brown musk shrew	Data deficient
Roan antelope	Vulnerable
Sundevall's leaf-nosed bat	Data deficient
Brown hyena	Near threatened
Single striped mouse	Data deficient
Serval	Near threatened
Pangolin	Vulnerable
Honey badger	Near threatened

English Name	Conservation status
BIRDS	
Schreiber's long-fingered bat	Near threatened
White tailed rat	Endangered
Rusty bat	Near threatened
African weasel	Data deficient
Darling's horseshoe bat	Near threatened
Bushveld gerbil	Data deficient
HERPETOFAUNA	
South African Python	Vulnerable
Giant bullfrog	Near threatened

10.1.6. 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 30. For planning purposes wetland areas were also delineated for a larger area outside of the focus area indicated in Figure 30.

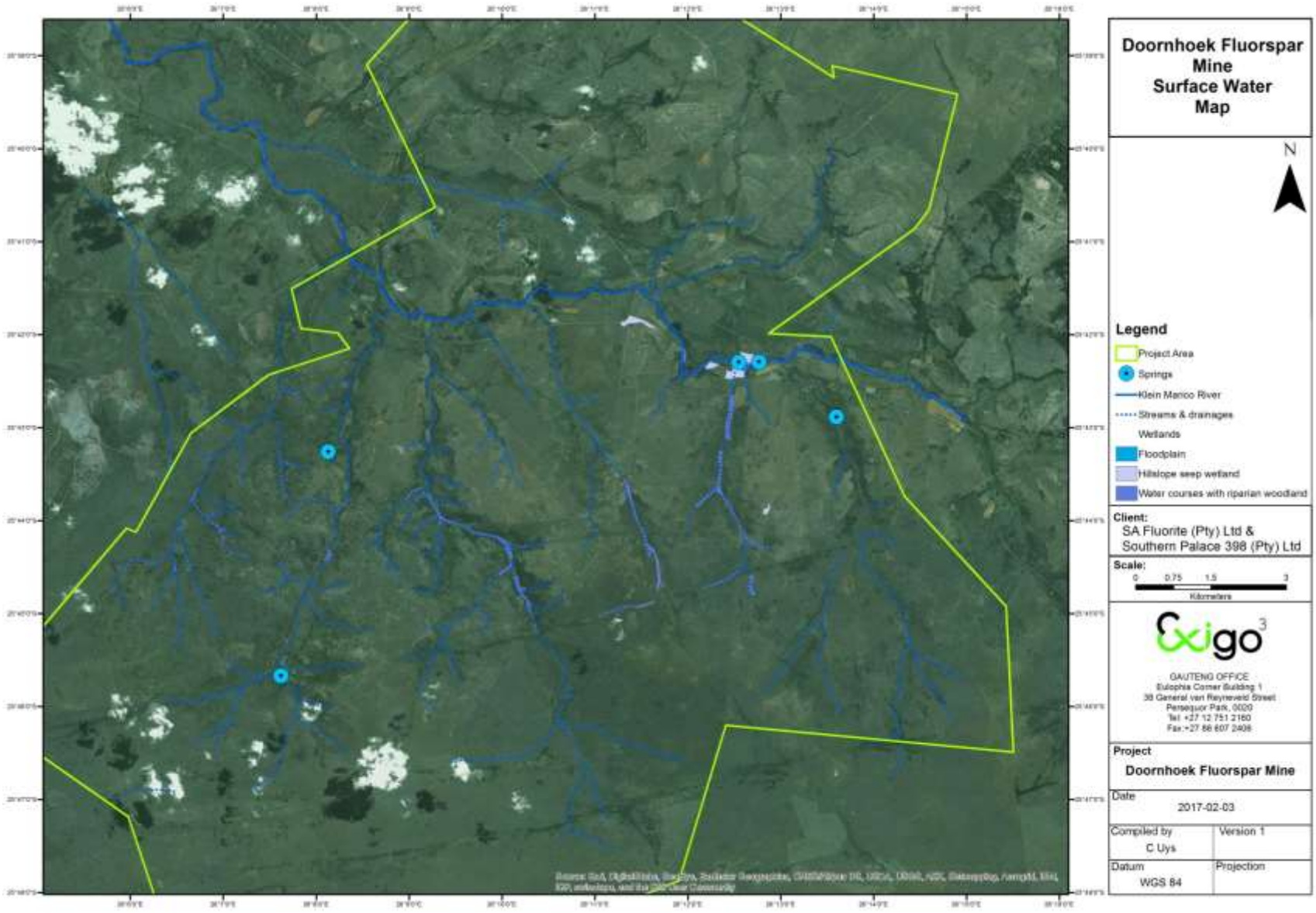


Figure 30 Wetland map for the proposed Doornhoek Fluorspar Mining Right Area

The current 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.

10.1.7. SURFACE WATER

10.1.7.1. 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 31.

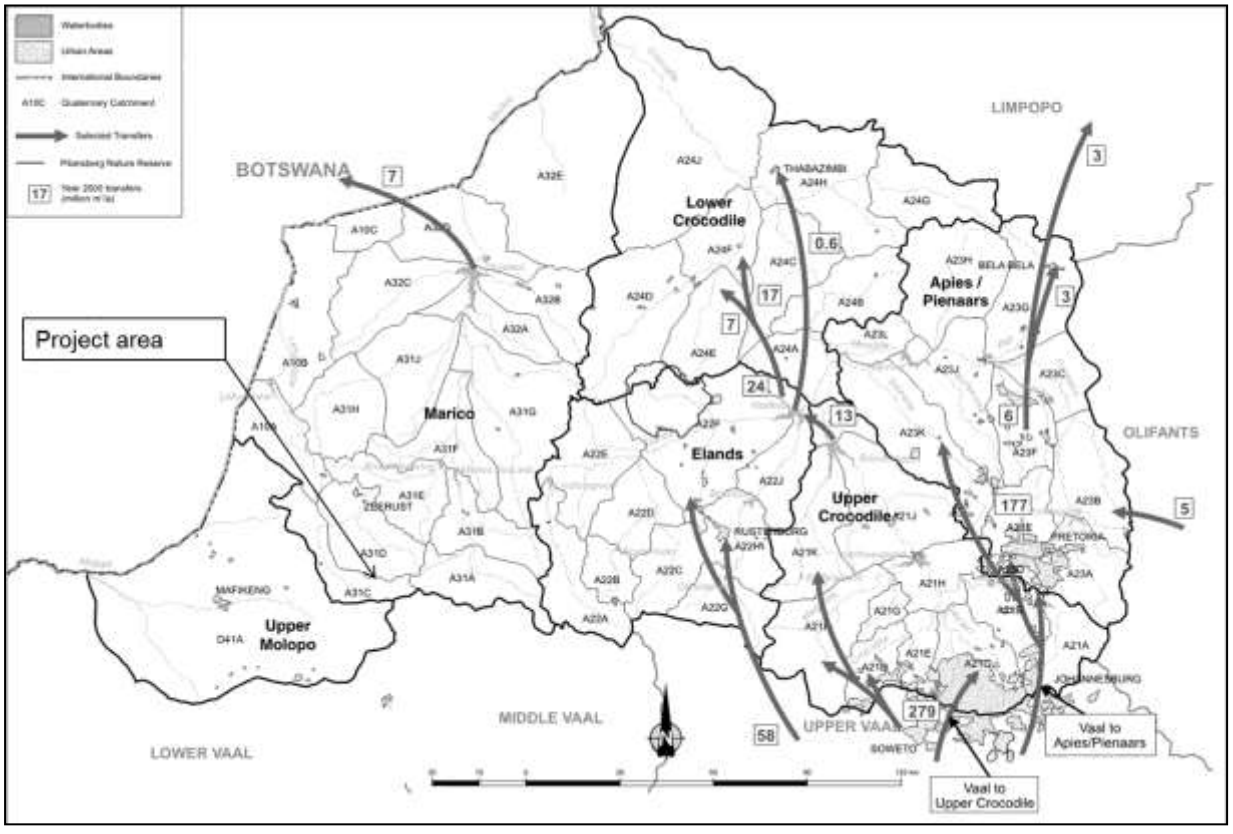


Figure 31 Project area in relation to the Crocodile (West) and Marico WMA

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 32 visually presents the locations of the various points along the various river systems, assessed, while Table 13 presents a description of the monitoring points.

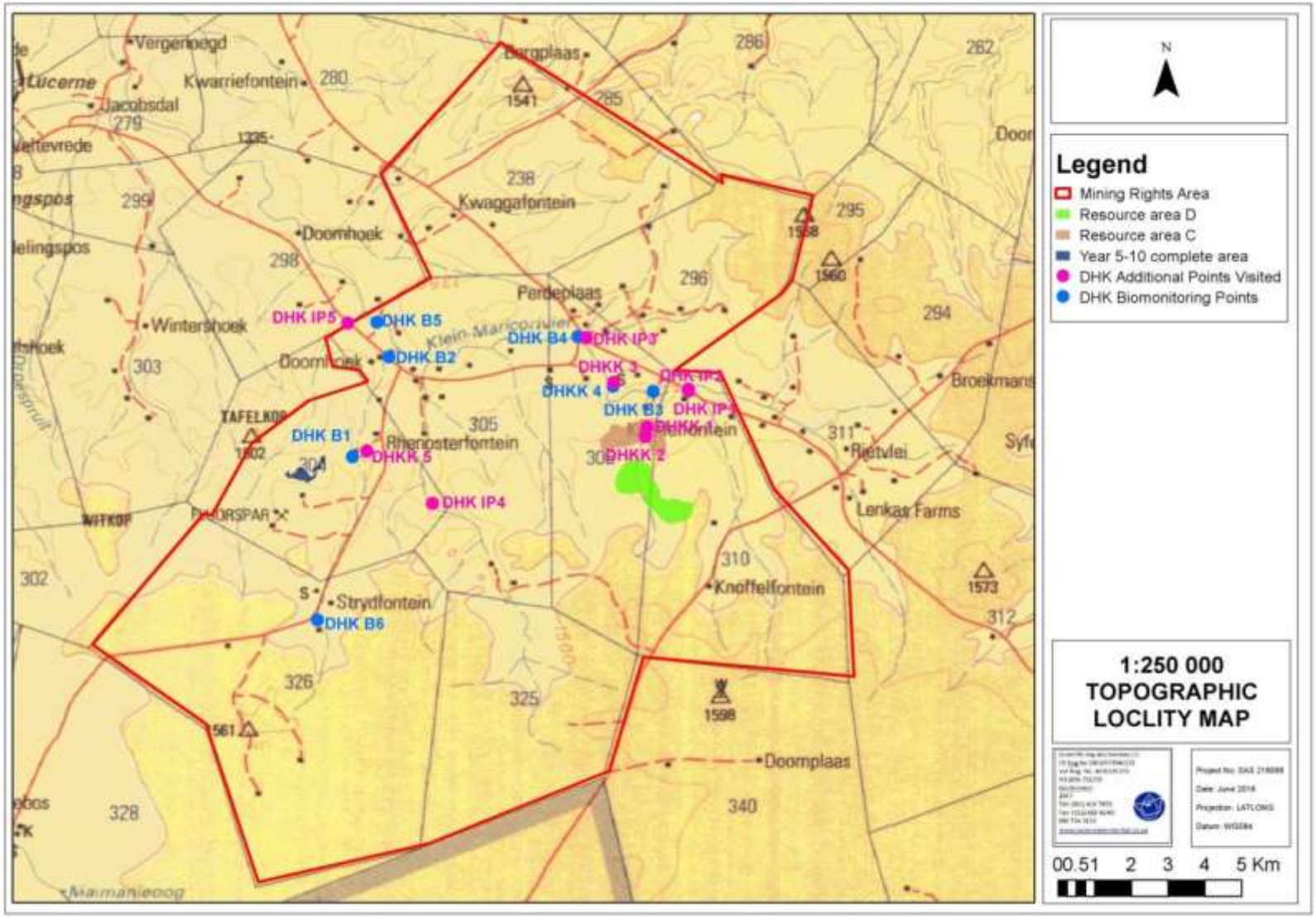


Figure 32 **Riverine aquatic ecological assessment points presented on a 1:250 000 topographical map (Scientific Aquatic Services, 2016)**

Table 13 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 14 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 14 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	October	D	A	D	C	D	NA*

Dallas (2007)	2014						
	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 (*E. motebensis*) 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.

10.1.8. GROUNDWATER

10.1.8.1. Crocodile (West) Marico Water Management Area Internal Strategic Perspective (ISP)

The National Water Act (NWA, 1998) requires that for each Water Management Area (WMA) a Catchment Management Agency (CMA) be established. The CMA will guide the management of the water resources of the WMA. The Marico, Upper Molopo and Upper Ngotwane catchments are part of the Crocodile (West) and Marico WMA.

Commercial irrigation, urban water use and rural domestic water use forms the three major water user sectors. Irrigation is the major water user in the greater Marico area along the Groot Marico River and the Klein Marico. The major source of supply to the water users and uses are the dolomitic aquifers of the Grootfontein compartments and the Molopo Springs.

The ISP found that the available water resources of the Marico catchments do not meet the water requirements at the appropriate levels of assurance of supply i.e. the catchments are in deficit. The ISP also found that the available water resources of the catchments are not well understood, especially the long term sustainable yield from groundwater resources abstracted from dolomites. Groundwater is widely available in chert horizons and karst zones with borehole yields between 5 and 20 L/s common and feasible. The aquifers in the catchments are important sources of stream base flow for the Groot Marico and the tributaries (DWAF, 2004).

In essence, the ISP concludes that groundwater management in the catchments are of utmost importance. The current water balance indicates a deficit in supply versus demand and little to no possibility of surface water resources being established. Groundwater resources is the only viable option, provided the development is accompanied by a detailed analyses and license application process.

Additionally, certain strategies such as alien vegetation eradication along the Klein Marico riparian zones will increase the water balance and possibly off set negative impacts.

10.1.8.2. 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 dolerite dyke which commonly intersects the strata. The underlying dolomitic package likely has variable permeability largely governed by the presence and absence of chert layers. As depicted in the stratigraphic sequence and observed from the geological cores viewed during the site visit, the upper sequence of the dolerites is largely laminar. These units likely have poor permeability and secondary structures such as faults and joints are important to groundwater flow.

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. As no hydrogeologically significant unit defines the aquifer base, the thickness of the aquifer is considered as ± 100 m. Sub-vertical dolerite 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 springs within the study area as indicated in Figure 30.

10.1.8.3. Compartment mapping

Through evaluation of the data sources the dyke 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 (

Figure 33).

Twenty-three compartments were identified. The focus area of the proposed mine is situated over three compartments demarcated as compartments 1, 3 and 4. 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 (

Figure 33).

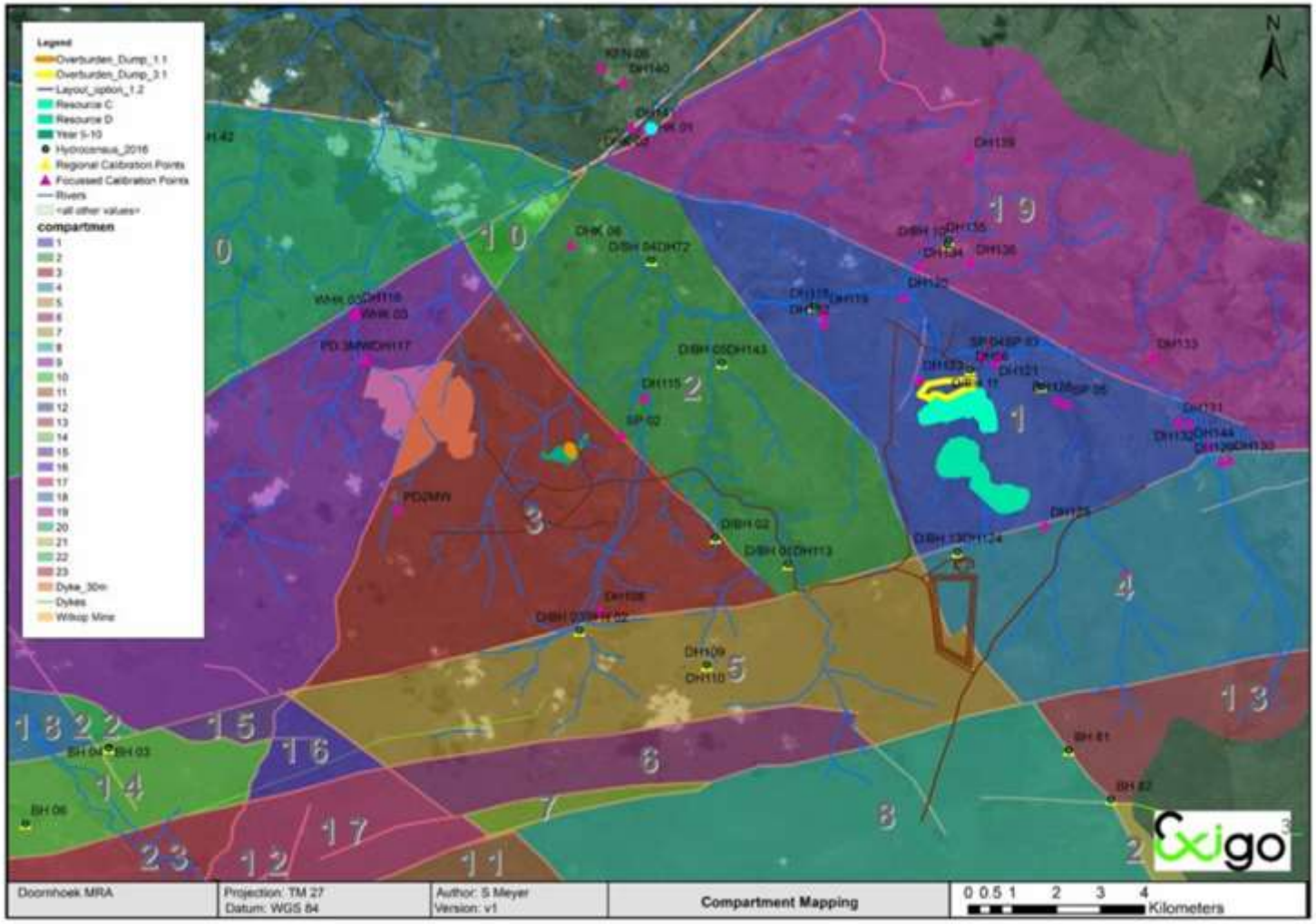


Figure 33 Compartment mapping for influence assessment

10.1.8.4. Compartments and Dyke Characteristics

The resource is located in a dolomitic aquifer. The aquifer is likely compartmentalised by dolerite dykes structures which cross cut the country rocks.

Compartment 1 housing a portion of the resource and Compartment 19, west of the resource area are the most sensitive compartments due to the large number of springs, the Klein Marico River and the significant number of water users in the compartments.

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 dolerite. 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.

10.1.8.5. Aquifer parameters (Hydraulic conductivity and Storativity)

Aquifer parameters, hydraulic conductivity and storativity are necessary parameters for the characterisation of an aquifer. Common to fractured aquifers, the hydraulic conductivity was found to be largely controlled by the proximity of the tested borehole to geological structures. Table 15 summarises aquifer parameters derived from tests in various hydrostratigraphic units. Country dolomite rock units display low median hydraulic conductivities in the order of 0.05 m2/d, while boreholes located on the dyke margins show median hydraulic conductivity values in the order of 4.3 m2/d. Tests carried out in the shale and quartzite units indicate hydraulic conductivity values of 0.01 to 0.23 m2/d respectively which is also representative of literature values (Spitz and Moreno, 1996). Alluvial units targeted indicate relatively higher hydraulic conductivity values of 0.37 to 4.36 m2/d as expected. While hydraulic conductivity can be effectively estimated from field tests, storativity can only be estimated with a level of confidence from a numerical model calibrated against transient water levels.

Table 15 Statistical summary: aquifer testing

Borehole	Formation targeted	Hydraulic Conductivity(m/d)
DH117	Dolomite	0.05
1T1	Dolomite	0.51
1T2	Dolerite Dyke & Alluvial material	0.90
DH125	Dolerite Dyke & Alluvial material	4.50
RH12-045	Dolerite Dyke & Alluvial material	4.31
RHRC12-066D	Chert/dolomite	0.02
RHRC12-022D	Chert/dolomite	0.03

KKPQ12-229	Chert/dolomite	0.37
DBH04	Dolerite	0.30
DBH05	Shale/Quartzite& Fault zone	0.23
DBH09	Shale	0.01
DBH14	Alluvial material	4.06
DBH16	Alluvial material	0.37
MIN		**0.01**
MAX		**4.50**
AVERAGE		**1.20**
STANDARD DEVIATION		**1.78**
5th PERCENTILE		**0.02**

10.1.8.6. 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.

- 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.

10.1.8.7. 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 16. 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 16 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**

10.1.8.8. 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 17. Also refer to Figure 34.

Table 17 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 sites.
- 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 35.
- Figure 36 and Figure 37 indicate the relative depth to groundwater as well as regional groundwater flow direction for the proposed project area and visited hydrocensus localities.

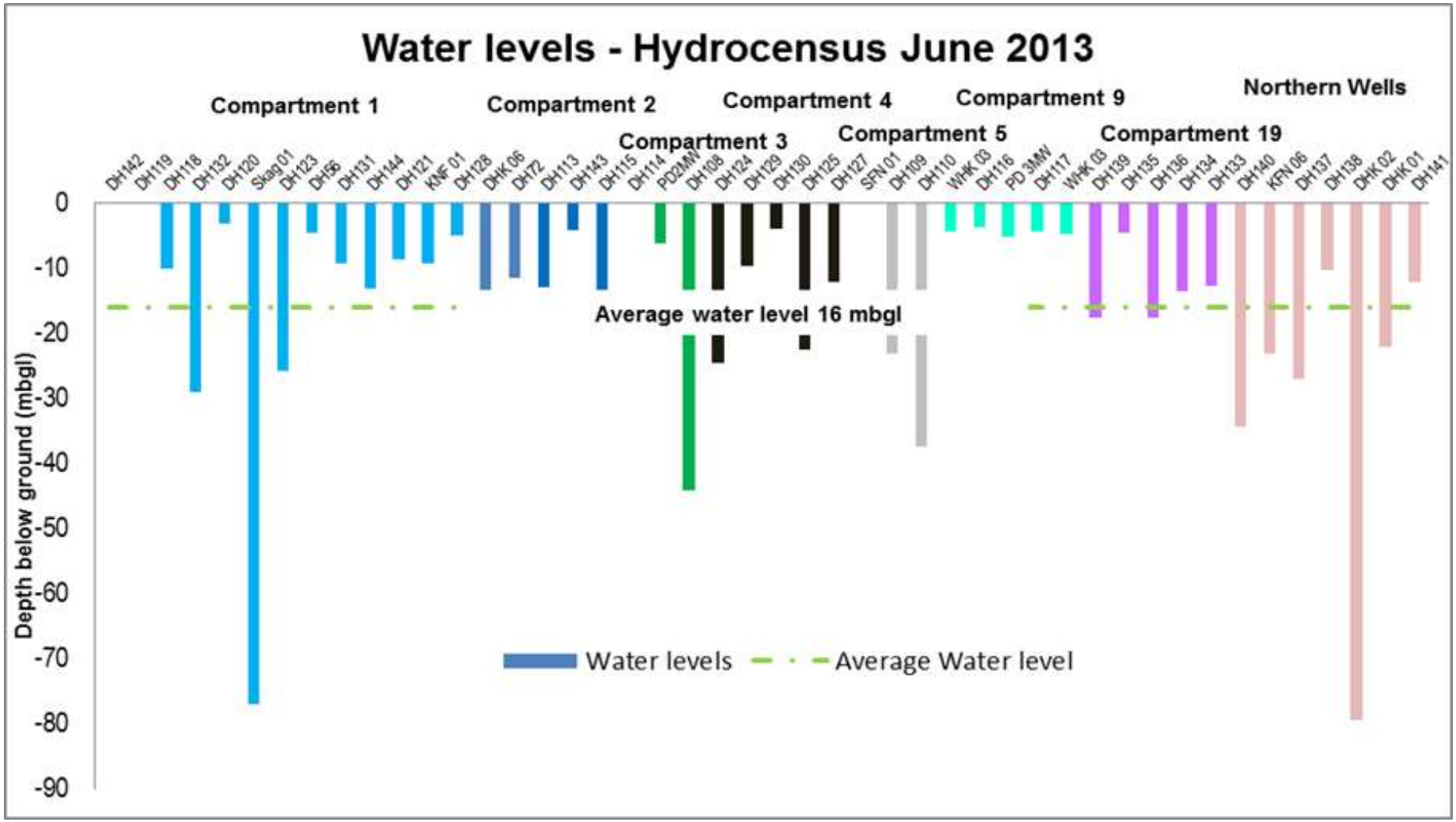


Figure 34 **Measured water levels – hydrocensus 2013**

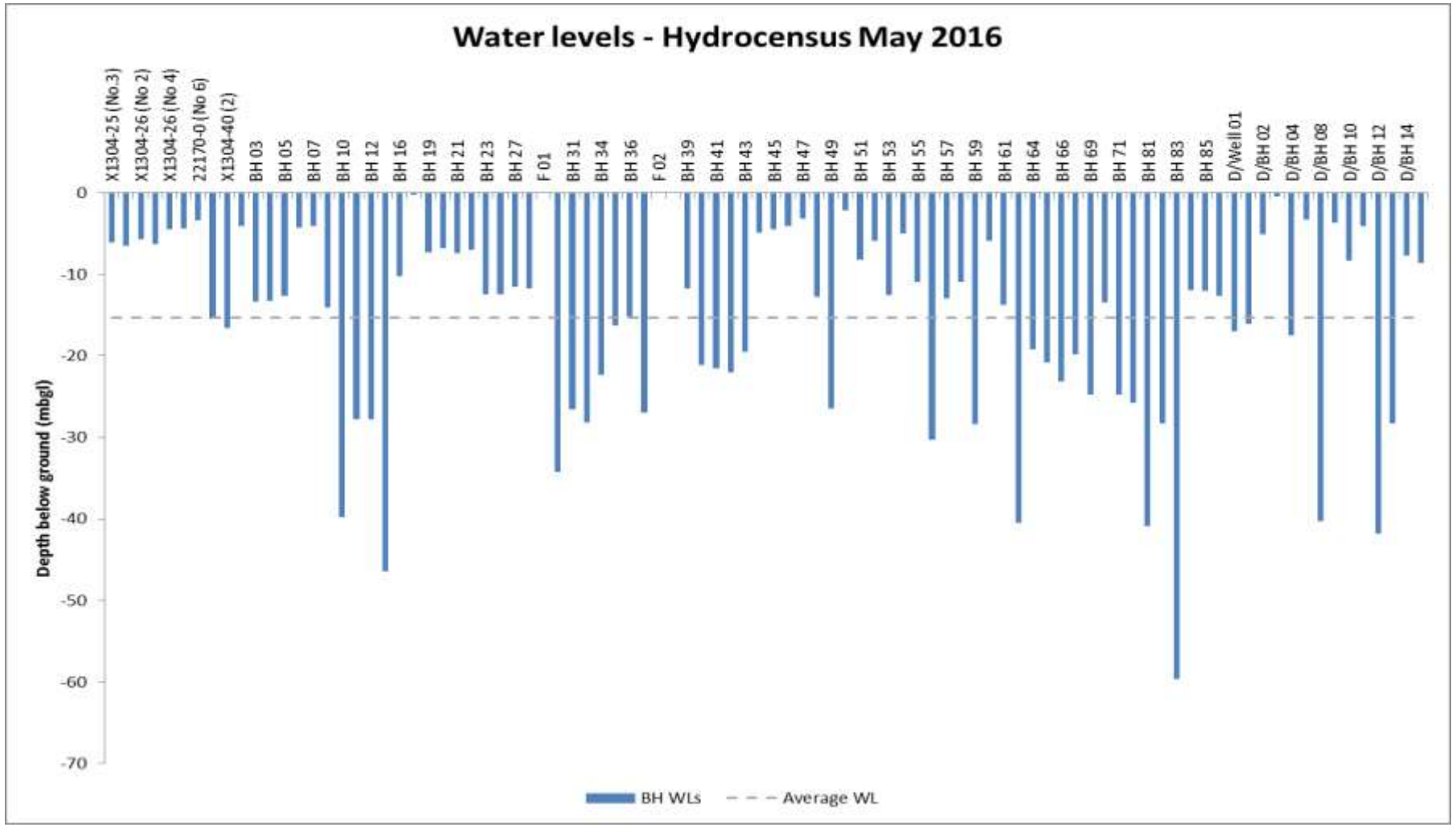


Figure 35 Measured water levels – hydrocensus 2016

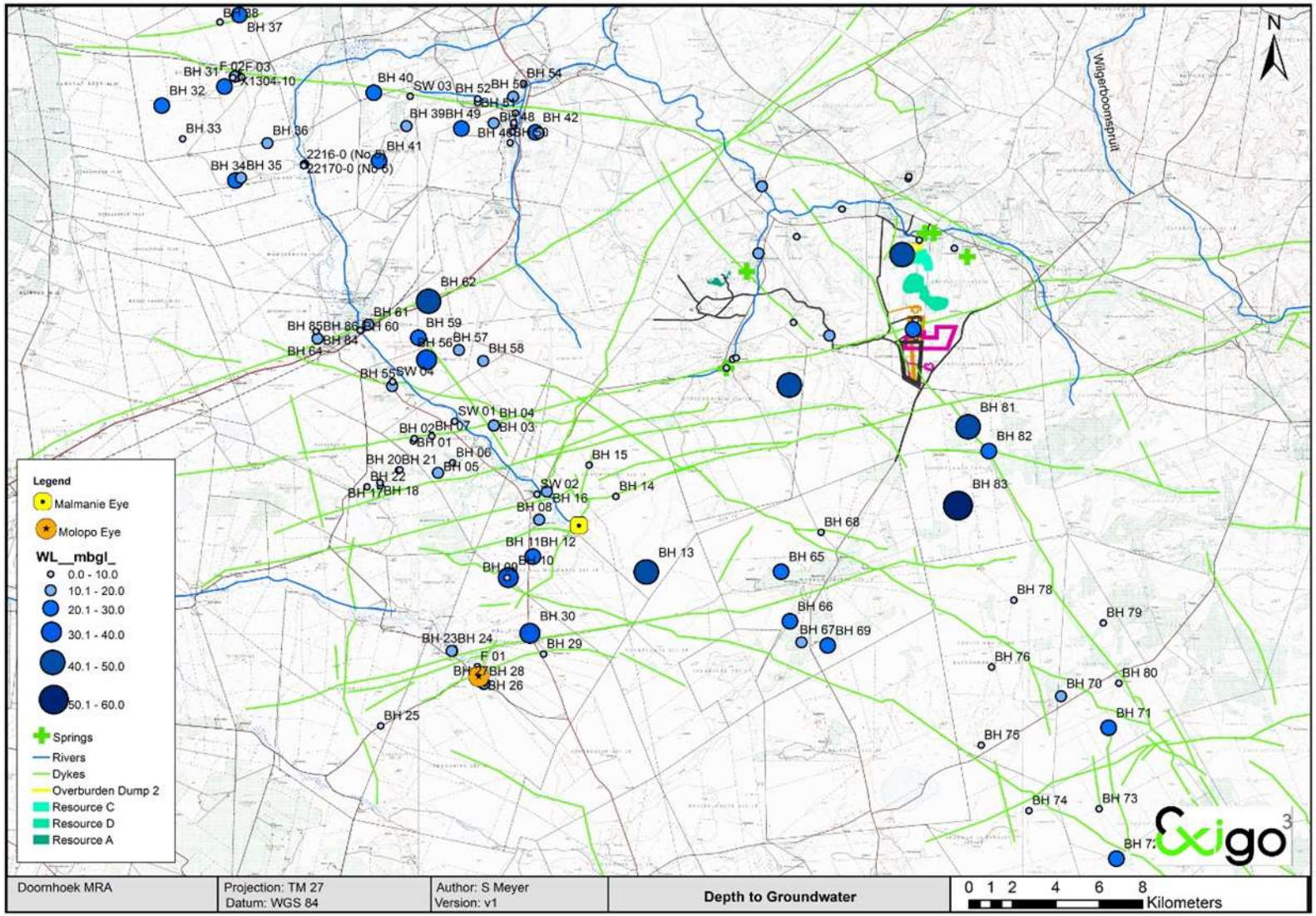


Figure 36 Depth to groundwater

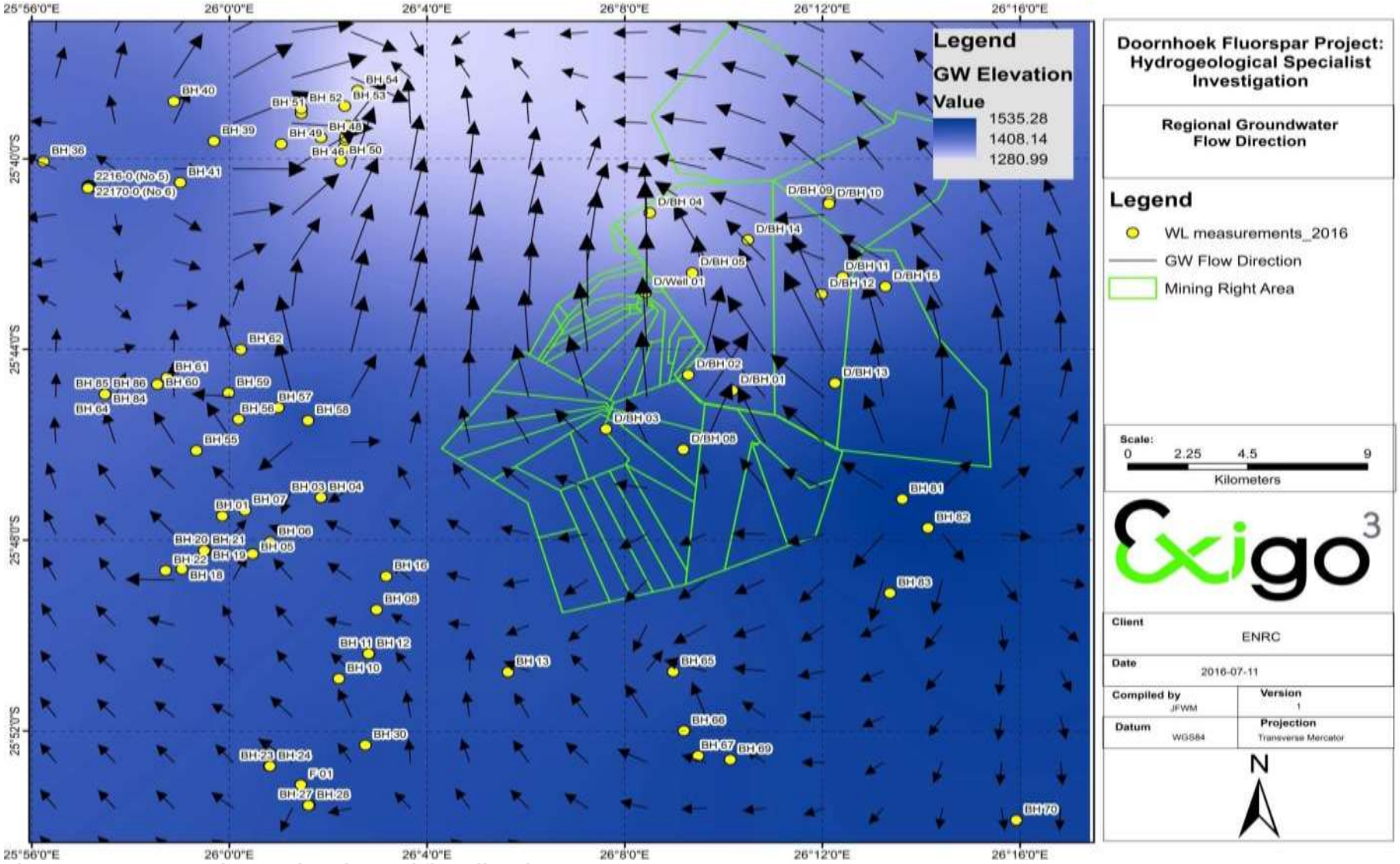


Figure 37 Groundwater elevation and flow directions

10.1.8.9. 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 38 and Figure 39).
- 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 40 depicts the spatial hydrochemistry distribution of sampling localities.

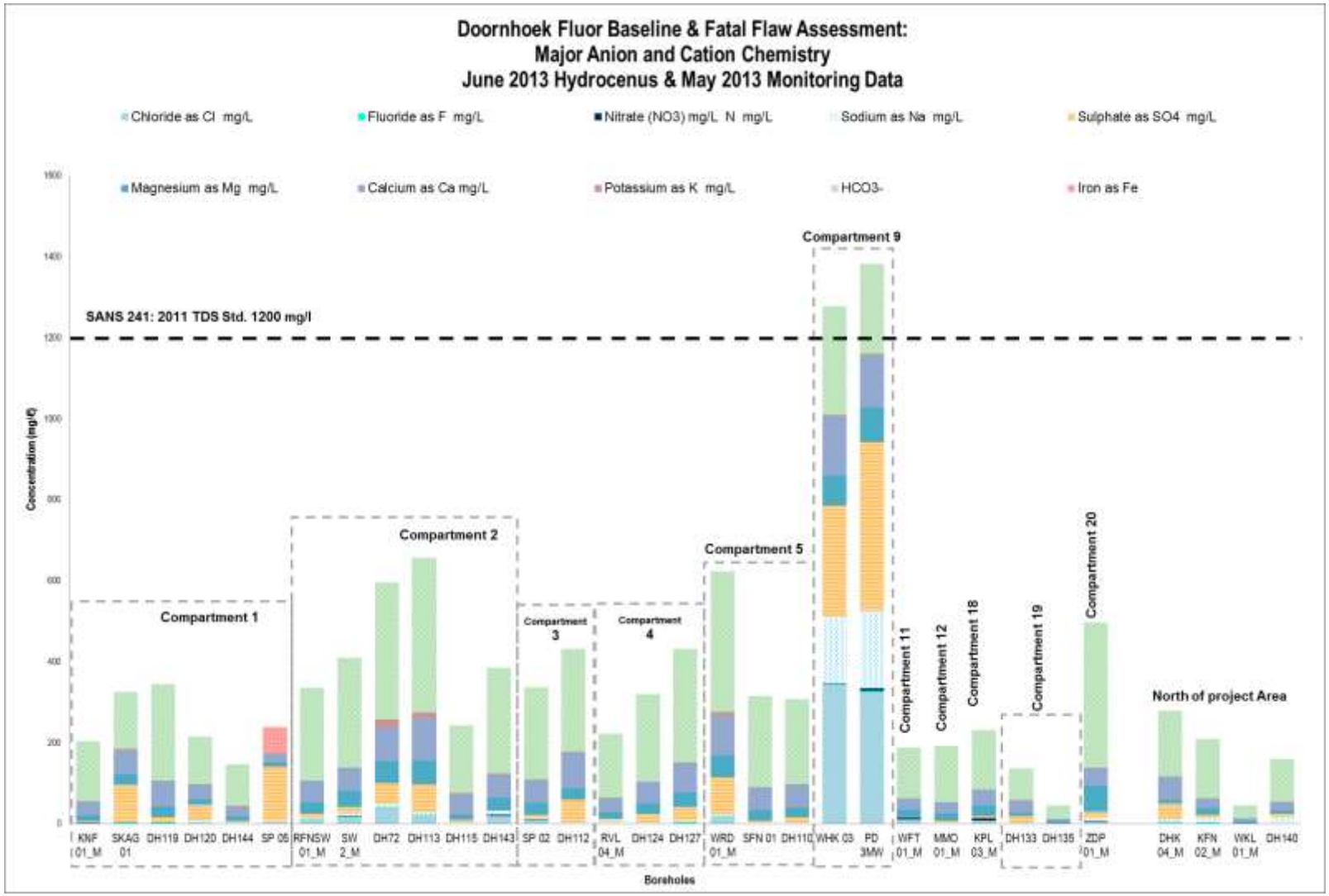


Figure 38 Hydrochemistry 2013

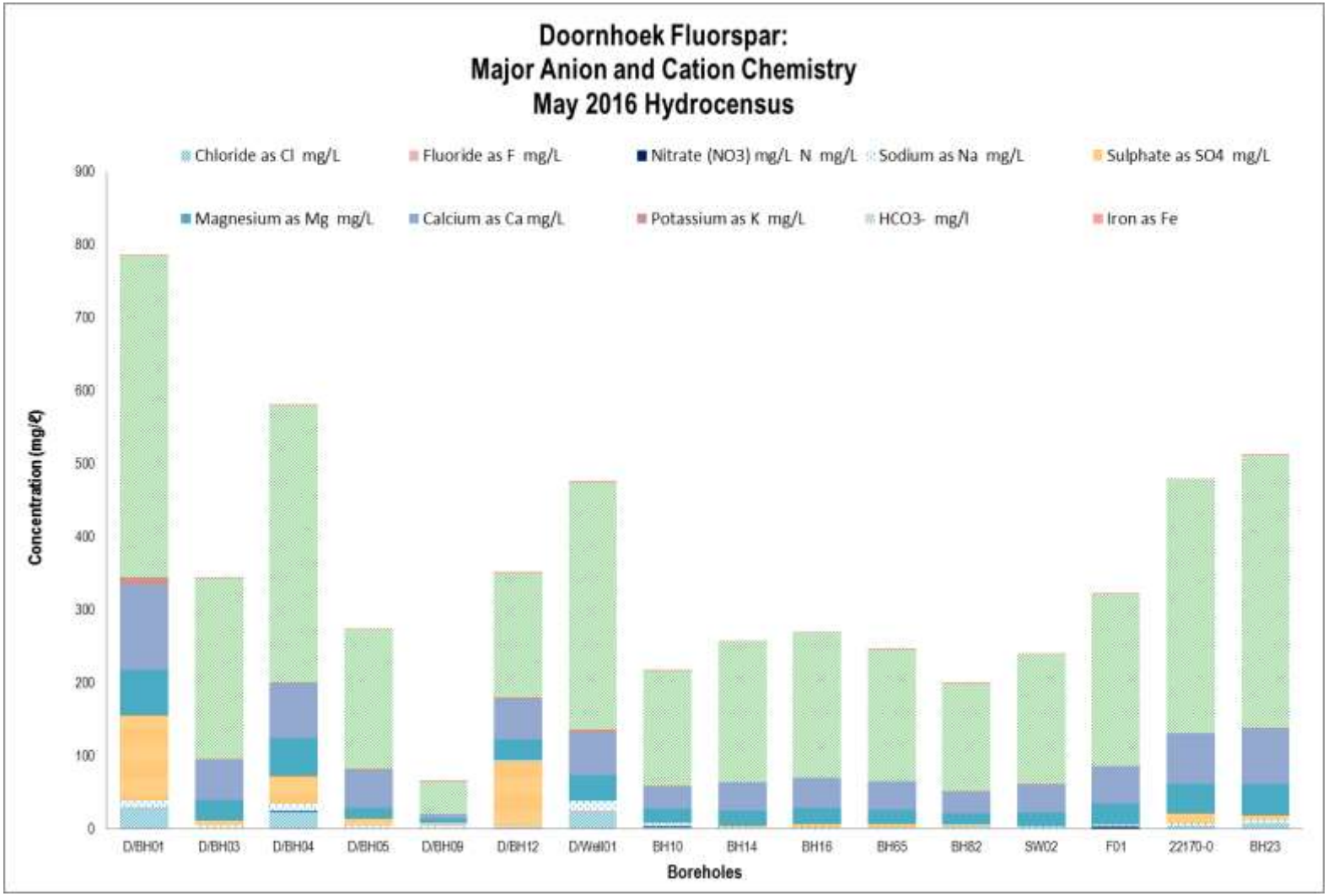


Figure 39 Hydrochemistry 2016

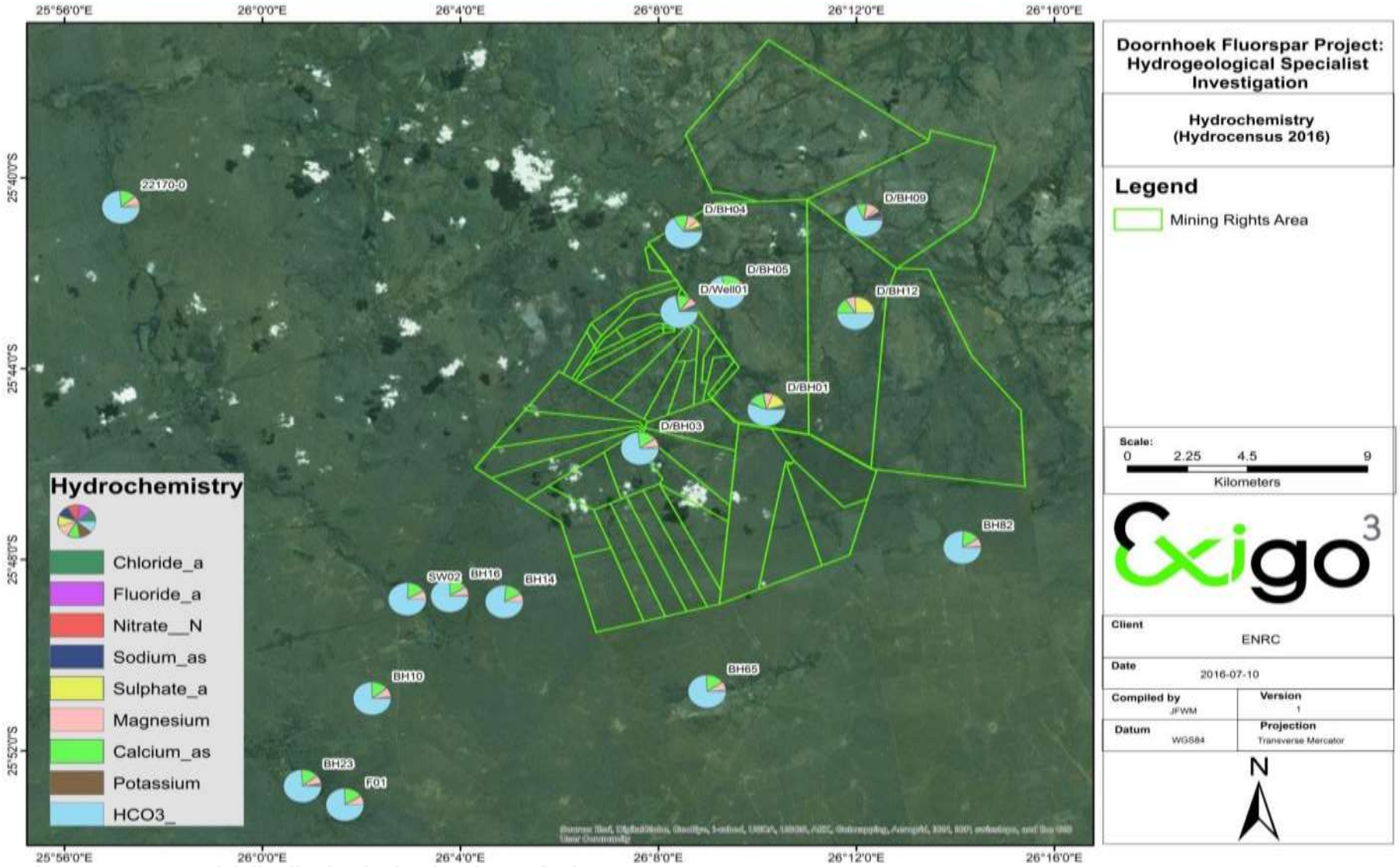


Figure 40 **Spatial distribution hydrochemistry – hydrocensus 2016**

10.1.8.10. Numerical groundwater flow model

A numerical groundwater flow model has been utilised to aid in decision making, understanding the sensitivity of the system and provide focus to the field work to be conducted in ensuing phases of this project. Previously, limited field work data has been conducted and the historical model was viewed as high level and has been qualified rather than calibrated. The fieldwork component was updated and this data was used in the model reconstruction, recalibration and additional simulations.

In addition, the client supplied updated mining schedules and mine site layouts. This data was used in the update of the numerical model as well as the detailed simulations. The work conducted with regards to the hydrogeological impacts was compiled by a competent person as defined, amongst other, in Regulation 6(6) of GNR. 632.

- **Boundaries**

The external boundaries of the model were delineated to coincide with topographical features such as surface water divides, rivers and drainage lines, cognisance of the underlying geology was however also considered in development.

  - Hydraulic head boundaries (Blue): The rivers are defined as hydraulic head boundaries where the fixed head is assumed to be equal to topographical elevation. A maximum flow constraint of zero has been applied to the boundary condition in order to simulate gaining type rivers systems i.e. the rivers remove groundwater from the system but do not recharge the aquifer zones. Sensitivity scenarios i.e. possible influence of the Klein Marico River on mine dewatering volumes were simulated.
  - No Flow type boundaries (Green): As mentioned, groundwater divides have been assumed to correlate with surface water divides. Thus all water sheds have been defined as no flow type boundaries i.e. boundaries where flow lines are parallel with boundary.

- **Sources**

Recharge is the primary source of inflow to the model domain. Due to a lack of suitable field data for estimating recharge, initial values for model development were derived from literature. The probable recharge values were determined through model qualification; these values are provided in Table 18 below.

- **Sinks**

Since the closure of the Witkop mine the primary sink in the catchment is groundwater abstraction for livestock watering and domestic purposes. The volume of water abstracted and the distribution of abstraction boreholes was sourced from the WARMS data base.

- **Aquifer parameters**

Hydraulic conductivity for model development was obtained from falling head tests, aquifer tests and literature. Through model qualification process hydraulic conductivity values describing the aquifer zones were determined.

Storativity values were assumed from literature as no suitable tests have yet been conducted to calibrate the model to obtain storage parameters.

- Summary of model inputs, data sources and uncertainty

Model input parameters, data sources and data uncertainty are provide in Table 18 below:

Table 18 Model input parameters, data sources and uncertainty

Input parameter	Scale	Source, parameter or assumption description	Data uncertainty
Topography (DEM)		The topographic elevations were interpolated from the 1:50 000 scale 20 m contour intervals.	Low
Rivers, streams, drainages	1:50 000	Digitised from topographical maps and aerial imagery.	Low
Lithology	1:250 000	GCS geological map sheets - Rustenburg (2526)and Mafikeng (2426) and ENRC detailed mapping	Moderate
Geological structures		High resolution aerial magnetic survey and gravity surveys. While the positions and extent are known the hydraulic characteristics are associated with uncertainty.	Moderate
Mine Layout		A mine layout was supplied by the client	Low
Boreholes and pumping rates		AGES hydrocensus 2013, Exigo Monitoring 2013 -2015, WARMS and aquifer tests conducted during 2016.	Moderate
Rainfall		Collected from rainfall stations within the catchment.	Low-moderate
Steady State Modelling Parameters – Flow Model			
Boundary conditions		Northern model boundary – Fixed hydraulic head boundary with a max flow constraint = 0 m3/d	Low-moderate
		Eastern, western and southern boundaries are no flow boundaries correlating with surface water divides.	Low-Moderate
		Rivers and drainages within the model domain are described by fixed head boundary conditions and maximum flow constraints of 0 m3/d. Similarly the dyke structures are assigned as seepage faces so as to simulate spring flows within the model domain.	Low-moderate
Recharge		Recharge could not be estimated from the existing data and was assumed from literature and refined through model qualification.	Moderate

Input parameter	Scale	Source, parameter or assumption description	Data uncertainty
Hydraulic Conductivity		The hydraulic conductivity was estimated from falling head tests literature and aquifer test.	Low
Aquifer thickness		The aquifer thickness is 150 m – the aquifer likely extends deeper than 150 m however no data exists to validate the exact depth.	Moderate
Transient State Modelling Parameters & Mass transport model			
Initial Hydraulic Heads		Simulated heads obtained from simulated steady state conditions as calibrated.	Moderate
Specific Storage		The volume of water that a unit volume of aquifer releases from or takes into storage per unit change in head. S = Ss x D. Ss, refer to section 4.4.4 of the Hydrogeological Impact Assessment.	High
Effective Porosity		Porosity is the ratio of the volume of void space to the total volume of the rock of earth material. Assumed conservative porosity of 3% was used in the transient simulations.	High
Longitudinal dispersion coefficient		No field work has been conducted to determine the dispersivity. An approximation of 20 m was used.	High
Transverse dispersion coefficient		Transverse dispersivity was assumed to be 10 x smaller than the longitudinal dispersivity (2 m)	High

- **Summary of model sensitivity**

The model shows negligible sensitivity to transmissivity in a range ±10% of the base case. Thus limited additional data will be required to constrain the transmissivity of the country rock.

The model shows negligible sensitivity to a reduced recharge of 10% relative to base case and marginal sensitivity to increased recharge of 10% relative to base case.

10.1.8.11. 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 mine residue. 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).

The detailed geochemical model was used as reference to obtain the baseline and possible leachate parameters associated with the mining infrastructure, especially the overburden dump and TSF position and alternatives. For the operational phase, the model results indicated that sulphate values in the tailings pore water exceed regulatory values and groundwater baseline values. Additionally, fluoride values in the tailings will range from 0.9 mg/L to 2.7 mg/L, with the later value the maximum. The mine residue material results associated with the overburden dumps indicated sulphide to be below detection limits and fluoride similar to the baseline values (Hansen, 2016). The work conducted with regards to the geochemical impacts was compiled by a competent person as defined, amongst other, in Regulation 6(6) of GNR. 632.

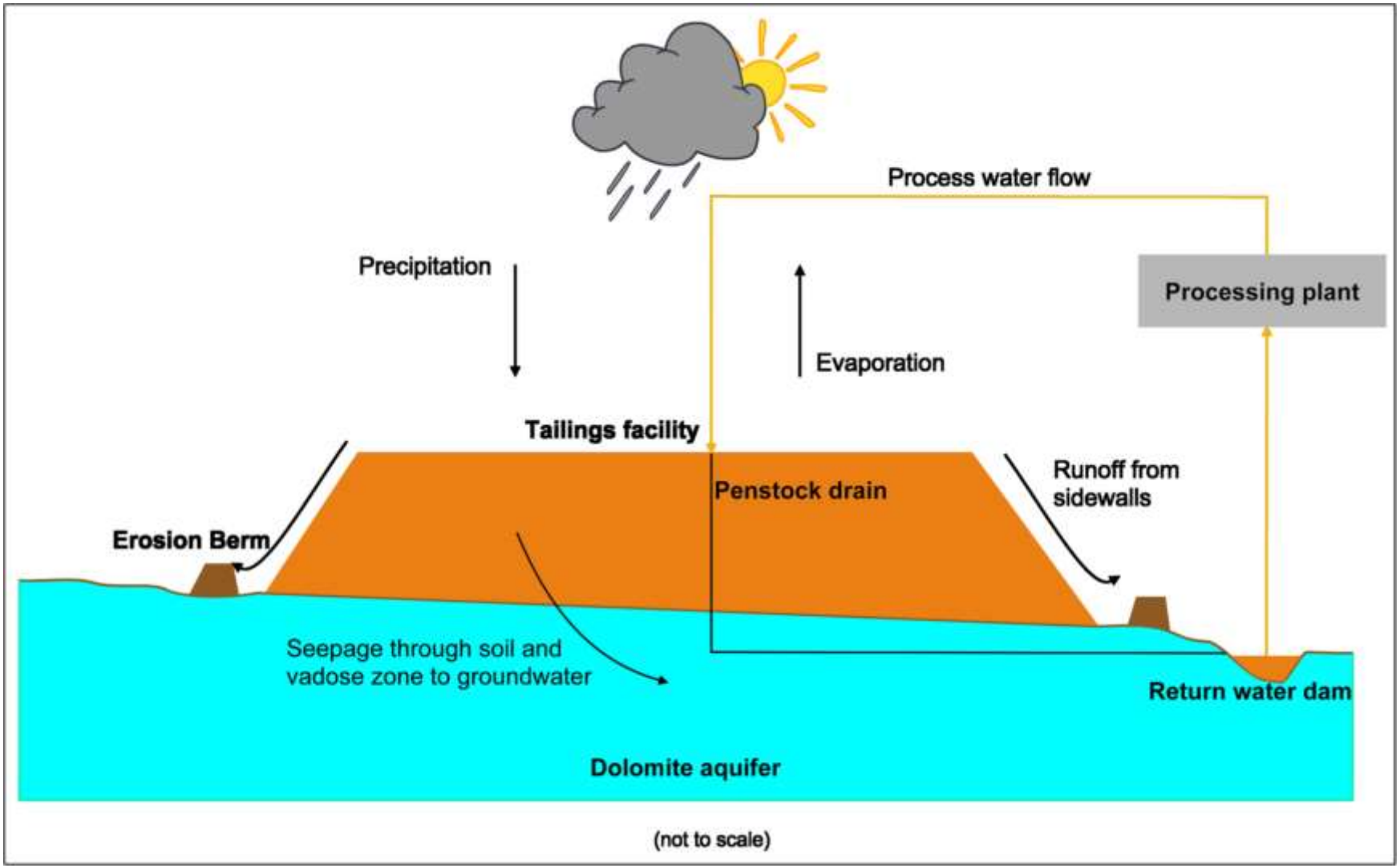


Figure 41 **Conceptual model of the tailings as a geochemical system showing the most important water flow paths**

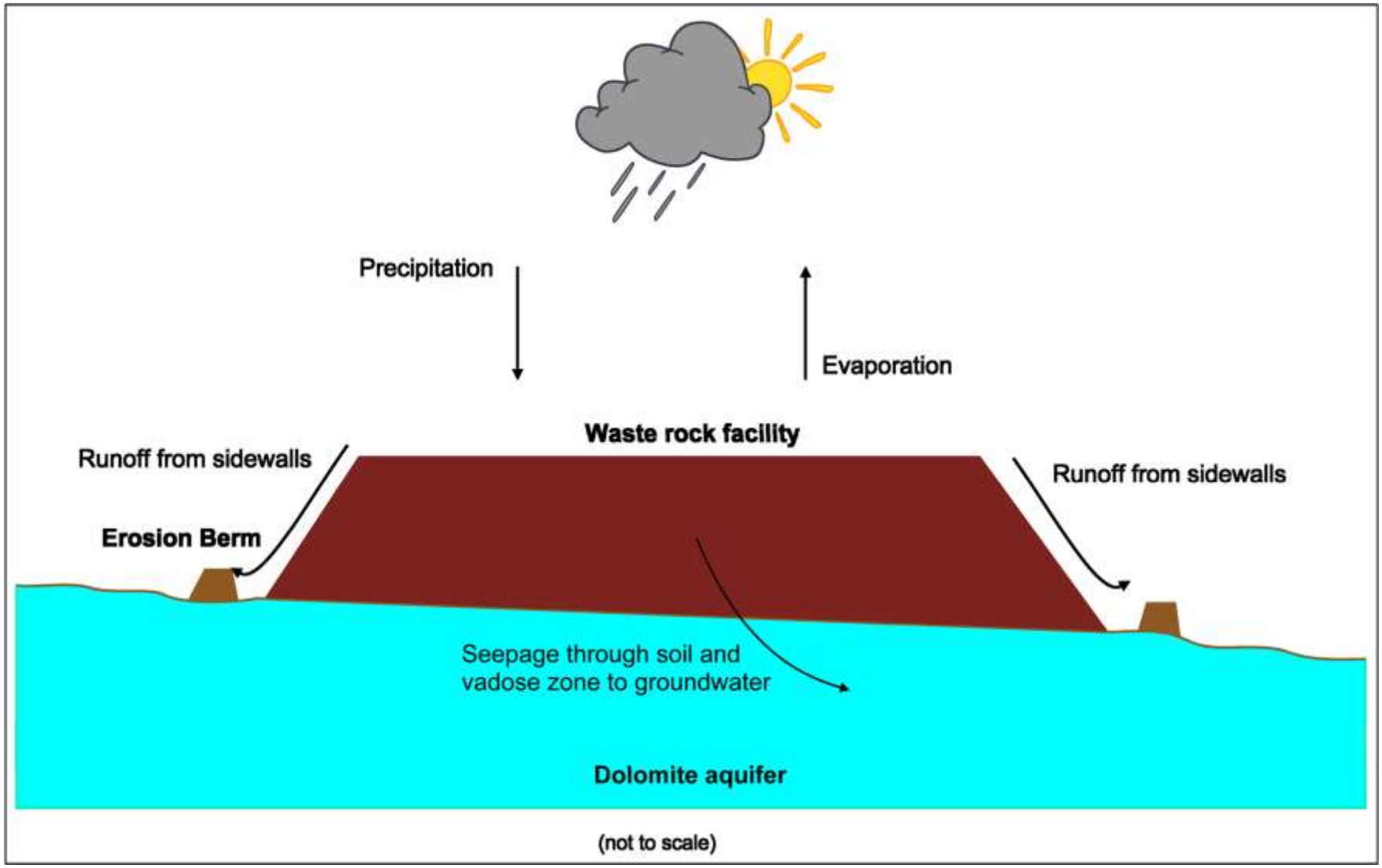


Figure 42 Conceptual model of the waste as a geochemical system showing the most important water flow paths

10.1.9. HERITAGE RESOURCES

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.

10.1.9.1. The Northwest Province: Prehistory

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 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 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.

10.1.9.2. The Northwest Province: Later History and 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.

10.1.9.3. 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.

- **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. 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 43 Aerial representation of stone wall settlements at Stone Wall Cluster 1

Figure 44 Rough stone walling at Site DIA01

Figure 45 Stone wall enclosure at site DIA02

Figure 46 Aerial representation of stone wall settlements at Stone Wall Cluster 2

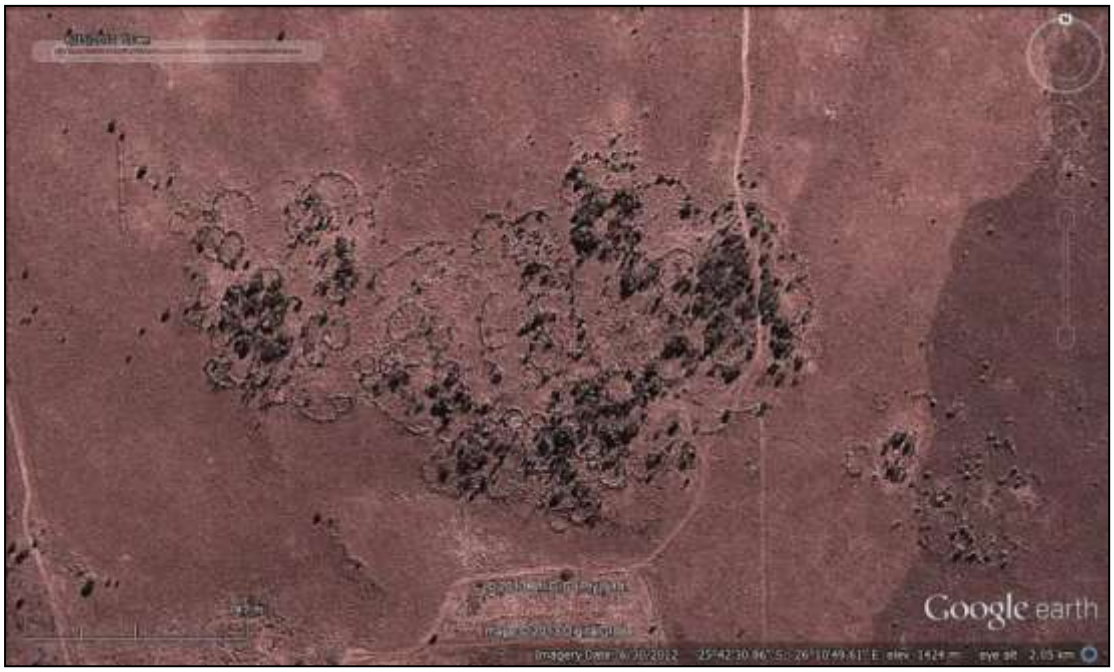


Figure 47 Detailed aerial representation of a large stone wall settlement (Site DIA12) at Stone Wall Cluster 2

Figure 48 Complex stone wall structures at Site DIA12

Figure 49 Collapsed stone walling at Site DIA12

Figure 50 Complex stone wall structures at Site DIA12

Figure 51 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. 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 52 Remains of diggings at a Fluorspar Mine on the farm Rhenosterfontein

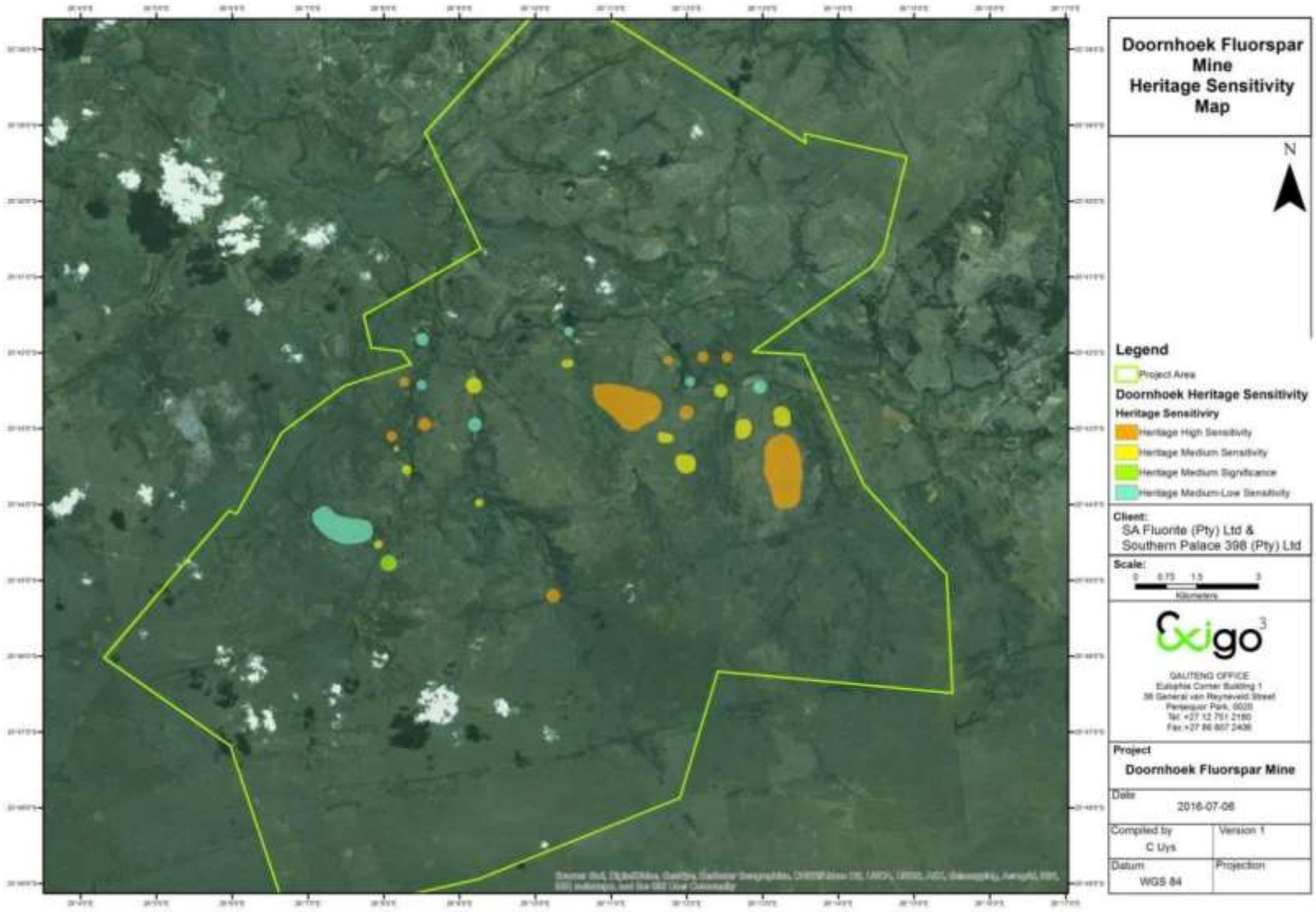


Figure 53 Map of heritage sites in the Doornhoek Fluorspar Mine Area

10.1.10. 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 21). Some crop cultivation occurs in isolated areas of the area.

The land use is dominated by game, livestock farming and chicken farming (Figure 54), 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 55).

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 54: Farming activities located alongside the Klein Marico River

Figure 55: Abandoned mine

Figure 56: General surroundings in the Doornhoek Fluorspar Mine area, with the stone-walled settlement in the foreground

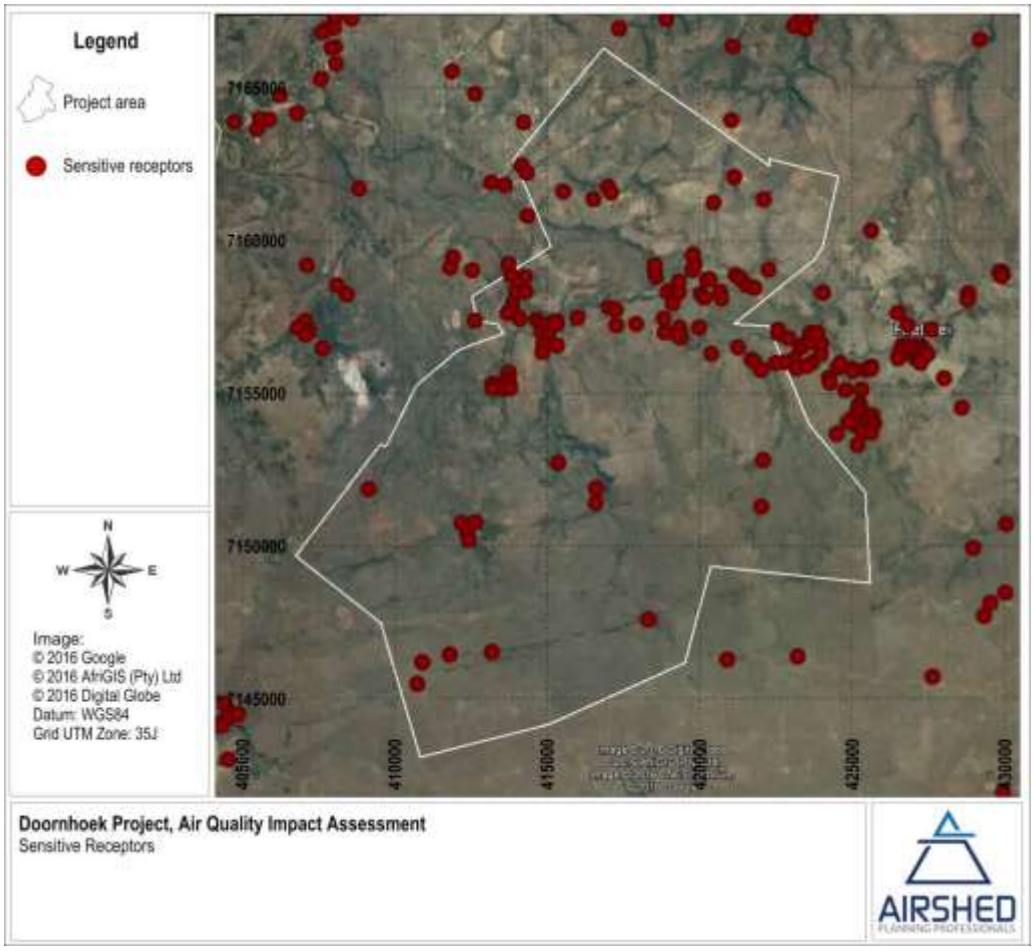


Figure 57 Location of sensitive receptors to the proposed mining right area

10.1.11. SOCIO-ECONOMIC ENVIRONMENT

The majority of the mining right area is located in the Ditsobotla Local Municipality (DLM), with a portion being extended over to the Ramotshere Moiloa Local Municipality (RMLM). Most of the surface infrastructure and Resource Area C and D are located in the RMLM while Resource Area A is located in the DLM. Both of these municipalities form part of the Ngaka Modiri Molema District Municipality (DM) in the North West Province.

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.

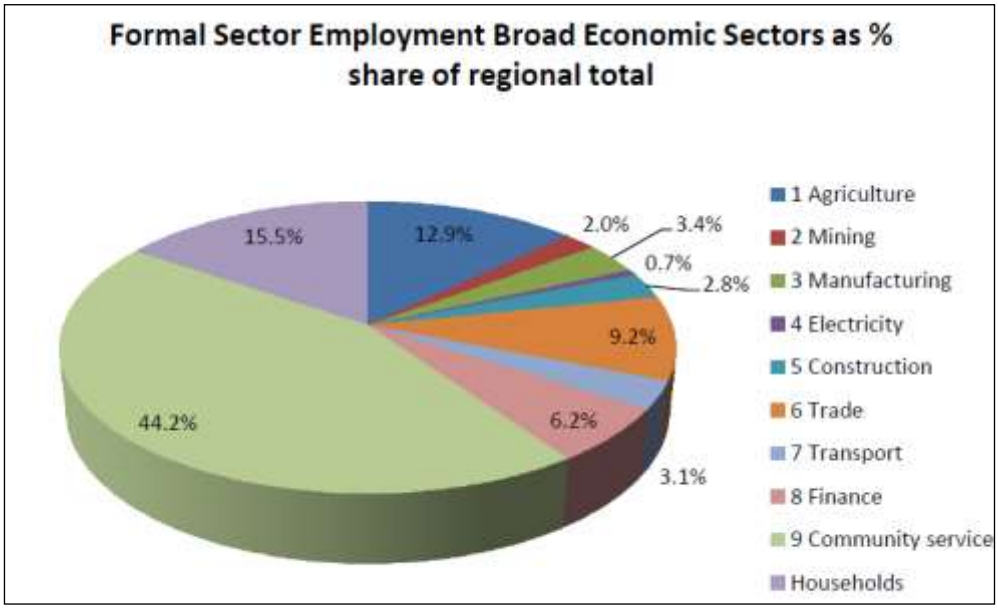


Figure 58: Formal Sector Employment (Draft NMMDM IDP 2012-2016)

As can be seen from Figure 58 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 59 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.

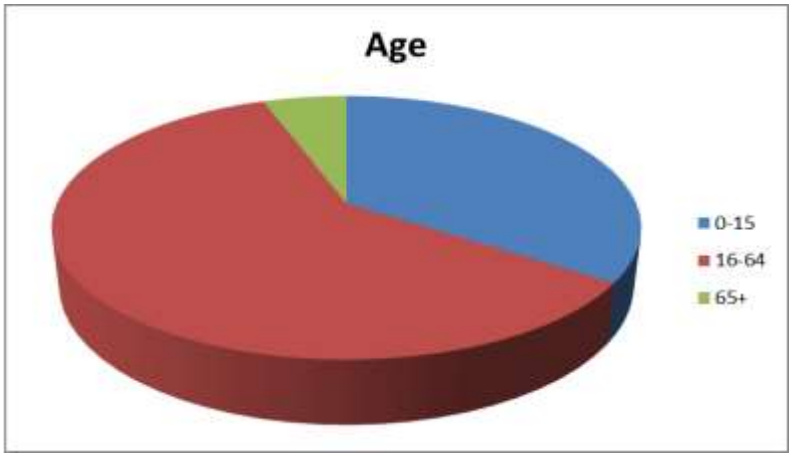


Figure 59: Age group (www.statssa.co.za)

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.

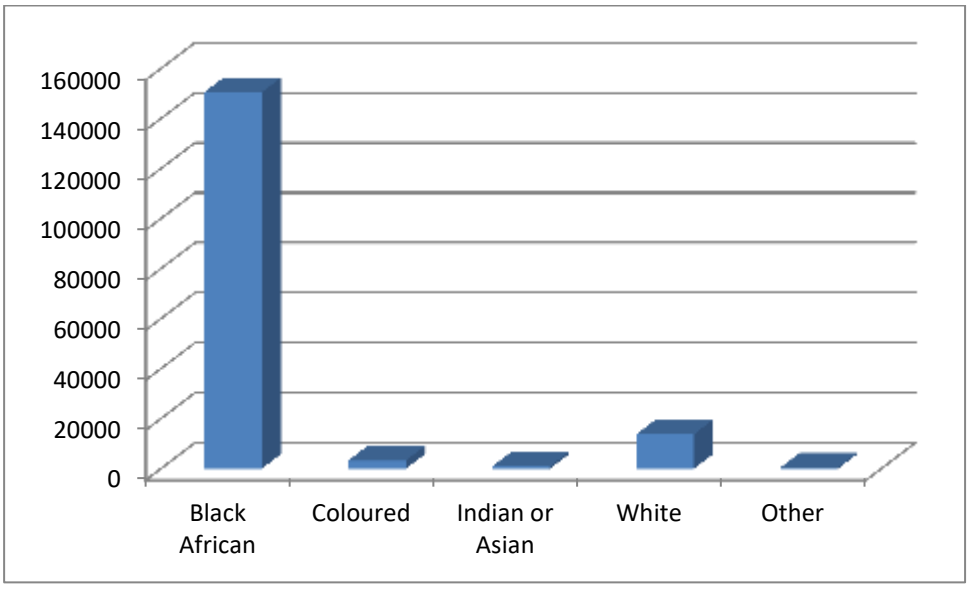


Figure 60: Population

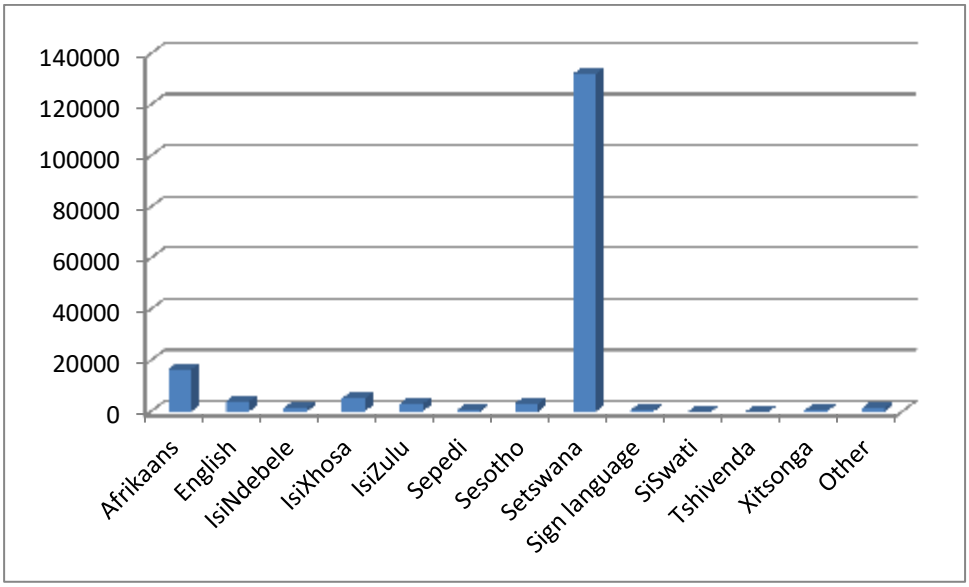


Figure 61: Language

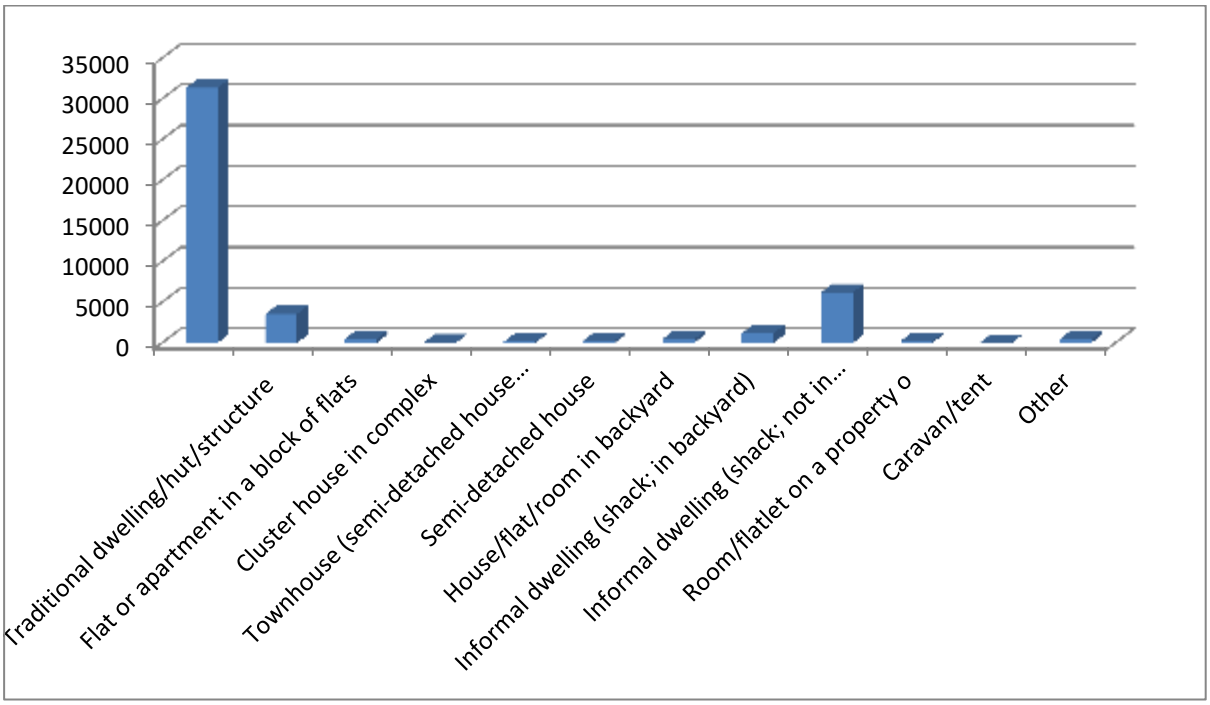


Figure 62: Type of main dwelling

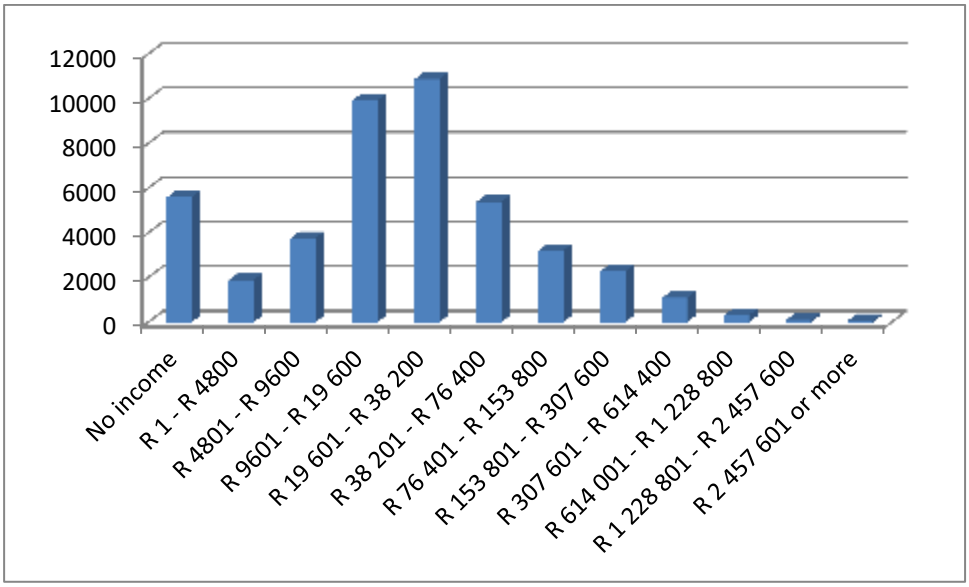


Figure 63: Annual Household Income

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 64 below:

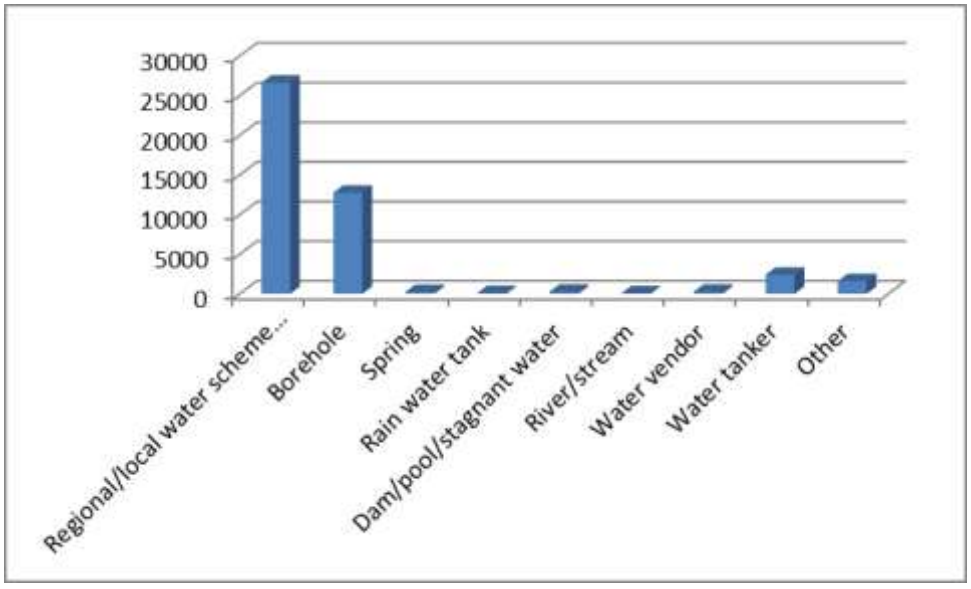


Figure 64: Source of water

11. 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.

12. 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 65 below and include amongst others:

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

13. ENVIRONMENTAL AND CURRENT LAND USE MAP.

(Show all environmental, and current land use features)

See Figure 65 and Figure 66 below.

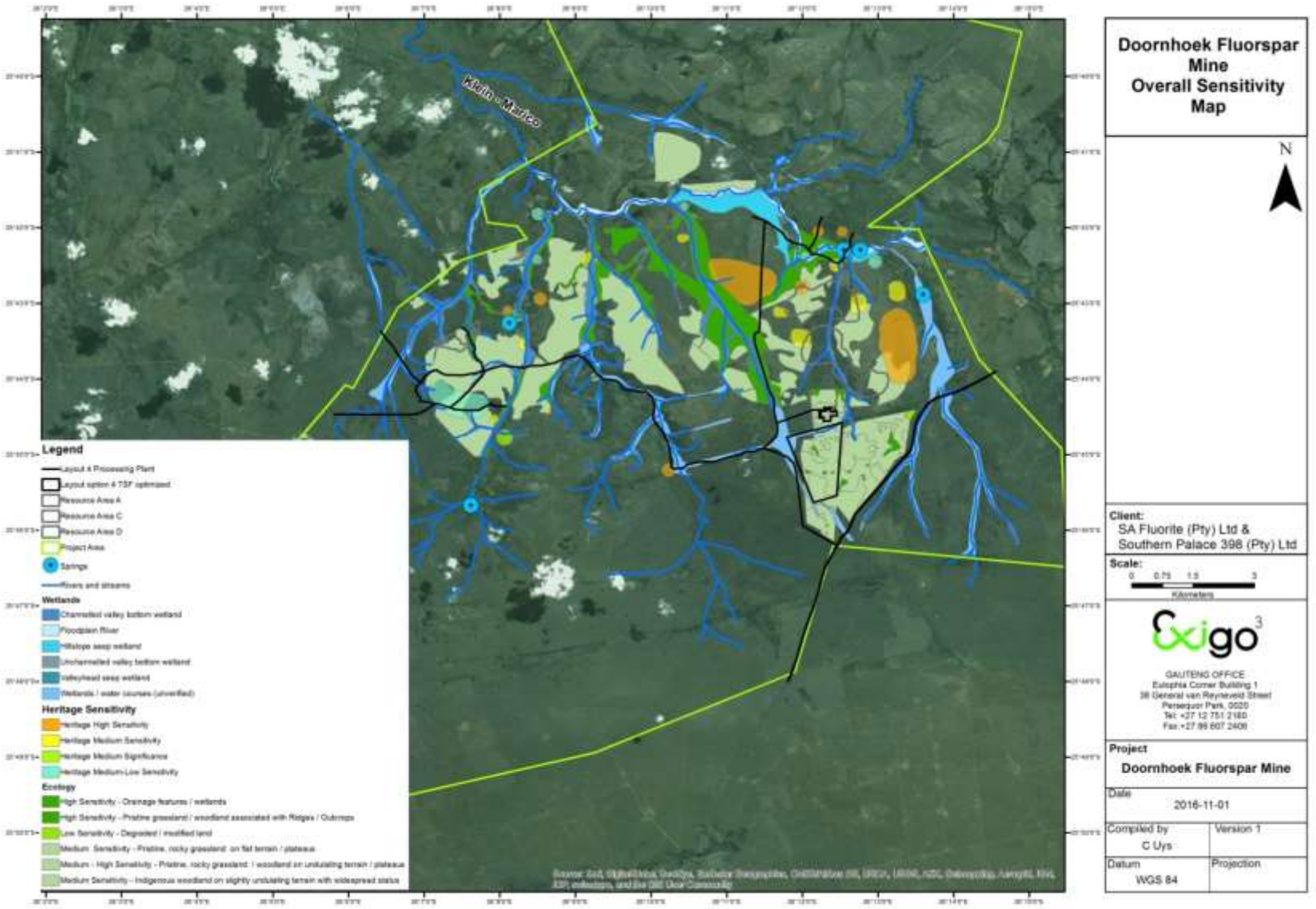


Figure 65 Overall Sensitivity Map

Figure 66: Land Use Map

14. IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF THE IMPACTS, INCLUDING THE DEGREE TO WHICH THESE IMPACTS

(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. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated).

Table 19: Impact Assessment Matrix

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 applications	Eradication of protected trees	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														
2	Clearing of vegetation for open pit, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats (Refer to Figure 67 to Figure 68.	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	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	Soil erosion and sedimentation	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	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
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 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
7	Heavy machinery and vehicle movement on site; construction of infrastructure, roads 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
Operational Phase														
8	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats (Refer to Figure 67 to Figure 68.	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
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	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
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 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
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	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

	mining site / vehicle movement on site															
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																
23	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																
24	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Wetland and watercourse destruction / fragmentation of wetland habitats (refer to Figure 69 to Figure 70)	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
25	Clearing of vegetation for open pit through wetlands and water courses as well as 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
26	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	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
27	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
28	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																
29	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
30	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	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
31	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
32	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																
33	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
34	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
35	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
36	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																

37	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
38	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
39	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
Soils															
Planning Phase															
40	Obtaining of IWUL for crossings (wetland soils) and mining layout on sensitive soils	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															
41	Heavy machinery and vehicle movement on site	Soil compaction	WOM	Negative	Definite	5	Permanent	5	Local	1	High	8	70	High	May cause irreplaceable loss of resources
			WM	Negative	Definite	5	Long term	4	Local	1	Low	2	35	Low	Can be reversed
42	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	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
43	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
44	Topsoil & subsoil stripping	Soil destruction and sterilization (refer to Figure 71 to Figure 72)	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
45	Topsoil & subsoil stripping, Clearing of vegetation through wetlands and water courses for road crossings	Loss of land capability	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															
46	Heavy machinery and vehicle movement on site, laydown areas of overburden dumps and stockpiles	Soil compaction	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
47	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	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
48	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
49	Topsoil & subsoil stripping, opencast mining	Soil destruction and sterilization	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
50	Topsoil & subsoil stripping, clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Loss of land capability	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															
51	Rehabilitation of mining site	Improvement of eroded soils and compaction / partial backfilling of pits	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
52	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	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
53	Heavy machinery and vehicle movement on site	Soil compaction	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
54	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															
55	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
56	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 resources

		areas on site post 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															
57	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
			WM	Negative	Probable	2	Long term	4	Regional	3	Medium	6	26	Low	Can be avoided, managed or mitigated
Construction Phase															
58	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
			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be avoided, managed or mitigated
59	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
			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be avoided, managed or mitigated
60	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
			WM	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	Can be avoided, managed or mitigated
61	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															
62	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	Site	2	Medium	6	48	Moderate	Can be avoided, managed or mitigated
63	Materials handling operations	PM10 and PM2.5 (refer to Figure 73 and Figure 74)	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
64	Mining operations within open pit	PM10 and PM2.5 (refer to Figure 73 and Figure 74)	WOM	Negative	Highly Probable	4	Long term	4	Local	1	High	8	52	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
65	Wind erosion	PM10 and PM2.5 (refer to Figure 73 and Figure 74)	WOM	Negative	Highly Probable	4	Long term	4	Local	1	Medium	6	44	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															
66	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
67	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
68	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															
69	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															
70	Disposal of tailings on tailings facility	Development of acid mine drainage conditions	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	
71	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	
72	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	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	
73	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	
74	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	
75	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	
76	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															
77	Disposal of tailings on tailings facility	Development of acid mine drainage	WOM	Negative	Improbable	1	Long term	4	Regional	3	High	8	15	Negligible	

		conditions	WM	Negative	Improbable	1	Long term	4	Site	2	High	8	14	Negligible	
78	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	
79	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	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	
80	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	
81	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	
82	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	
83	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															
84	Construction Phase Years 1 - 5 (All receptors)	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															
85	Construction Phase Years 1 - 5 (All receptors)	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															
86	Construction Phase Years 1 - 5 (All receptors)	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															
87	Construction Phase Years 1 - 5 (All receptors)	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															
88	Construction Phase Years 1 - 5 (All receptors)	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															
89	Open cast years 5 - 10 (receptor 1 to 5)	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
90	Open cast years 5 - 10 (receptor 5 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
Construction Phase															
91	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels (refer to Figure 76)	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
92	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels (refer to Figure 76)	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															
93	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels (refer to Figure 77)	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
94	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels (refer to Figure 77)	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															
95	Open cast years 5 - 10 (receptor 1 to 5)	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
96	Open cast years 5 - 10 (receptor 5 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
Post-Closure Phase															
97	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed

		ambient/rating levels	WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be reversed
98	Open cast years 5 - 10 (receptor 5 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
Planning Phase															
99	Open cast years 10 - 20 (receptor 1 to 9)	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
100	Open cast years 10 - 20 (receptor 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
Construction Phase															
101	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels (refer to Figure 78)	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
102	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels (refer to Figure 78)	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															
103	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels (refer to Figure 79)	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
104	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels (refer to Figure 79)	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															
105	Open cast years 10 - 20 (receptor 1 to 9)	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
106	Open cast years 10 - 20 (receptor 10)	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															
107	Open cast years 10 - 20 (receptor 1 to 9)	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
108	Open cast years 10 - 20 (receptor 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
Planning Phase															
109	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
110	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															
111	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels (refer to Figure 80)	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
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	Can be reversed
Operational Phase															
113	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels (refer to Figure 81)	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
114	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels (refer to Figure 81)	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															
115	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
116	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
Post-Closure Phase															
117	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
118	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															
119	Planning	Site EXIGO-DFM-IA01 (medium significance) (refer to Figure 82)	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
120	Planning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance) (refer to Figure 82)	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
121	Planning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance) (refer to Figure 82)	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be avoided, managed or mitigated
			WM	Positive	Improbable	1	Short term	1	Local	1	High	8	10	Negligible	Can be avoided, managed or mitigated
Construction Phase															
122	Construction / Clearing	Site EXIGO-DFM-IA01 (medium significance) (refer to Figure 82)	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
123	Construction / Clearing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance) (refer to Figure 82)	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
124	Construction / Clearing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance) (refer to Figure 82)	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															
125	Mining / Processing	Site EXIGO-DFM-IA01 (medium significance) (refer to Figure 82)	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
126	Mining / Processing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance) (refer to Figure 82)	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
127	Mining / Processing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance) (refer to Figure 82)	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															
128	Decommissioning	Site EXIGO-DFM-IA01 (medium significance) (refer to Figure 82)	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
129	Decommissioning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance) (refer to Figure 82)	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
130	Decommissioning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance) (refer to Figure 82)	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															
131	Post-Closure	Site EXIGO-DFM-IA01 (medium significance) (refer to Figure 82)	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
132	Post-Closure	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance) (refer to Figure 82)	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
133	Post-Closure	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance) (refer to Figure 82)	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
Palaeontology															
Construction Phase															
134	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
135	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
136	Construction of buildings, dams, roads, pylons. Exploration for mining	Preservation of fossils.	WOM	Positive	Improbable	1	Permanent	5	Local	1	Low	2	8	Negligible	
			WM	Positive	Highly Probable	4	Permanent	5	Local	1	Low	2	32	Low	
Operational Phase															
137	Mining	Destruction of stromatolites	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low	Can be avoided, managed or mitigated
138	Mining	Destruction of fossils.	WOM	Negative	Probable	2	Permanent	5	Site	2	Low	2	18	Negligible	Can be avoided, managed or mitigated

			WM	Negative	Probable	2	Permanent	5	Site	2	Low	2	18	Negligible	Can be avoided, managed or mitigated
139	Mining	Preservation of fossils.	WOM	Positive	Improbable	1	Permanent	5	Site	2	Low	2	9	Negligible	
			WM	Positive	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low	
Traffic															
Planning Phase															
140	Vehicular operation and usage of roads	Increase in traffic	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	N/A
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	N/A
Construction Phase															
141	Construction of plant and access roads	Increased traffic volumes: Traffic volumes is very low with the increase in traffic flow still well below road capacity Impeded access	WOM	Negative	Highly Probable	4	Short term	1	Regional	3	Low	2	24	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Short term	1	Regional	3	Low	2	12	Negligible	Can be reversed
142	Road upgrades	Improved access points resulting in increased safety for all road users	WOM	Positive	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	N/A
			WM	Positive	Definite	5	Permanent	5	Regional	3	High	8	80	High	N/A
143	Road upgrades	Upgrades to roads benefitting all road users	WOM	Positive	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	N/A
			WM	Positive	Definite	5	Permanent	5	Regional	3	High	8	80	High	N/A
144	Road rehabilitation	Rehabilitation of roads benefitting all road users	WOM	Positive	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	N/A
			WM	Positive	Definite	5	Long term	4	Regional	3	High	8	75	High	N/A
Operational Phase															
145	Vehicular operation and usage of roads	Added trips to the surrounding road network resulting in an increase in traffic	WOM	Negative	Definite	5	Long term	4	Regional	3	Medium	6	65	High	Can be avoided, managed or mitigated
			WM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate	Can be reversed
Closure and Decommissioning Phase															
146	Vehicular operation and usage of roads	Increase in traffic Deterioration in road quality	WOM	Negative	Highly Probable	4	Short term	1	Regional	3	Low	2	24	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Short term	1	Regional	3	Low	2	12	Negligible	Can be reversed
Post-Closure Phase															
147	No traffic	No impact	WOM	N/A	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	N/A
			WM	N/A	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	N/A
Visual															
Planning Phase															
148	Implementation of Mitigation Measures such as visual berms / vegetation screens	No negative visual impact	WOM	Positive	Probable	2	Permanent	5	Regional	3	Low	2	20	Negligible	Can be reversed
			WM	Positive	Probable	2	Permanent	5	Site	2	Low	2	18	Negligible	Can be avoided, managed or mitigated
Construction Phase															
149	Site preparation: clearance of vegetation and dust generation	Alteration of the visual quality and sense of place of the area (Figure 83 to Figure 87)	WOM	Negative	Definite	5	Medium term	3	Regional	3	Medium	6	60	Moderate	Can be reversed
			WM	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	Can be avoided, managed or mitigated
150	Construction of the Site Camp / Office	Alteration of the visual quality and sense of place of the area (Figure 83 to Figure 87)	WOM	Negative	Definite	5	Short term	1	Site	2	Low	2	25	Low	Can be reversed
			WM	Negative	Highly Probable	4	Short term	1	Site	2	Low	2	20	Negligible	Can be avoided, managed or mitigated
151	Removal of topsoil and subsoil for open pit mining: overburden dumps, topsoil dumps and dust generation	Alteration of the visual quality and sense of place of the area (Figure 83 to Figure 87)	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
152	Construction of the plant: physical structure will become more visible	Alteration of the visual quality and sense of place of the area (Figure 83 to Figure 87)	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
153	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															
154	Physical structure of the plant	Alteration of the visual quality and sense of place of the area (Figure 83 to Figure 87)	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
155	Physical structure of the TSF	Alteration of the visual quality and sense of place of the area (Figure 83 to Figure 87)	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 reversed

156	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 (Figure 83 to Figure 87)	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
157	Topsoil dumps, overburden dumps	Alteration of the visual quality and sense of place of the area (Figure 83 to Figure 87)	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
158	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															
159	Removal of the plant structures: generation 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	
160	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	
161	Closure of the open pit mining areas: generation 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	
162	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	
163	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
Post-Closure Phase															
164	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	N/A
			WM	Positive	Definite	5	Long term	4	Regional	3	Low	2	45	Moderate	
165	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															
Planning Phase															
166	Stakeholder engagement: aquifer testing arrangements.	Lowering of local water levels caused by pump testing	**WOM**	Negative	Highly Probable	4	Short term	1	Local	1	Medium	6	32	Low	
			WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
167	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	Negative	Probable	2	Short term	1	Site	2	Low	2	10	Negligible	Can be avoided, managed or mitigated
168	Anthropogenic activities on site.	Contamination risk	**WOM**	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	
			WM	Negative	Probable	2	Short term	1	Site	2	Low	2	10	Negligible	Can be avoided, managed or mitigated
169	Fuelling and movement of construction vehicles.	Risk of hydrocarbon spillage and contamination	**WOM**	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate	
			WM	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low	Can be avoided, managed or mitigated
Construction Phase															
170	Oil, grease and diesel spillages from construction vehicles	Contamination risk	**WOM**	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	
			WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
171	Pollution of groundwater due to sanitation facilities	Deterioration of groundwater quality	**WOM**	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	
			WM	Negative	Probable	2	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
172	Ground and surface water pollution due to storage of chemicals and building materials	Deterioration of groundwater and surface quality	**WOM**	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	
			WM	Negative	Improbable	1	Short term	1	Local	1	Medium	6	8	Negligible	Can be avoided, managed or mitigated
173	Spillages from diesel (fuel storage) facilities	Deterioration of groundwater and surface quality	**WOM**	Negative	Highly Probable	4	Short term	1	Site	2	Medium	6	36	Low	
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be avoided, managed or mitigated
Operational Phase															
174	Dewatering zone of influence.	Lowering of regional groundwater levels (refer to Figure 88)	**WOM**	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
			WM	Negative	Probable	2	Long term	4	Regional	3	High	8	30	Low	Can be avoided, managed or mitigated
175	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination (Figure 91)	**WOM**	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
			WM	Negative	Probable	2	Medium term	3	Regional	3	Medium	6	24	Low	Can be avoided, managed or mitigated
176	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	Negative	Highly Probable	4	Medium term	3	Site	2	Low	2	28	Low	Can be avoided, managed or mitigated
177	Hydrocarbon spillages from fuel storage	Hydrocarbon contamination of	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	Can be avoided, managed or mitigated

	facilities, fuelling and wash-bays.	groundwater and surface water resources	**WM**	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	
178	Flooding of the open pit	Unsafe working conditions	**WOM**	Negative	Improbable	1	Long term	4	Site	2	Medium	6	12	Negligible	
			WM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	Can be avoided, managed or mitigated
179	Pollution of groundwater due to sanitation facilities	Deterioration of groundwater quality	**WOM**	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	
			WM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	Can be avoided, managed or mitigated
180	Seepage from overburden dumps	Deterioration of groundwater quality (Figure 91)	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
181	Sulphate and Fluoride leaching from the TSF	Deterioration of groundwater quality (Figure 89 to Figure 90)	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
182	Increased TDS / Nitrate leaching from the overburden dumps	Deterioration of groundwater quality (Figure 91)	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
183	Dewatering: Water from the Klein Marico into the open pit	Depletion of surface water resource (Figure 88)	**WOM**	Negative	Highly Probable	4	Long term	4	Regional	3	High	8	60	Moderate	
			WM	Negative	Probable	2	Medium term	3	Regional	3	Medium	6	24	Low	Can be avoided, managed or mitigated
184	Dewatering: Spring flow affected	Deterioration of spring flow quantity (Figure 88)	**WOM**	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
			WM	Negative	Probable	2	Long term	4	Regional	3	High	8	30	Low	May cause irreplaceable loss of resources
185	Water losses: leaking pipes	Insufficient maintenance and increase in water use	**WOM**	Negative	Probable	2	Medium term	3	Site	2	High	8	26	Low	
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be avoided, managed or mitigated
186	Water Losses: Transmission losses and evaporation	Insufficient maintenance and increase in water use	**WOM**	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low	
			WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be avoided, managed or mitigated
187	Dewatering: Depletion of water levels in boreholes due to over pumping - Higher than recommended yield	Depletion of groundwater resource, impact on neighbouring users (Figure 88)	**WOM**	Negative	Probable	2	Long term	4	Regional	3	High	8	30	Low	
			WM	Negative	Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate	Can be reversed
188	Dewatering: Depletion of water levels in boreholes due to over pumping - Longer than recommended pumping time	Depletion of groundwater resource, impact on neighbouring users (Figure 88)	**WOM**	Negative	Probable	2	Long term	4	Regional	3	High	8	30	Low	
			WM	Negative	Improbable	1	Medium term	3	Site	2	Medium	6	11	Negligible	Can be reversed
189	Dewatering: Depletion of community water supply boreholes due to dewatering	Depletion of groundwater resource, impact on neighbouring users (Figure 88)	**WOM**	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
			WM	Negative	Highly Probable	4	Medium term	3	Regional	3	Medium	6	48	Moderate	Can be reversed
Post-Closure Phase															
190	Increased groundwater ingress at disturbed/rehabilitated areas	Potential decanting of groundwater at low elevation areas.	**WOM**	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	
			WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
191	Migration of contamination plume from mine contamination sources	Contamination of regional groundwater and surface water resources.	**WOM**	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	
			WM	Negative	Probable	2	Long term	4	Regional	3	Low	2	18	Negligible	Can be avoided, managed or mitigated
192	Post-closure pit flooding and acidification	Negative impact on regional groundwater resources.	**WOM**	Negative	Probable	2	Long term	4	Local	1	Medium	6	22	Low	
			WM	Negative	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated
193	Permanent radius of influence due to mine dewatering	Depletion of groundwater resource, impact on neighbouring users (Figure 88)	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	
			WM	Negative	Probable	2	Medium term	3	Regional	3	Medium	6	24	Low	May cause irreplaceable loss of resources
194	Sulphate and Fluoride leaching from the TSF	Deterioration of groundwater quality (Figure 89 to Figure 90)	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
195	Increased TDS / Nitrate leaching from the overburden dumps	Deterioration of groundwater quality (Figure 91)	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible	Can be avoided, managed or mitigated
Aquatic															
Planning Phase															
196	Potentially poor planning leading to extensive dirty water areas which need to be managed which may reduce the mean annual run-off (MAR) to the non-perennial drainage systems in the area.	Loss of instream flow	**WOM**	Negative	Probable	2	Permanent	5	Regional	3	High	8	32	Low	May cause irreplaceable loss of resources
			WM	Positive	Improbable	1	Long term	4	Site	2	Medium	6	12	Negligible	Can be avoided, managed or mitigated
197	Stormwater designs leading to rapid release of water which in turn may lead to a loss of streamflow regulation capabilities in the area	Loss of instream flow	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	Medium	6	52	Moderate	Can be reversed
			WM	Negative	Probable	2	Long term	4	Local	1	Medium	6	22	Low	Can be avoided, managed or mitigated
198	Use of surface runoff and groundwater sources for the supply of production water for the mining project may alter the flow in the receiving systems	Loss of instream flow	**WOM**	Negative	Definite	5	Long term	4	Regional	3	High	8	75	High	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
199	Use of layout option 2 may impact on the	Loss of instream flow	**WOM**	Negative	Definite	5	Long term	4	Site	2	High	8	70	High	May cause irreplaceable loss of resources

	instream flow of the receiving systems.		**WM**	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Can be avoided, managed or mitigated
200	Potentially poor planning leading to extensive and complex dirty water areas which need to be managed may impact on water quality.	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	Permanent	5	Regional	3	Medium	6	28	Low	Can be avoided, managed or mitigated
201	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.	Impacts 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
202	Potentially inadequate separation of clean and dirty water areas leading to contaminated water leaving the defined dirty water area may impact in water quality.	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	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
203	Clean and dirty water systems not being designed adequately to ensure protection of the water resources.	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	Improbable	1	Long term	4	Local	1	Low	2	7	Negligible	Can be avoided, managed or mitigated
204	Potentially poor planning leading to the placement of infrastructure within non-perennial drainage lines, with special mention of the waste stockpile areas as well as roads, road crossings and bridges all may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	Can be reversed
			WM	Negative	Improbable	1	Long term	4	Local	1	Low	2	7	Negligible	Can be avoided, managed or mitigated
205	Potentially inadequate design of infrastructure leading to changes to instream habitat.	Loss of aquatic habitat	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	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
206	Potentially inadequate design of infrastructure leading to changes to system hydrology may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	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
207	Potentially inadequate separation of clean and dirty water areas and the prevention of the release of sediment rich water may alter the aquatic habitat within the receiving environment.	Loss of aquatic habitat	**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	Medium	6	22	Low	Can be avoided, managed or mitigated
208	Potentially poor planning leading to the placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Improbable	1	Long term	4	Local	1	Low	2	7	Negligible	May cause irreplaceable loss of resources
209	Potentially inadequate design of infrastructure leading to changes to instream habitat may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Improbable	1	Long term	4	Local	1	Low	2	7	Negligible	May cause irreplaceable loss of resources
210	Potentially inadequate design of infrastructure leading to changes to system hydrology may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Improbable	1	Long term	4	Local	1	Low	2	7	Negligible	May cause irreplaceable loss of resources
211	Potentially inadequate design of infrastructure leading to contamination of water and sediments in the streams may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**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	Medium	6	22	Low	Can be avoided, managed or mitigated
Construction Phase																
212	Disturbance of soils during the construction phase could lead to erosion and sedimentation of the aquatic resources present, thus resulting in a loss of instream flow.	Loss of instream flow	**WOM**	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	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
213	Construction of clean and dirty water separation structures for dirty water management purposes may lead to altered flow levels.	Loss of instream flow	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	Medium	6	52	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
214	Change in surface coverage.	Loss of instream flow	**WOM**	Negative	Definite	5	Long term	4	Site	2	High	8	70	High	May cause irreplaceable loss of resources

	Development of the mining rights area will change the surface coverage in some areas from vegetated soil to buildings, hardened gravel roads, paved areas (parking) and compacted earth.		**WM**	Negative	Probable	2	Long term	4	Local	1	Medium	6	22	Low	Can be avoided, managed or mitigated
215	Clean and dirty water systems not being constructed to the required specifications to prevent contamination of clean water areas may impact on water quality.	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	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
216	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.	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	Short term	1	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
217	Poor housekeeping and management may lead to impacts on water quality.	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
218	Spills and other unplanned events may impact on water quality.	Impacts 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
219	Site clearing and the removal of vegetation leading to increased runoff and erosion may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Definite	5	Permanent	5	Site	2	Medium	6	65	High	Can be reversed
			WM	Negative	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated
220	Site clearing and road construction and the disturbance of soils leading to increased erosion may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	Medium	6	52	Moderate	Can be reversed
			WM	Negative	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated
221	Earthworks in the vicinity of drainage systems leading to increased runoff and erosion and altered runoff patterns may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	Can be reversed
			WM	Negative	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated
222	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	Can be reversed
			WM	Negative	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated
223	Site clearing and the removal of vegetation may lead to a loss in aquatic biodiversity. Site clearing and road construction may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Definite	5	Permanent	5	Site	2	Medium	6	65	High	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated
224	Earthworks and other mining construction activities in the vicinity of wetland and riparian areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated
225	Placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	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
226	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Permanent	5	Site	2	Medium	6	26	Low	Can be avoided, managed or mitigated
Operational Phase															
227	Loss of MAR from dirty water areas may impact on the instream flow of the receiving systems.	Loss of instream flow	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	Can be reversed
			WM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
228	Loss of water through clean and dirty water separation may alter instream flow on the receiving systems.	Loss of instream flow	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	Can be reversed
			WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
229	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area, with special mention of the formation of an ever increasing cone of depression over the life of the proposed mining project as a result of open cast mining activities and water	Loss of instream flow	**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	High	8	56	Moderate	May cause irreplaceable loss of resources

	abstraction, may lead to altered instream flow														
230	Intercepting run-off around mining activities and infrastructure could reduce the amount of time that water would take to reach the Klein Marico River and its associated tributaries and may lead to "flash flood" events on varying scales.	Loss of instream flow	**WOM**	Negative	Probable	2	Long term	4	Site	2	High	8	28	Low	Can be reversed
			WM	Negative	Improbable	1	Medium term	3	Local	1	Low	2	6	Negligible	Can be avoided, managed or mitigated
231	Capture of run-off and capture of rainfall (inundation) in the 'dirty'/impacted areas would lower instream flow in the receiving environment.	Loss of instream flow	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
232	Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution.	Impacts 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
233	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.	Impacts 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
234	Poor housekeeping and management during operational phase may lead to impacts on water quality.	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
235	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.	Impacts 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
236	Spills and other unplanned events during operational phase may impact on water quality.	Impacts 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
237	Ongoing disturbance of soils during general operational activities may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	Can be reversed
			WM	Negative	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated
238	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the operational phase.	Loss of aquatic habitat	**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	Local	1	Medium	6	22	Low	Can be avoided, managed or mitigated
239	Mining related activities leading to increased disturbance of soils and drainage lines may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	Can be reversed
			WM	Negative	Improbable	1	Long term	4	Local	1	Low	2	7	Negligible	Can be avoided, managed or mitigated
240	Any activities which lead to the reduction of flow in the system with special mention of the use of surface and groundwater sources for production water may alter the aquatic habitat. It is considered likely that the operational activities will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat.	Loss of aquatic habitat	**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	May cause irreplaceable loss of resources
241	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	Can be reversed
			WM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated
242	Ongoing disturbance of soils with general operational activities may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	Can be reversed
			WM	Negative	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated
243	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**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	Local	1	Medium	6	22	Low	Can be avoided, managed or mitigated
244	Loss of instream flow due to abstraction	Loss of aquatic biodiversity and	**WOM**	Negative	Highly Probable	4	Long term	4	Site	2	High	8	56	Moderate	Can be reversed

	for water for production may lead to a loss in aquatic biodiversity.	sensitive taxa	**WM**	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
245	Seepage from the discard dumps and overburden stockpiles may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Permanent	5	Regional	3	Medium	6	56	Moderate	May cause irreplaceable loss of resources
246	Potential discharge from the mine process water system with special mention of RWD and any PCD's may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	Can be reversed
			WM	Negative	Probable	2	Long term	4	Regional	3	Medium	6	26	Low	Can be avoided, managed or mitigated
247	Sewage discharge from mine offices and camps may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Probable	2	Permanent	5	Regional	3	Medium	6	28	Low	Can be reversed
			WM	Negative	Probable	2	Short term	1	Site	2	Medium	6	18	Negligible	Can be avoided, managed or mitigated
248	It is considered likely that the operational activities, with special mention of the open cast mining activities, will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat as well as a loss of surface water recharge to the wetlands and springs which occur in the vicinity of the proposed mining project.	Loss of aquatic biodiversity and sensitive taxa	**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	May cause irreplaceable loss of resources
249	Acidification as a result of pyrite oxidation and the release of metals due to tillage and blasting may lead to a loss in aquatic biodiversity	Loss of aquatic biodiversity and sensitive taxa	**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	May cause irreplaceable loss of resources
Closure and Decommissioning Phase															
250	Loss of MAR from latent dirty water areas may still impact on the flow even after operational phase.	Loss of instream flow	**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
251	Loss of water to inadequately rehabilitated areas may still have an impact on the flow post operational phase.	Loss of instream flow	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	Can be reversed
			WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
252	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post operational phase	Loss of instream flow	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	Medium	6	56	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Improbable	1	Medium term	3	Local	1	Low	2	6	Negligible	Can be avoided, managed or mitigated
253	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.	Impacts 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
254	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.	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	Long term	4	Site	2	Low	2	16	Negligible	Can be avoided, managed or mitigated
255	Poor housekeeping and management during decommissioning phase may lead to impacts on water quality.	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
256	Spills and other unplanned events during decommissioning phase may impact on water quality.	Impacts 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
257	Disturbance of soils as part of demolition activities may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Probable	2	Permanent	5	Site	2	High	8	30	Low	Can be reversed
			WM	Negative	Improbable	1	Short term	1	Local	1	Medium	6	8	Negligible	Can be avoided, managed or mitigated
258	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	Loss of aquatic habitat	**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	Regional	3	Medium	6	26	Low	Can be avoided, managed or mitigated
259	Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Definite	5	Long term	4	Site	2	Medium	6	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
260	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	Can be reversed
			WM	Negative	Probable	2	Long term	4	Local	1	Medium	6	22	Low	Can be avoided, managed or mitigated
261	Disturbance of soils as part of demolition	Loss of aquatic biodiversity and	**WOM**	Negative	Probable	2	Permanent	5	Site	2	High	8	30	Low	May cause irreplaceable loss of resources

	activities may lead to a loss in aquatic biodiversity.	sensitive taxa	**WM**	Negative	Improbable	1	Short term	1	Local	1	Medium	6	8	Negligible	Can be reversed
262	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**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	Regional	3	Medium	6	26	Low	Can be avoided, managed or mitigated
263	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Permanent	5	Regional	3	Medium	6	56	Moderate	May cause irreplaceable loss of resources
264	Inadequate closure leading to post closure impacts on water quality may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	May cause irreplaceable loss of resources
			WM	Negative	Improbable	1	Permanent	5	Regional	3	Medium	6	14	Negligible	Can be avoided, managed or mitigated
265	Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Improbable	1	Permanent	5	Local	1	Low	2	8	Negligible	Can be avoided, managed or mitigated
Post-Closure Phase															
266	Loss of MAR from latent dirty water areas may still impact on the flow even after decommissioning phase.	Loss of instream flow	**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
267	Loss of water to inadequately rehabilitated areas may still have an impact on the flow post decommissioning phase.	Loss of instream flow	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	Medium	6	56	Moderate	Can be reversed
			WM	Negative	Probable	2	Long term	4	Local	1	Low	2	14	Negligible	Can be avoided, managed or mitigated
268	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post decommissioning phase	Loss of instream flow	**WOM**	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High	May cause irreplaceable loss of resources
			WM	Negative	Improbable	1	Medium term	3	Local	1	Low	2	6	Negligible	Can be avoided, managed or mitigated
269	Ongoing erosion and sedimentation of the aquatic resources, which will result in a loss of instream flow due to inadequate rehabilitation of affected areas.	Loss of instream flow	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Improbable	1	Medium term	3	Local	1	Low	2	6	Negligible	Can be avoided, managed or mitigated
270	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 decant degenerated from in-filled opencast pits	Impacts 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	Local	1	Low	2	12	Negligible	Can be avoided, managed or mitigated
271	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.	Impacts 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
272	Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present.	Impacts on water quality	**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
273	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	Loss of aquatic habitat	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	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
274	Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	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
275	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Probable	2	Permanent	5	Local	1	Low	2	16	Negligible	Can be avoided, managed or mitigated
276	Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Highly Probable	4	Permanent	5	Site	2	High	8	60	Moderate	May cause irreplaceable loss of resources
			WM	Negative	Improbable	1	Medium term	3	Local	1	Low	2	6	Negligible	Can be avoided, managed or mitigated
277	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	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
278	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Permanent	5	Regional	3	Medium	6	56	Moderate	May cause irreplaceable loss of resources
279	Potential post closure impacts on water quality may lead to a loss in aquatic	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	Definite	5	Permanent	5	Regional	3	High	8	80	High	May cause irreplaceable loss of resources
			WM	Negative	Highly Probable	4	Permanent	5	Regional	3	Medium	6	56	Moderate	May cause irreplaceable loss of resources

	biodiversity.														
	Socio-economic														
Construction Phase															
280	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	N/A
			WM	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	
281	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	N/A
			WM	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	
282	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	N/A
			WM	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	
283	Creation of employment	Skills development	**WOM**	Positive	Probable	2	Short term	1	Regional	3	Medium	6	20	Negligible	N/A
			WM	Positive	Highly Probable	4	Short term	1	Regional	3	Medium	6	40	Low	
284	Capital investment into the establishment of the mine	Government revenue increase	**WOM**	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	N/A
			WM	Positive	Definite	5	Short term	1	Regional	3	Medium	6	50	Moderate	
285	Sterilisation of land due to construction and mine establishment activities	Loss of agricultural production due to land sterilisation and other environmental impacts	**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	
286	Construction activities on site	Change in the sense of place among the directly and indirectly affected communities	**WOM**	Negative	Definite	5	Short term	1	Site	2	Medium	6	45	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Definite	5	Short term	1	Site	2	Low	2	25	Low	
287	Influx of job seekers	Added pressure on basic service delivery and economic infrastructure	**WOM**	Negative	Highly Probable	4	Medium term	3	Regional	3	Medium	6	48	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Medium term	3	Regional	3	Low	2	16	Negligible	
288	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	**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	
Operational Phase															
289	Mining operations	Stimulation of production and GDP due to operations	**WOM**	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	N/A
			WM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	
290	Mining operations	Stimulation of employment creation due to operations	**WOM**	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	N/A
			WM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	
291	Mining operations	Skills development	**WOM**	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	N/A
			WM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	
292	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	N/A
			WM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	
293	Mining operations	Increase in government revenue and its ability to deliver services	**WOM**	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	N/A
			WM	Positive	Definite	5	Long term	4	Regional	3	Medium	6	65	High	
294	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	
295	Presence of the mine and resultant environmental impacts (noise, visual, air quality)	Change in sense of place	**WOM**	Negative	Definite	5	Long term	4	Regional	3	Medium	6	65	High	Can be avoided, managed or mitigated
			WM	Negative	Definite	5	Long term	4	Regional	3	Low	2	45	Moderate	
296	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 avoided, managed or mitigated
			WM	Positive	Definite	5	Long term	4	Regional	3	Low	2	45	Moderate	
Closure															
297	Expenditure on decommissioning and closure	Stimulation of production and GDP and employment	**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	
	Blasting														
Operational Phase															
298	Blasting	Ground vibration Impact on houses	**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	
299	Blasting	Ground vibration Impact on boreholes	**WOM**	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	N/A
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	
300	Blasting	Ground vibration Impact on roads	**WOM**	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	N/A
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	
301	Blasting	Ground vibration Impact on	**WOM**	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Can be avoided, managed or mitigated

		animals	**WM**	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	
302	Blasting	Air blast Impact on houses	**WOM**	Negative	Probable	2	Long term	4	Site	2	High	8	28	Low	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	
303	Blasting	Air blast Impact on boreholes	**WOM**	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	N/A
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	
304	Blasting	Air blast Impact on roads	**WOM**	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	N/A
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	
305	Blasting	Air blast Impact on animals	**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	
306	Blasting	Fly Rock Impact on houses	**WOM**	Negative	Highly Probable	4	Long term	4	Site	2	Medium	6	48	Moderate	Can be avoided, managed or mitigated
			WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible	
307	Blasting	Fly Rock Impact on boreholes	**WOM**	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	N/A
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	
308	Blasting	Fly Rock Impact on roads	**WOM**	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	N/A
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	
309	Blasting	Fly Rock Impact on animals	**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	
310	Blasting	Impact of Fumes - Houses	**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	
311	Blasting	Impact of Fumes - Boreholes	**WOM**	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	N/A
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	
312	Blasting	Impact of Fumes - Roads	**WOM**	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	N/A
			WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	
313	Blasting	Impact of Fumes - animals	**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	

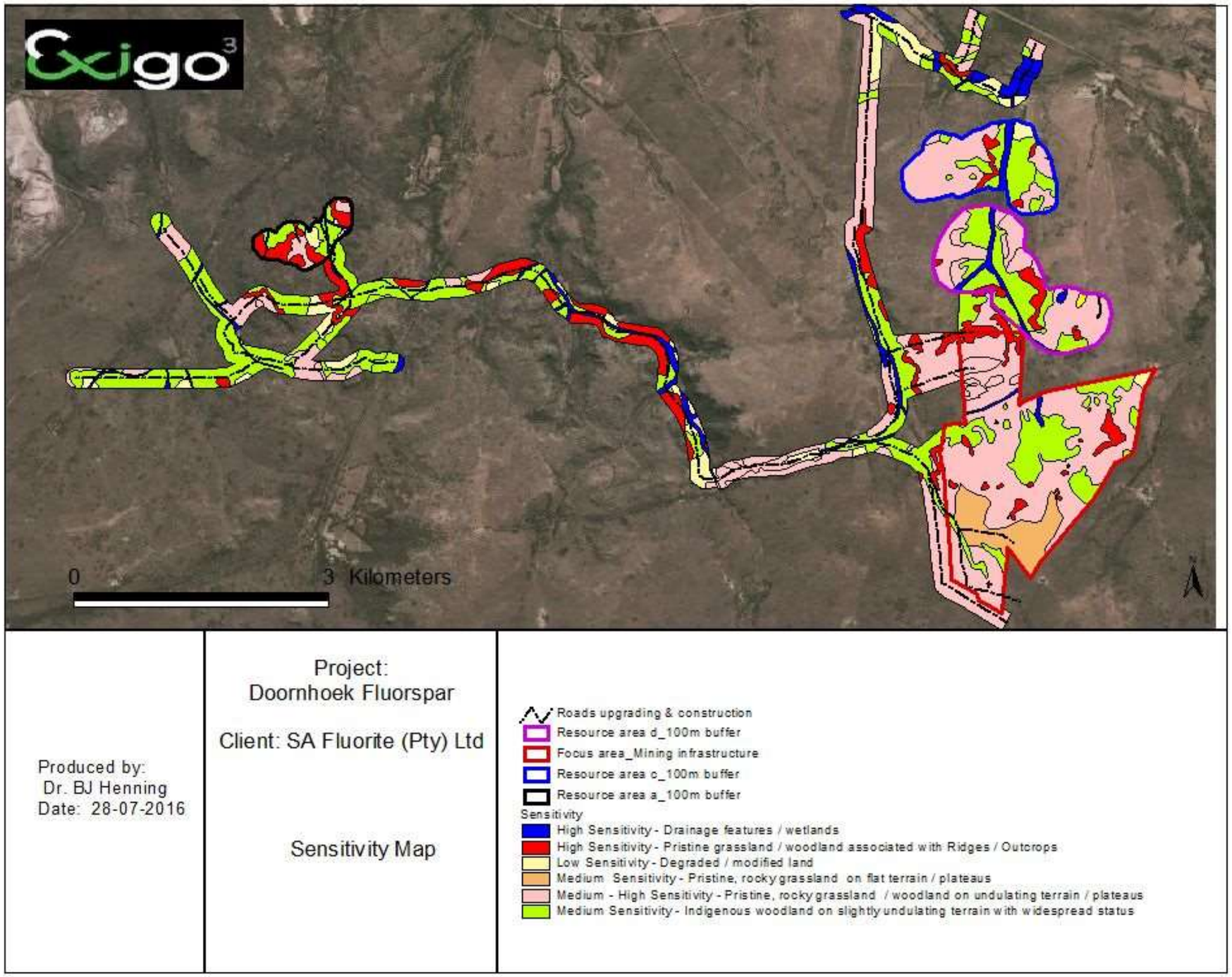


Figure 67 **Sensitivity Map of the proposed Doornhoek Fluorspar Mine site**

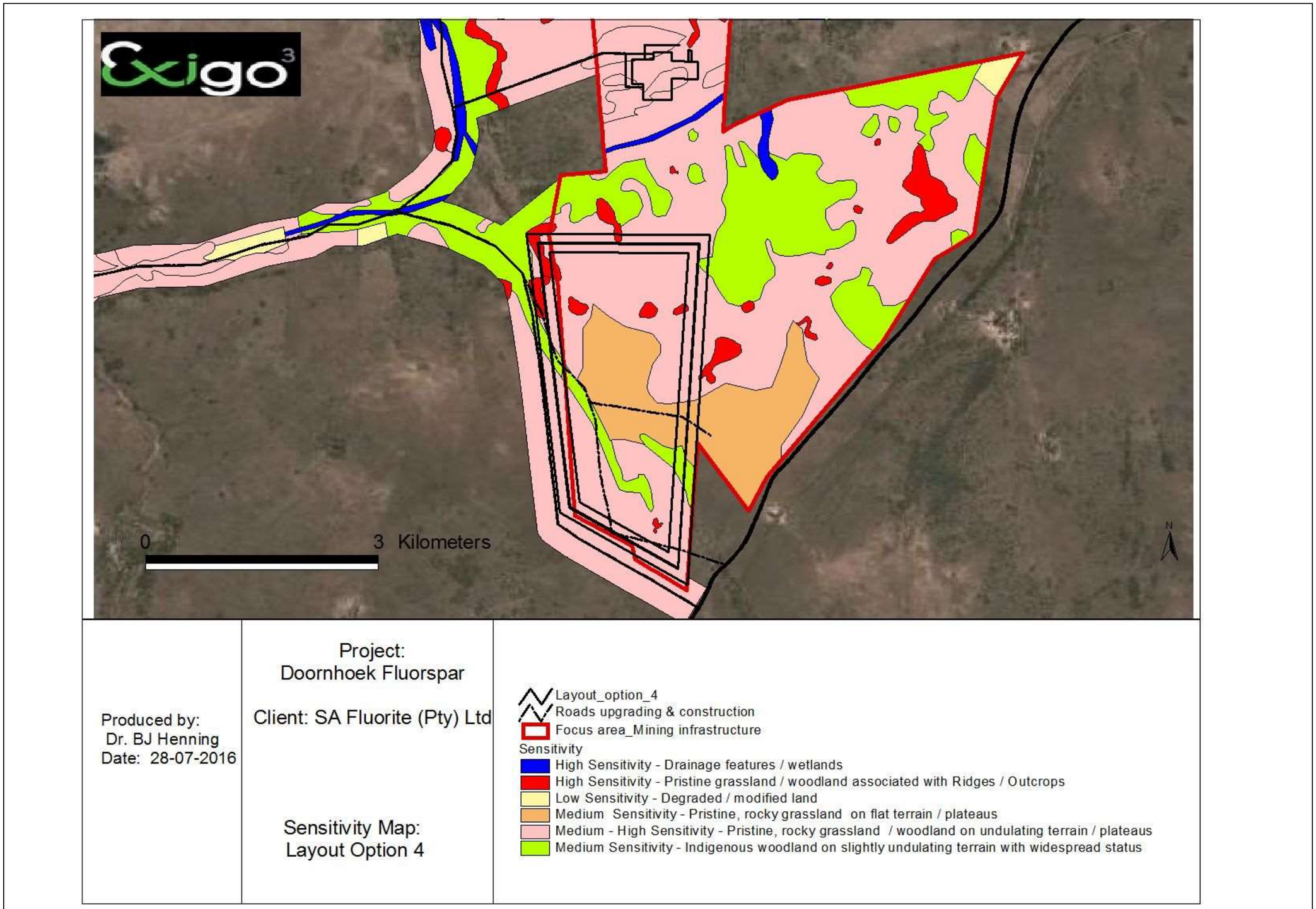


Figure 68 **Layout option 4 Sensitivity Overlay**

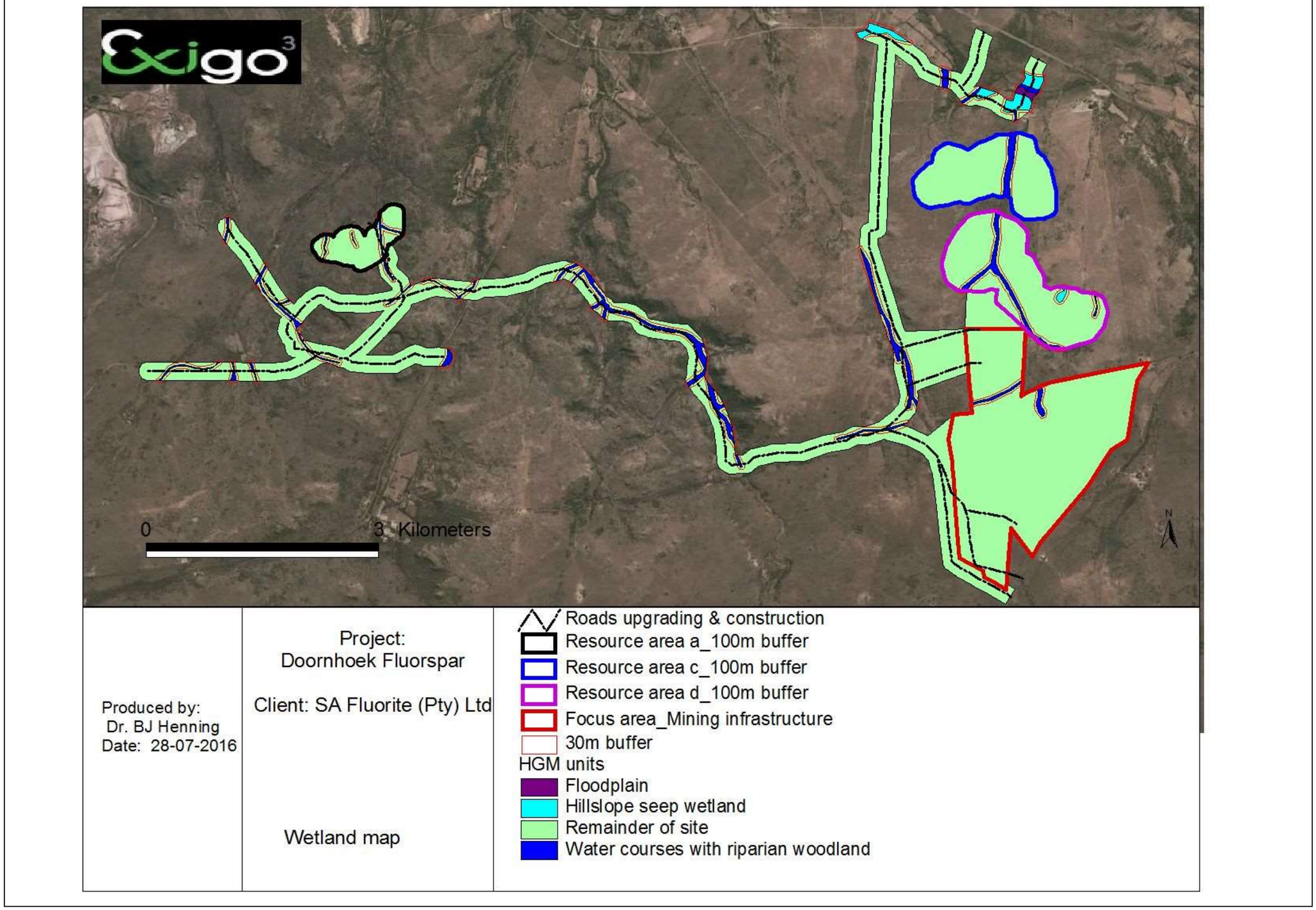


Figure 69 **Wetland map for the proposed Doornhoek Fluorspar Mine project Area**

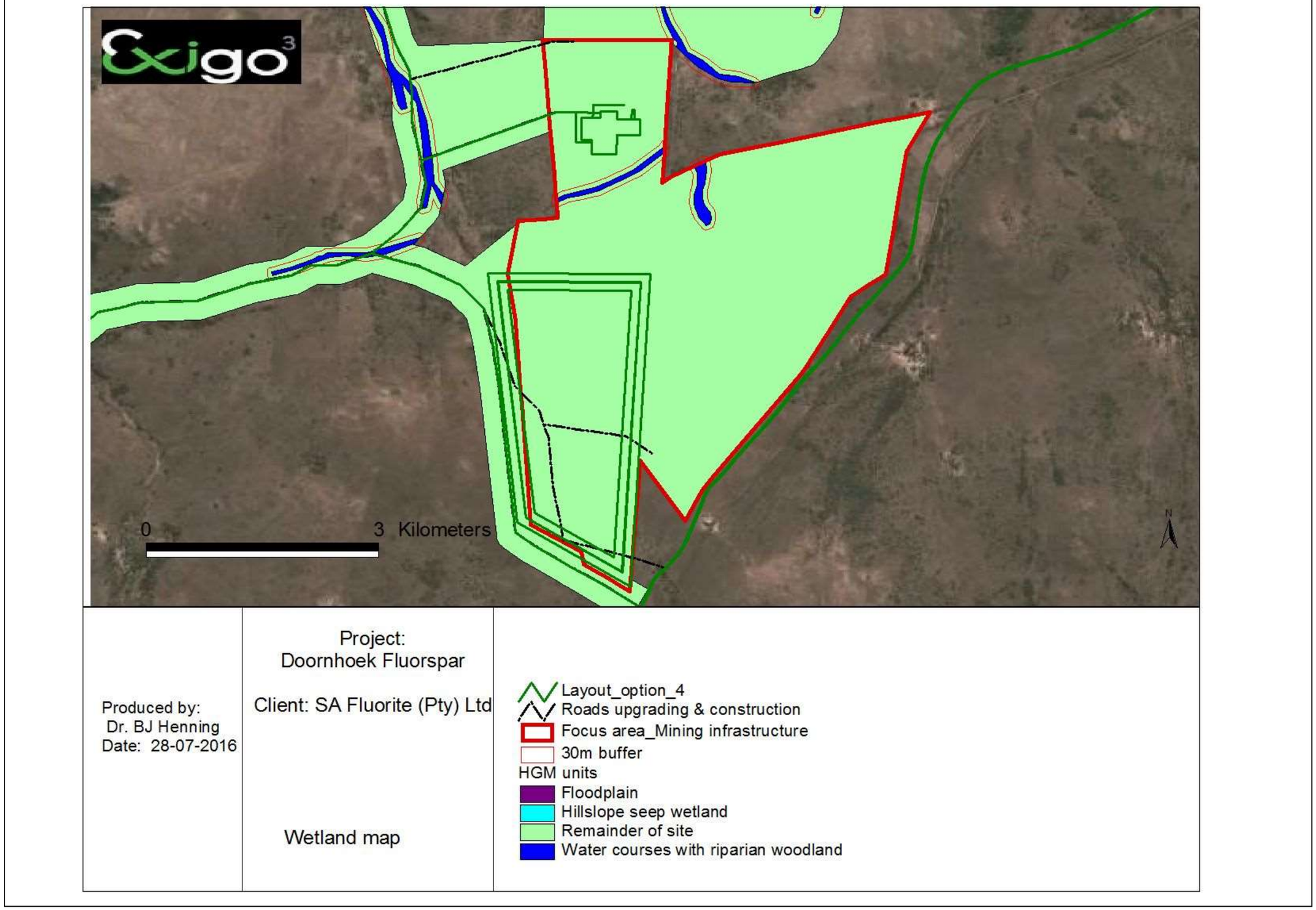


Figure 70 **Layout option 4 wetland overlay map**

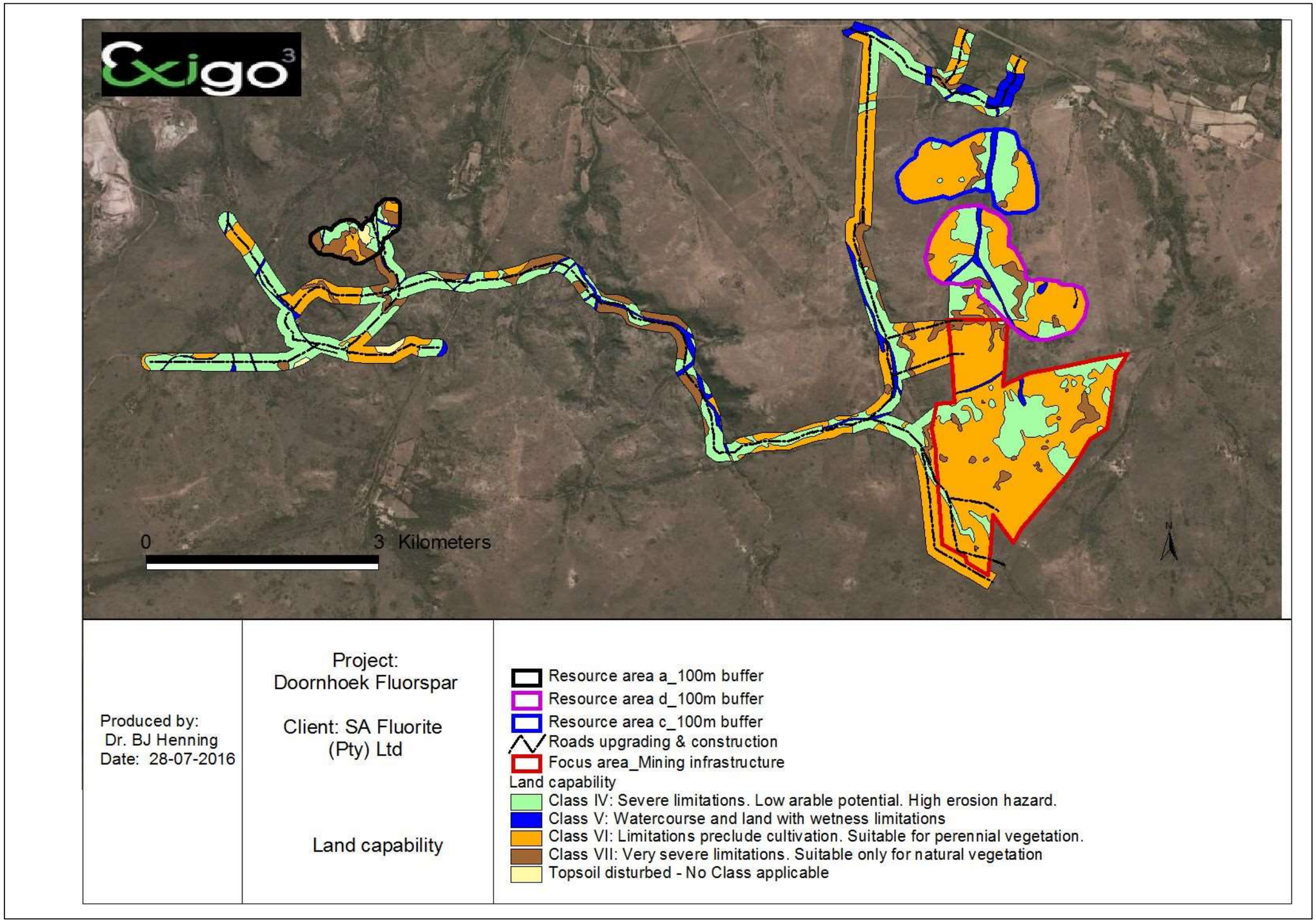


Figure 71 **Land capability map for the proposed Fluorspar Mine development**

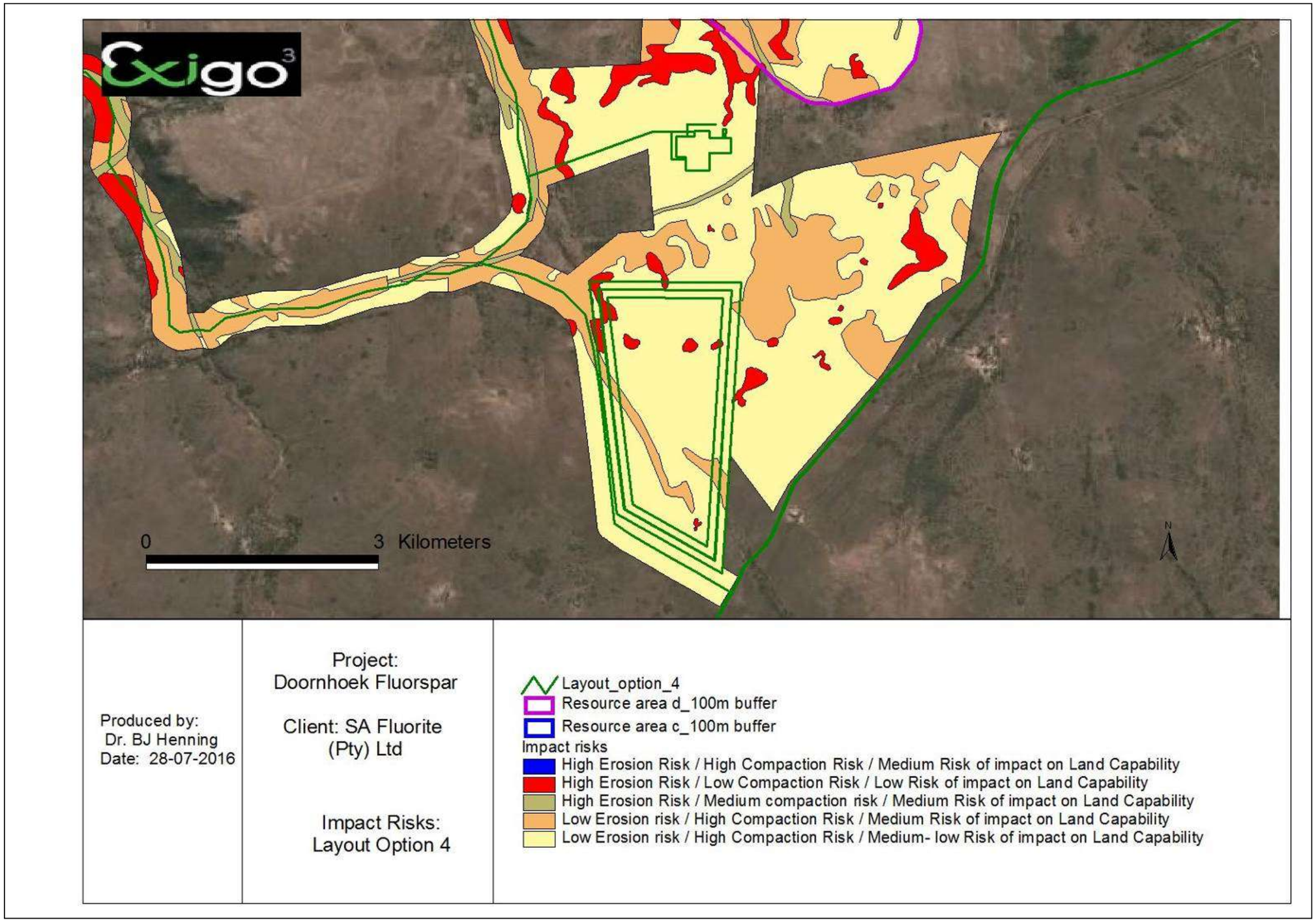
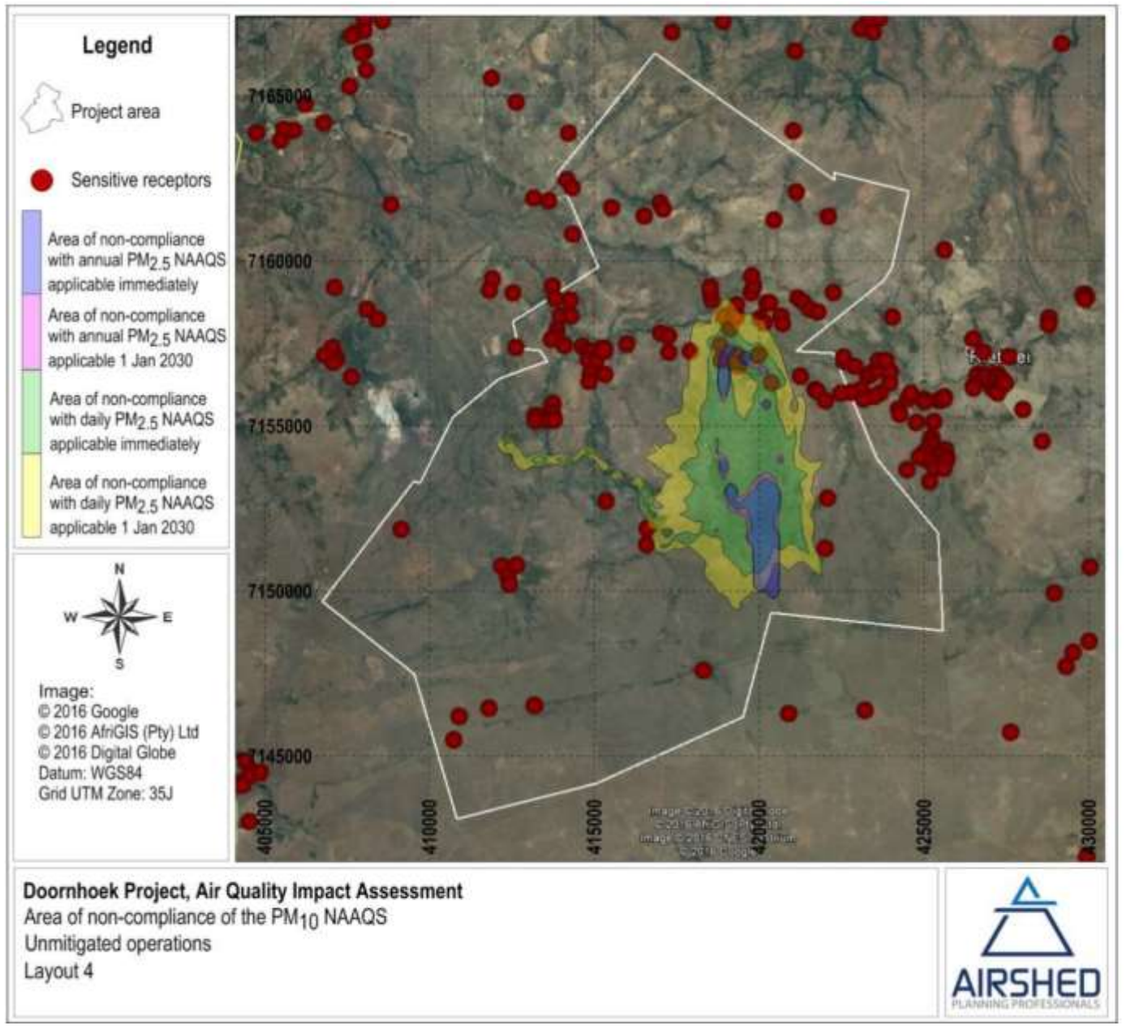


Figure 72 **Layout option 4 Soil risks overlay map**



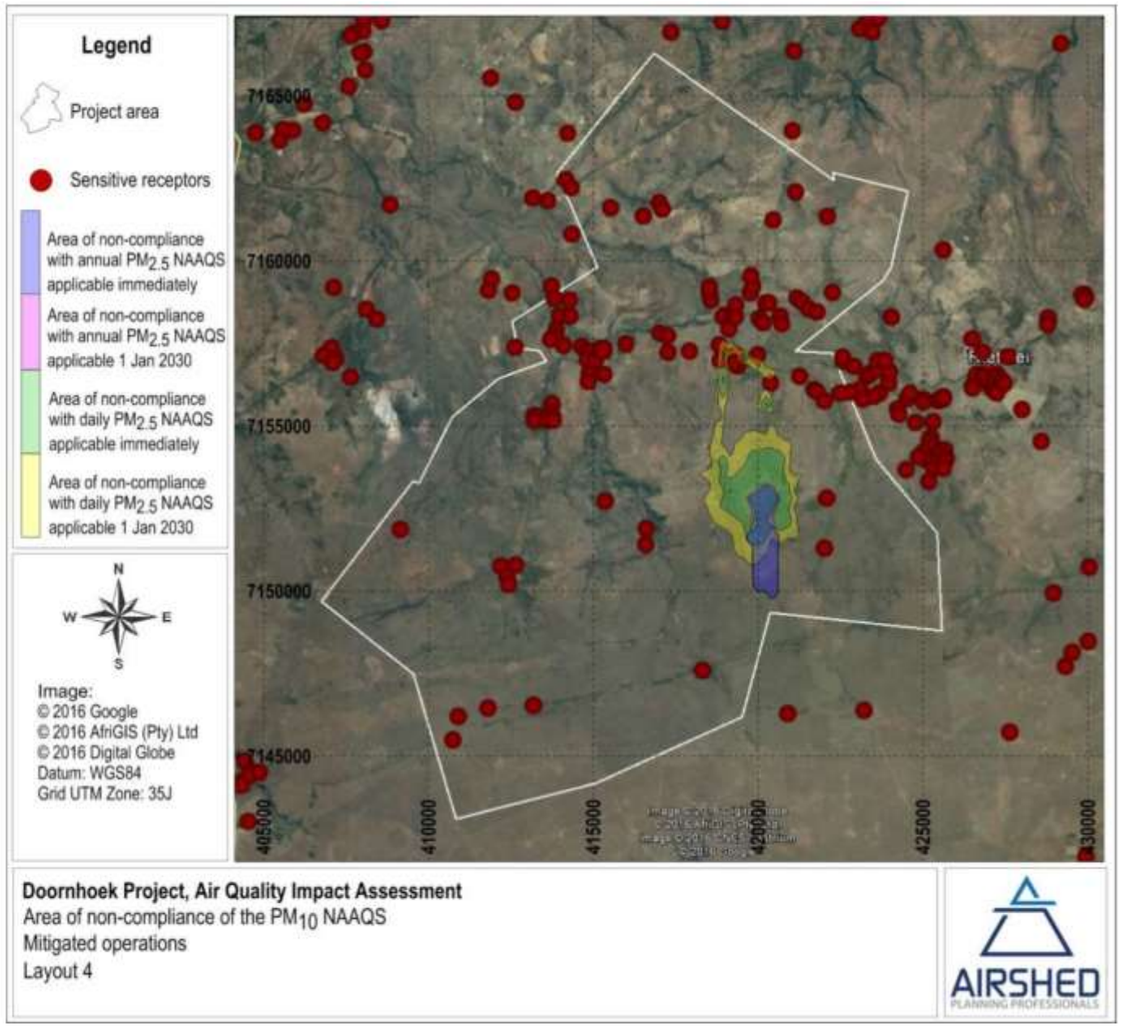
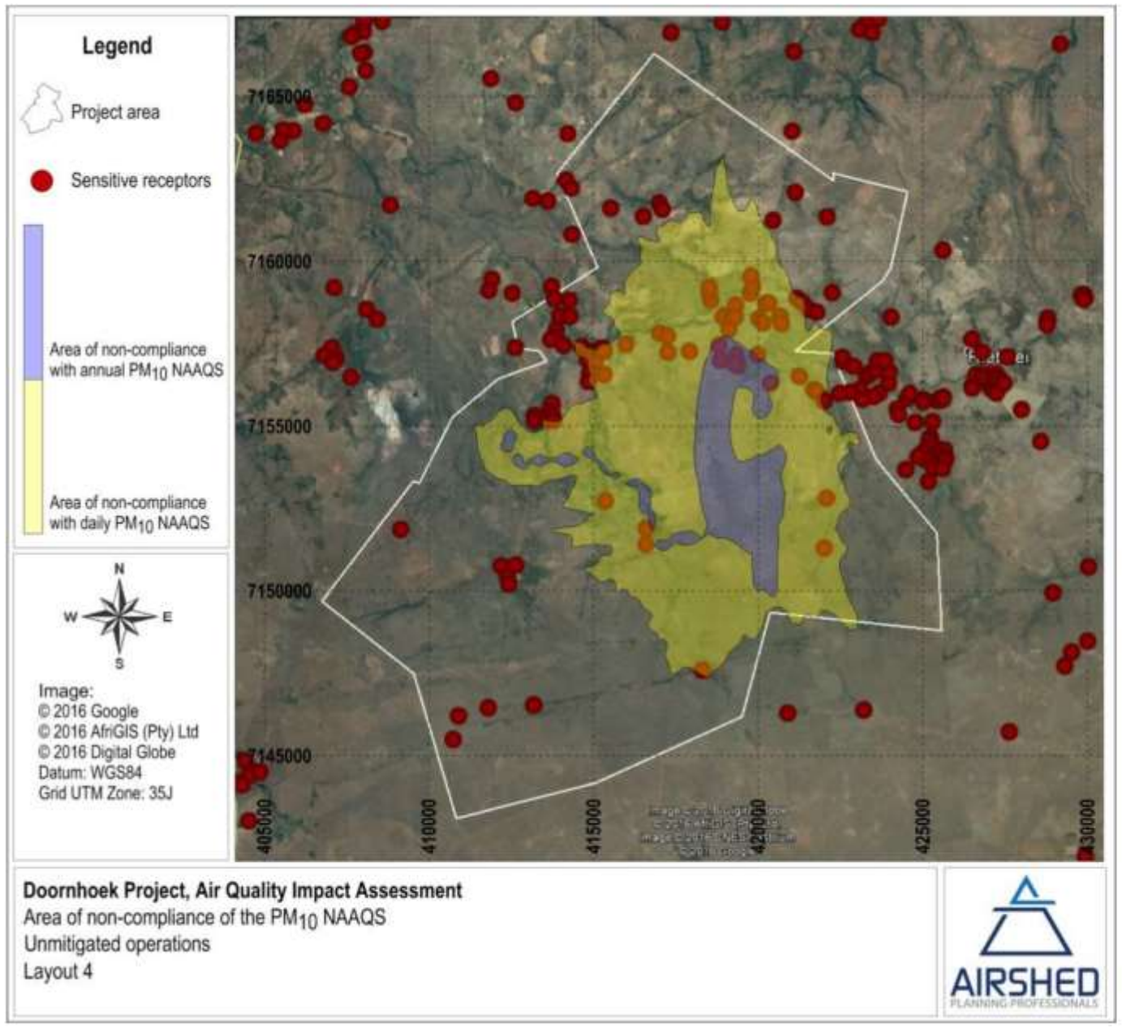


Figure 73 Area of non-compliance of PM2.5 NAAQS due to unmitigated and mitigated operations assuming layout 4



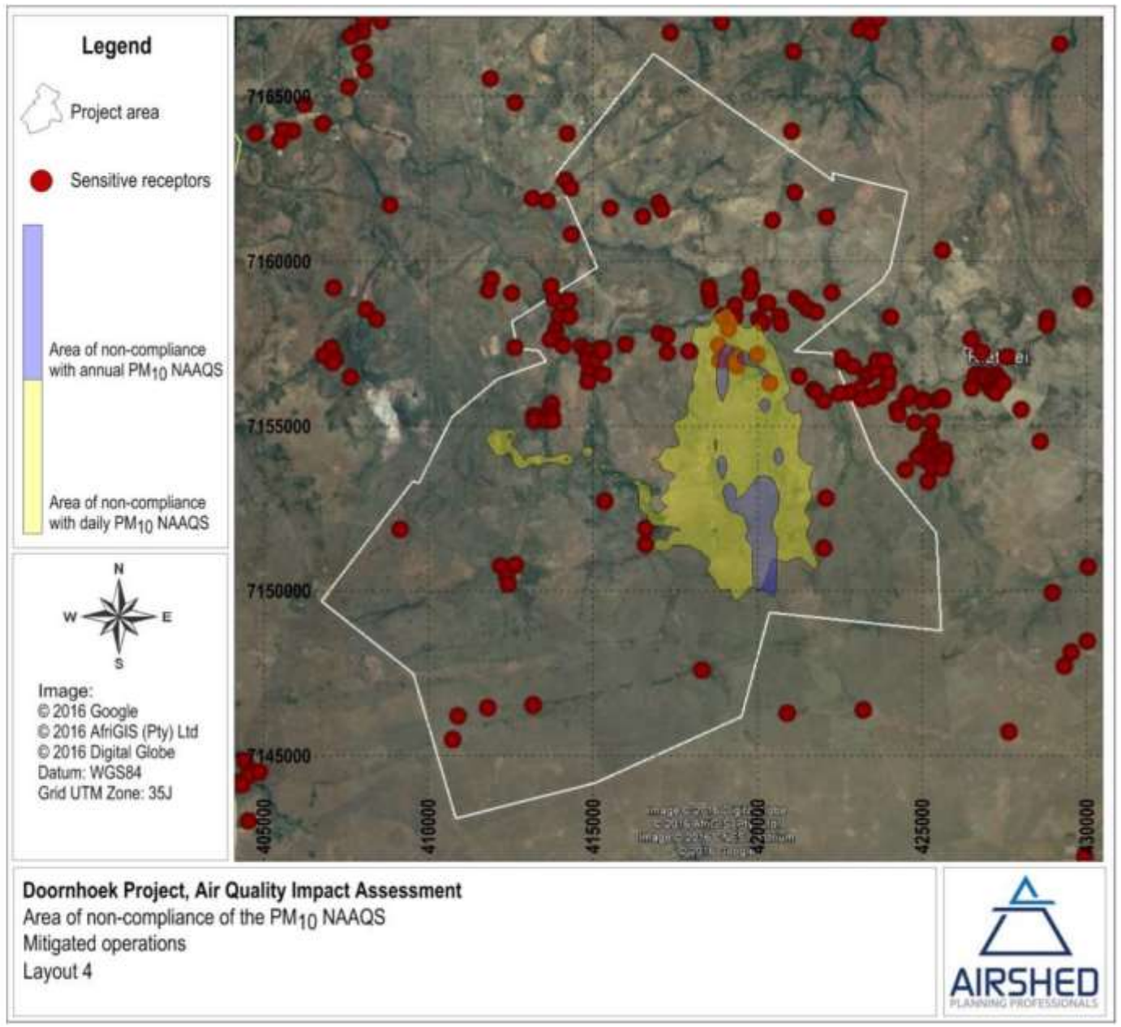
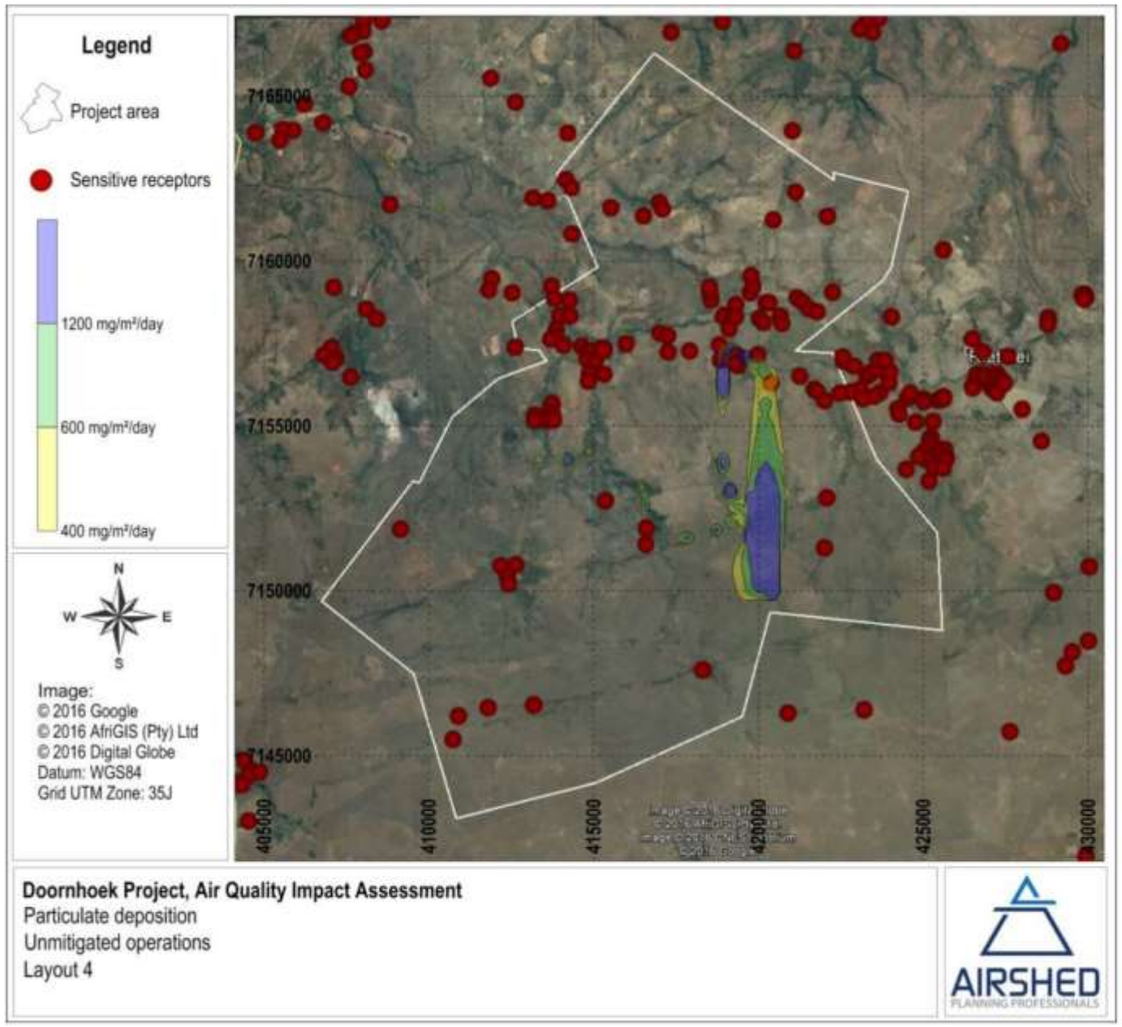


Figure 74 Area of non-compliance of PM10 NAAQS due to unmitigated and mitigated operations assuming layout 4



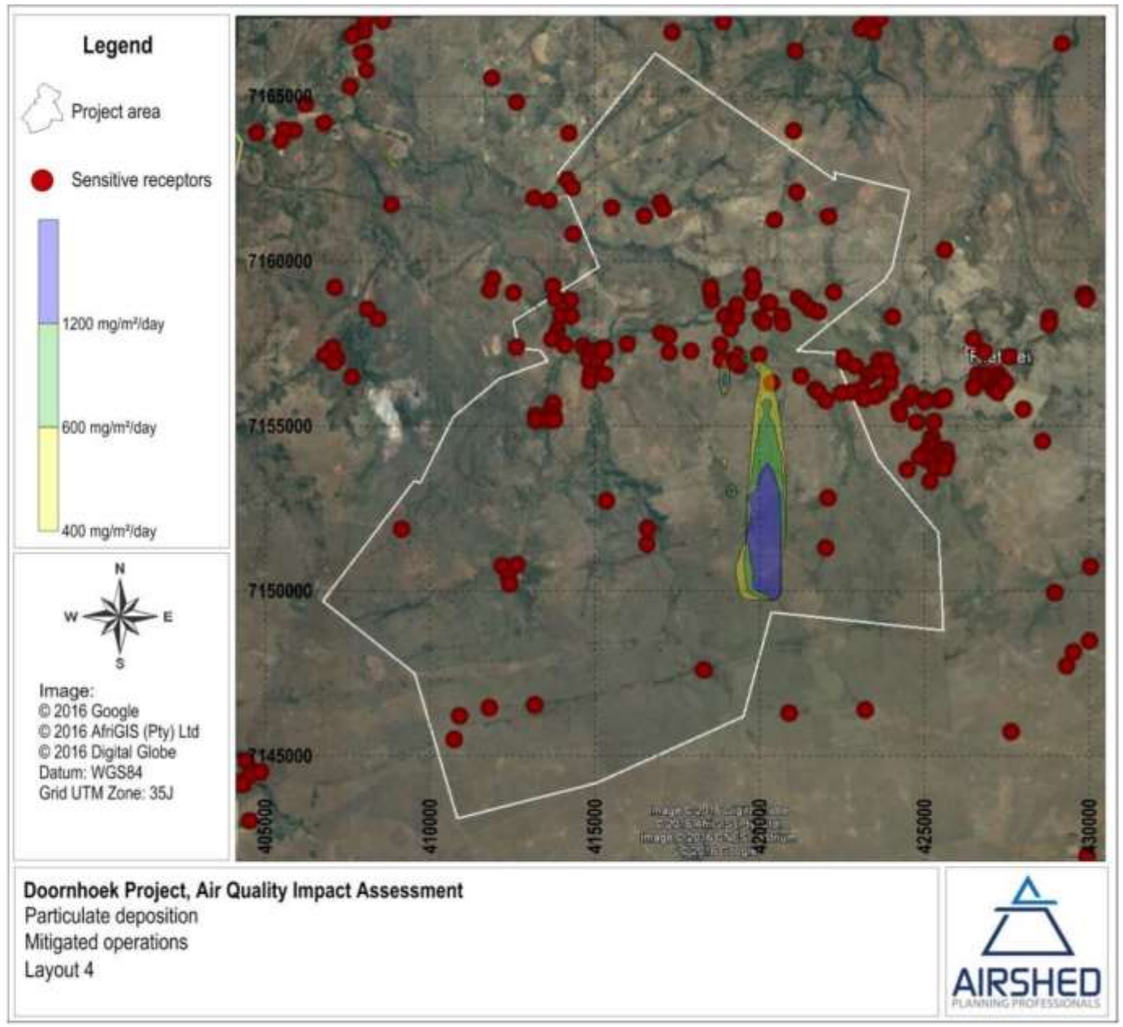


Figure 75 Total particulate deposition due to unmitigated and mitigated operations assuming layout 4

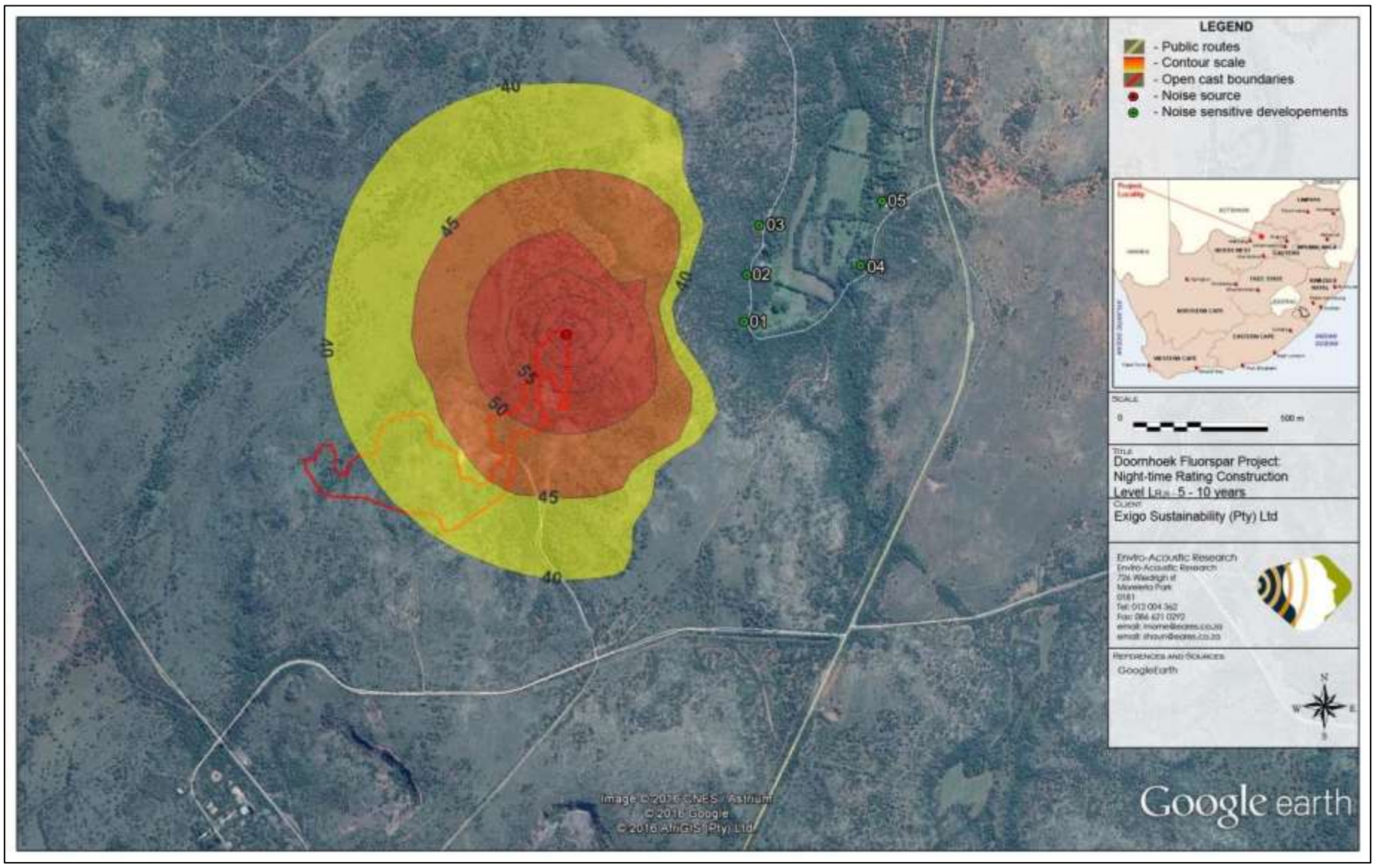


Figure 76 **Projected 5-10 years night time construction noise rating levels**

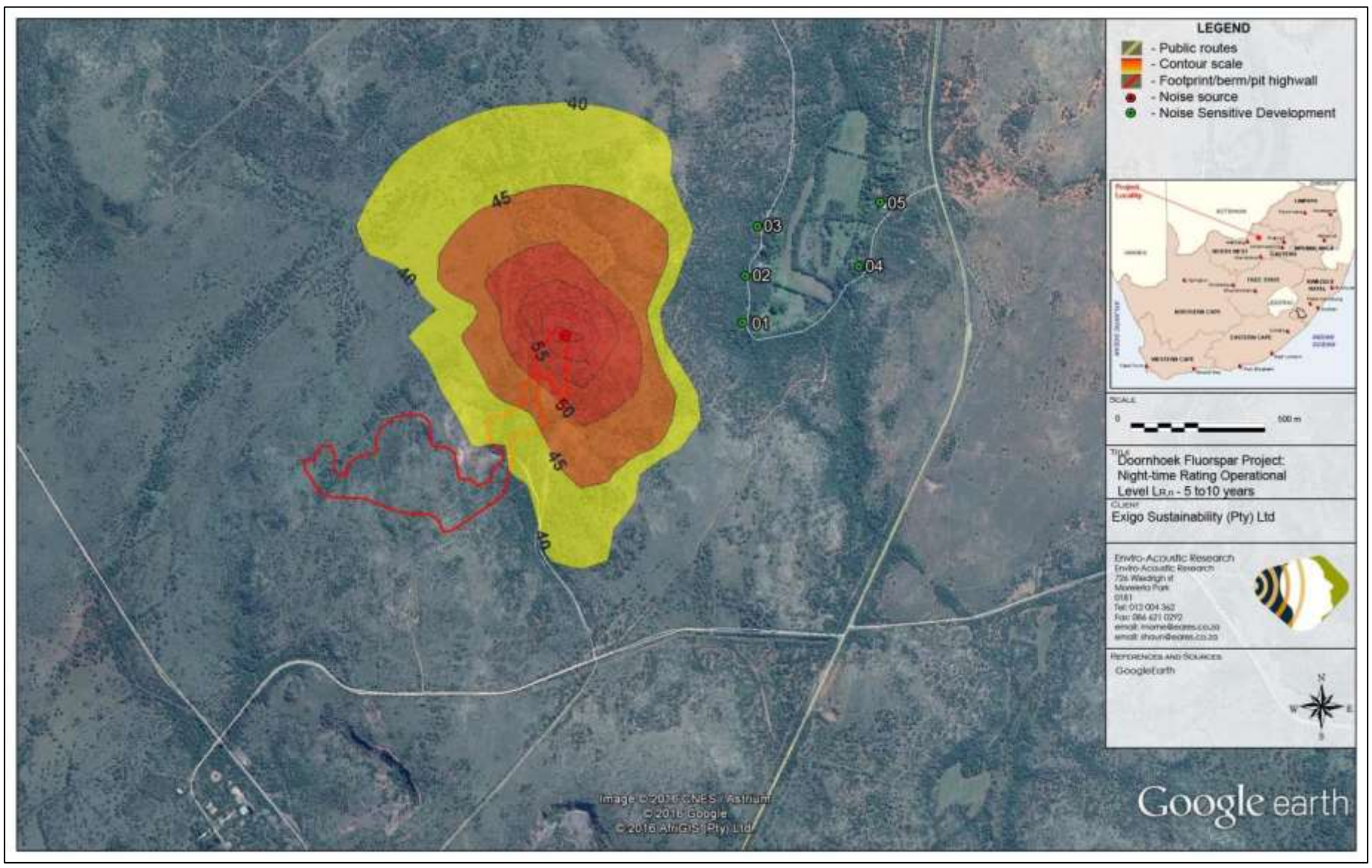


Figure 77 **Projected 5-10 years night-time operational rating levels**

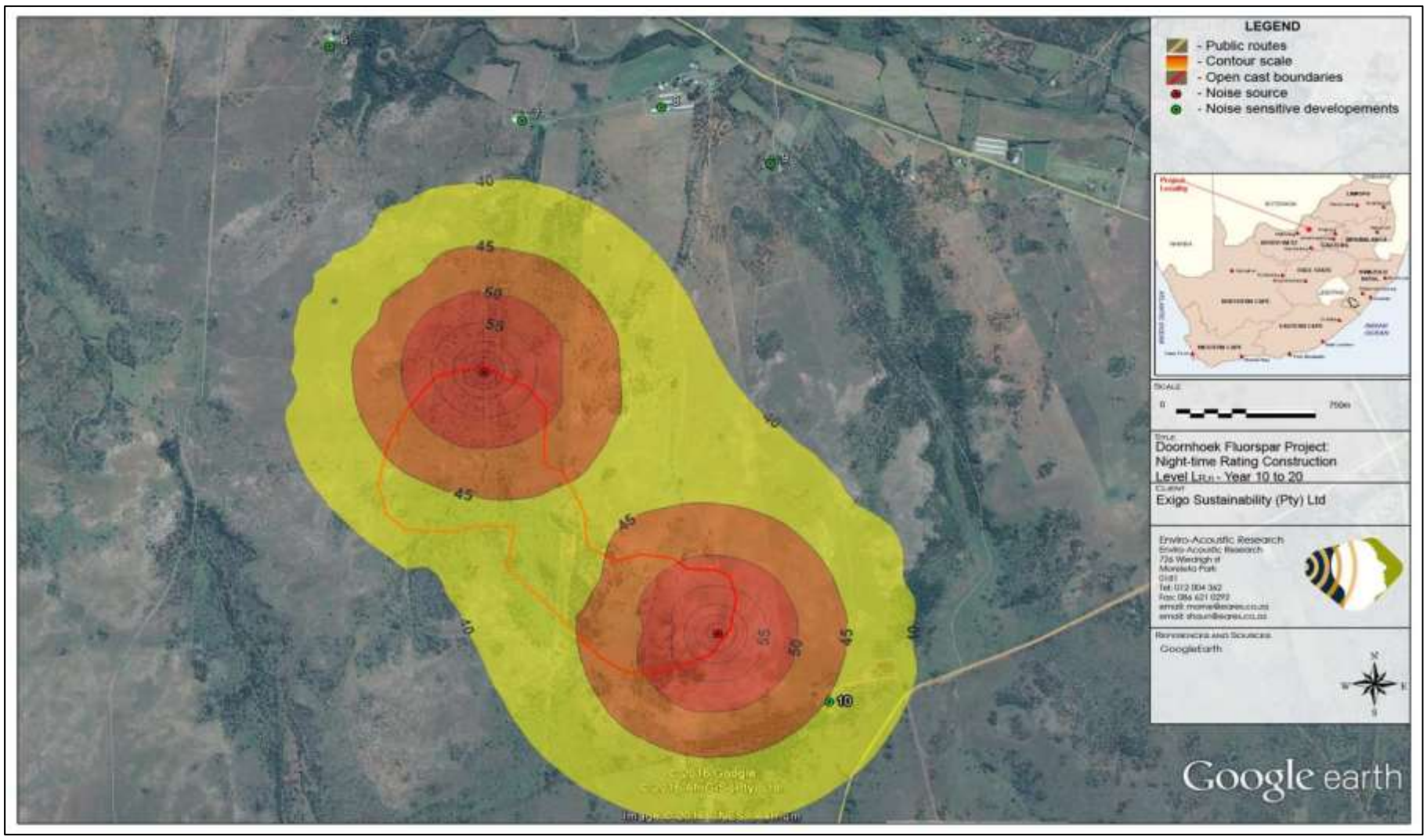


Figure 78 **Projected year 10 – 20 night-time construction noise rating levels**

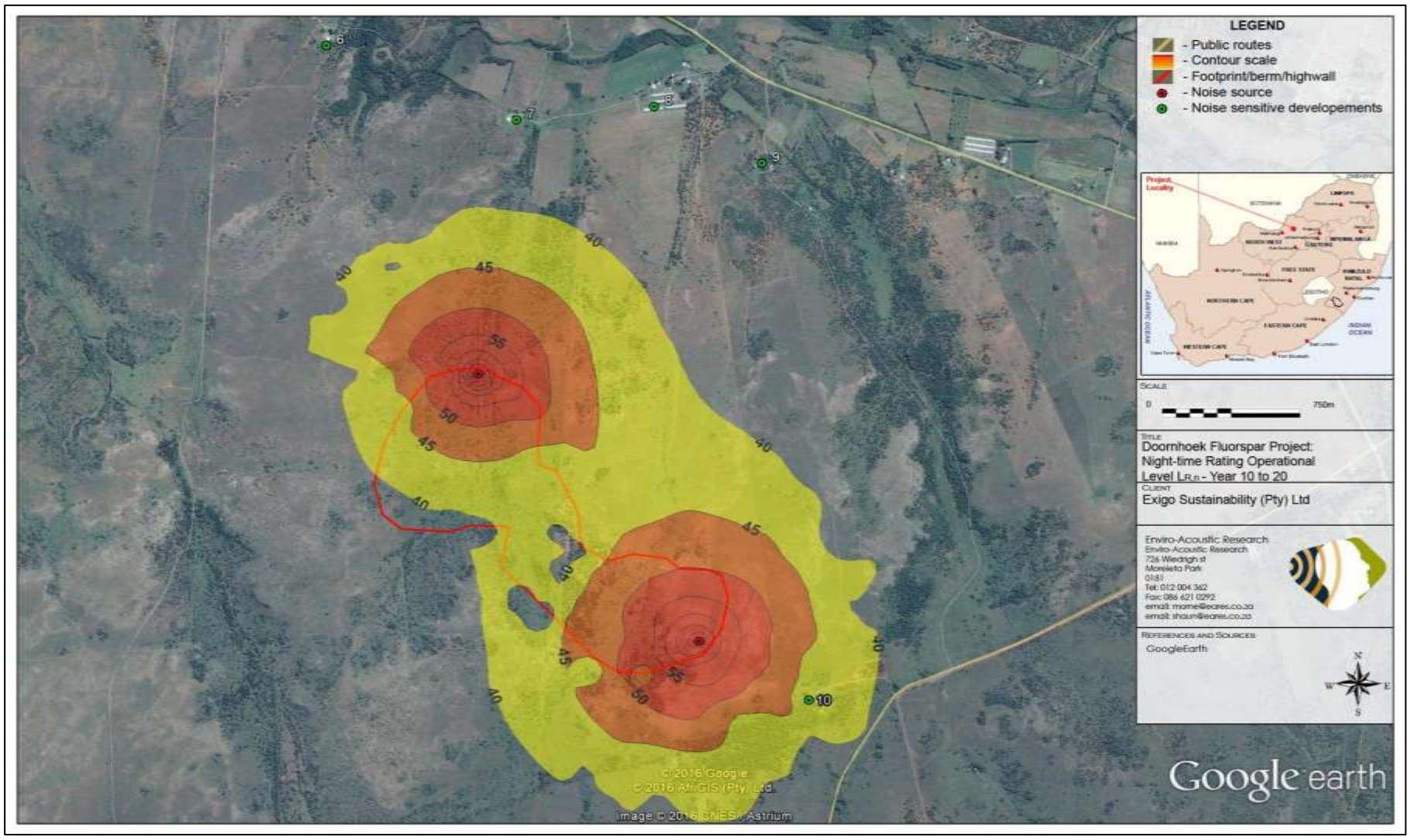


Figure 79 **Projected year 10 – 20 night-time operational noise rating levels**

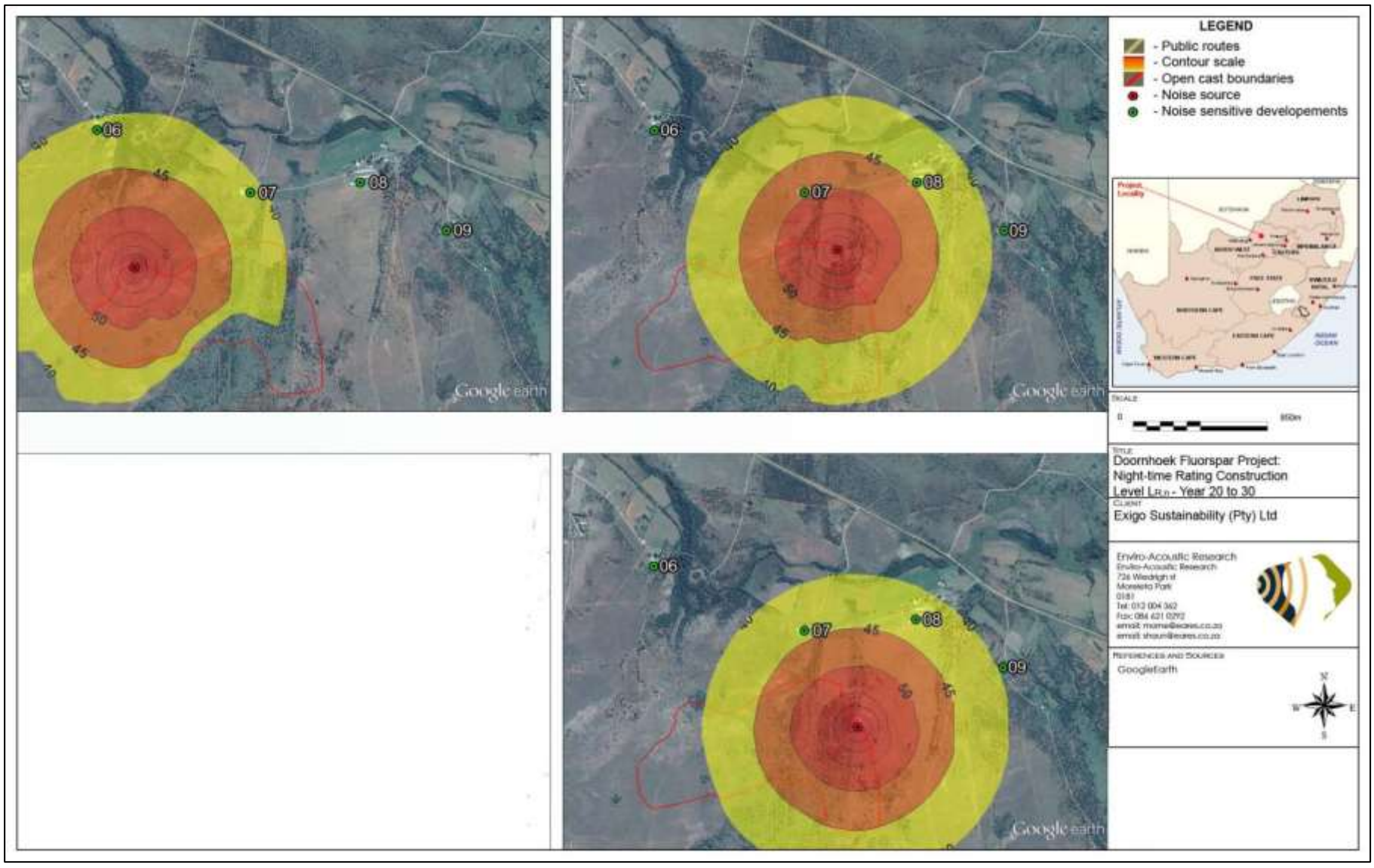


Figure 80 **Projected year 20 – 30 night-time construction noise rating levels**

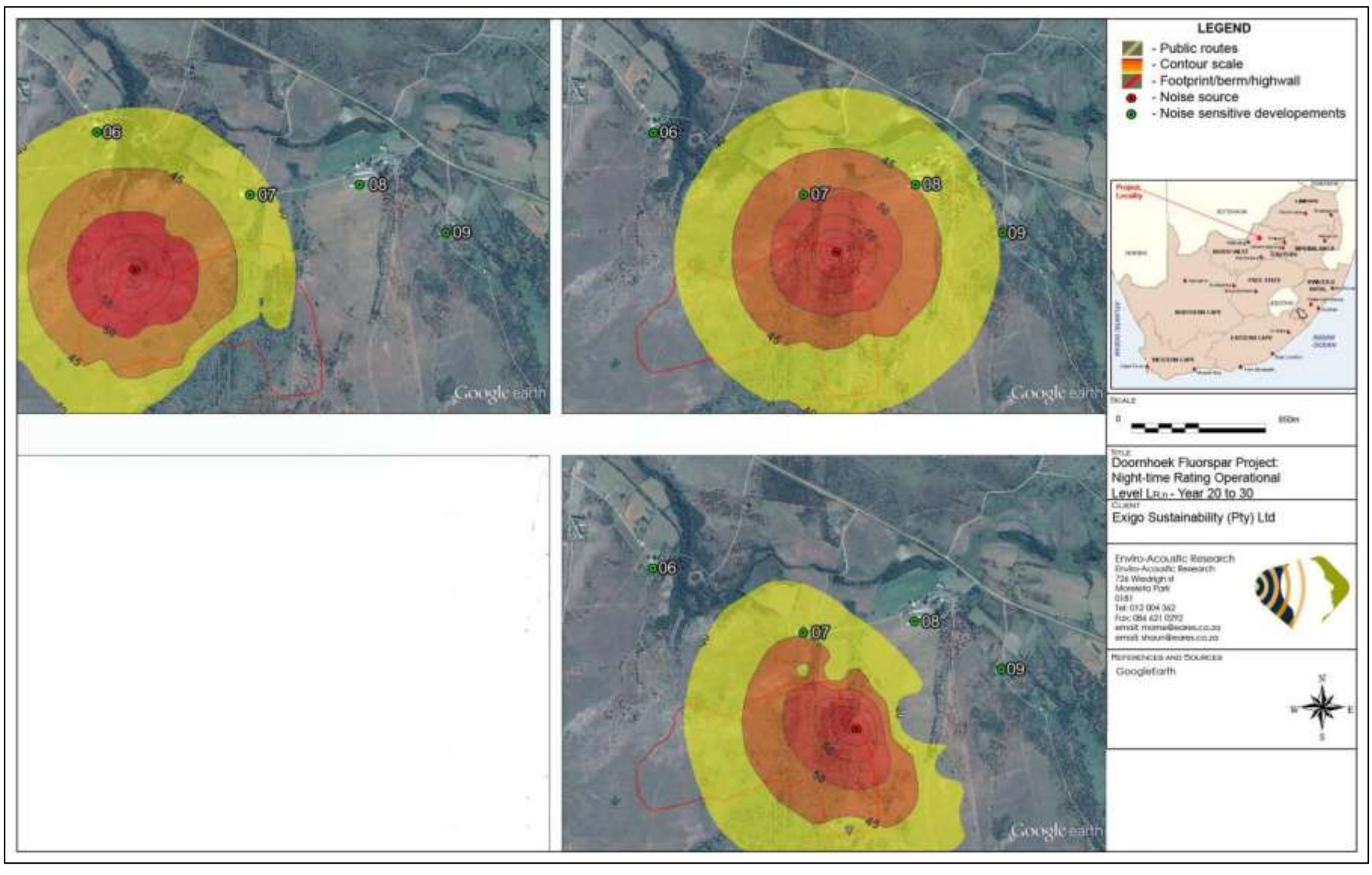


Figure 81 **Projected year 20 – 30 night-time operational noise rating levels**

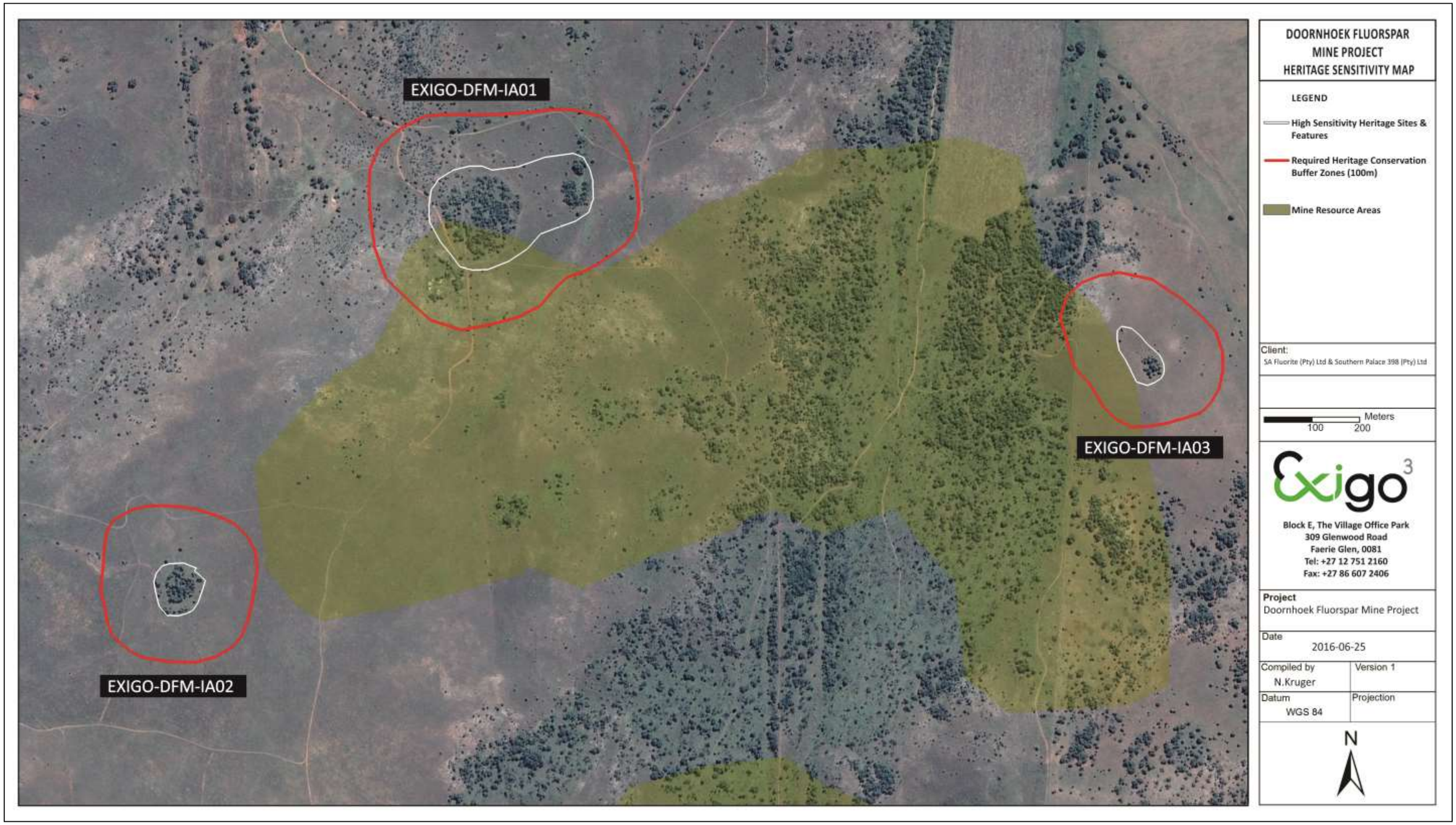


Figure 82 **Aerial map indicating the location of the heritage sites of significance as well as conservation buffers**

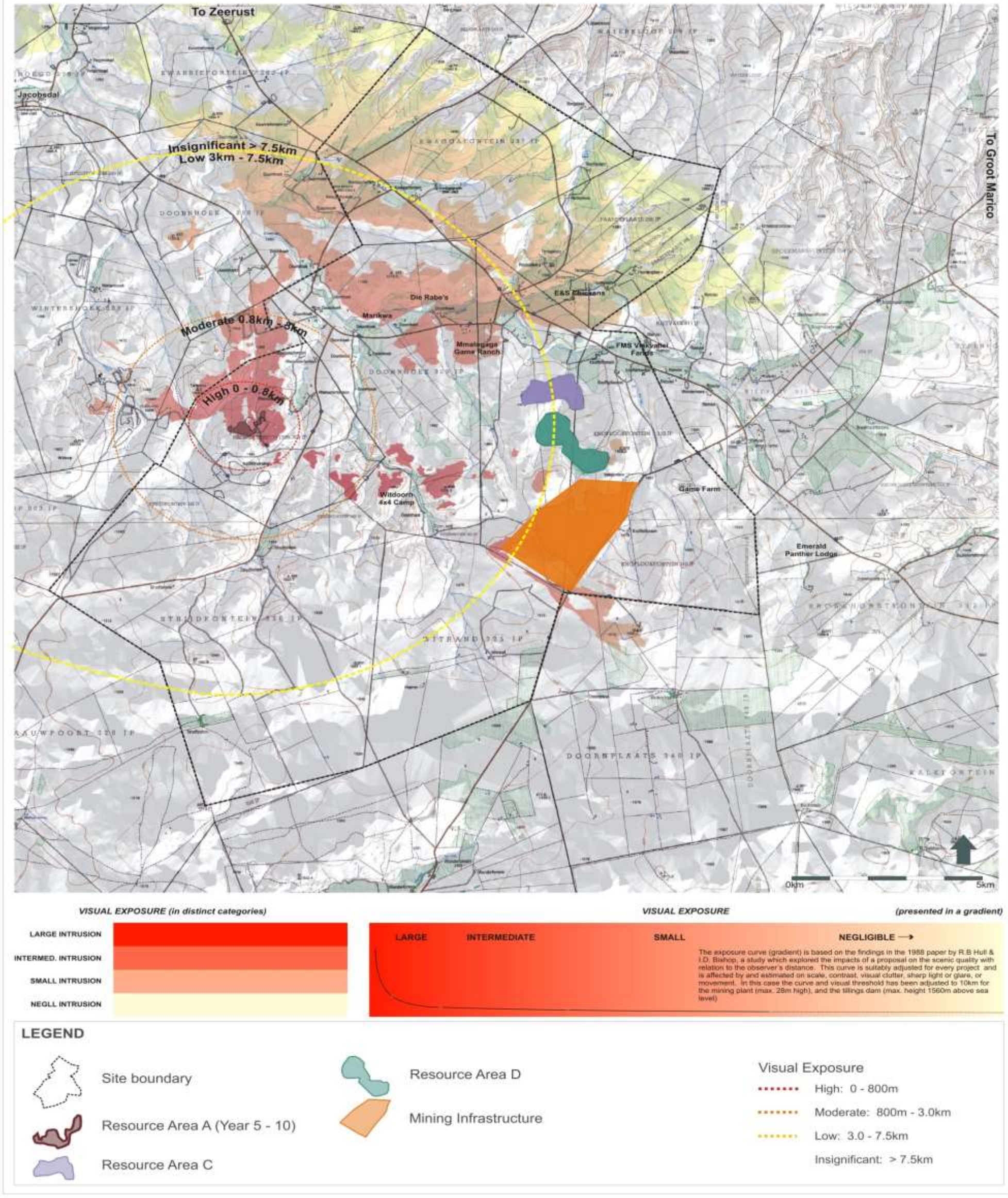


Figure 83 Viewshed Resource A (1 -5 years)

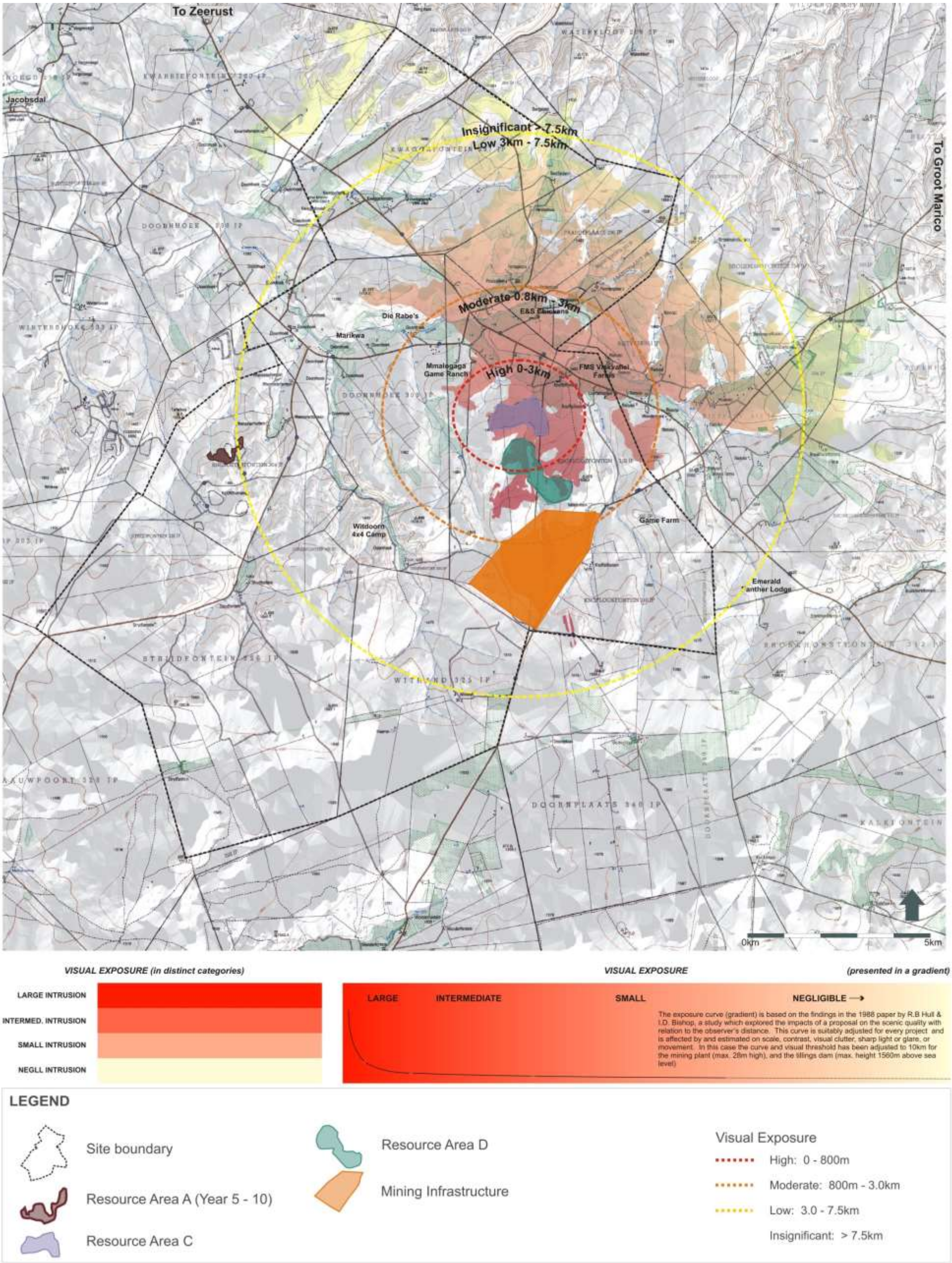


Figure 84 Viewshed Resource C

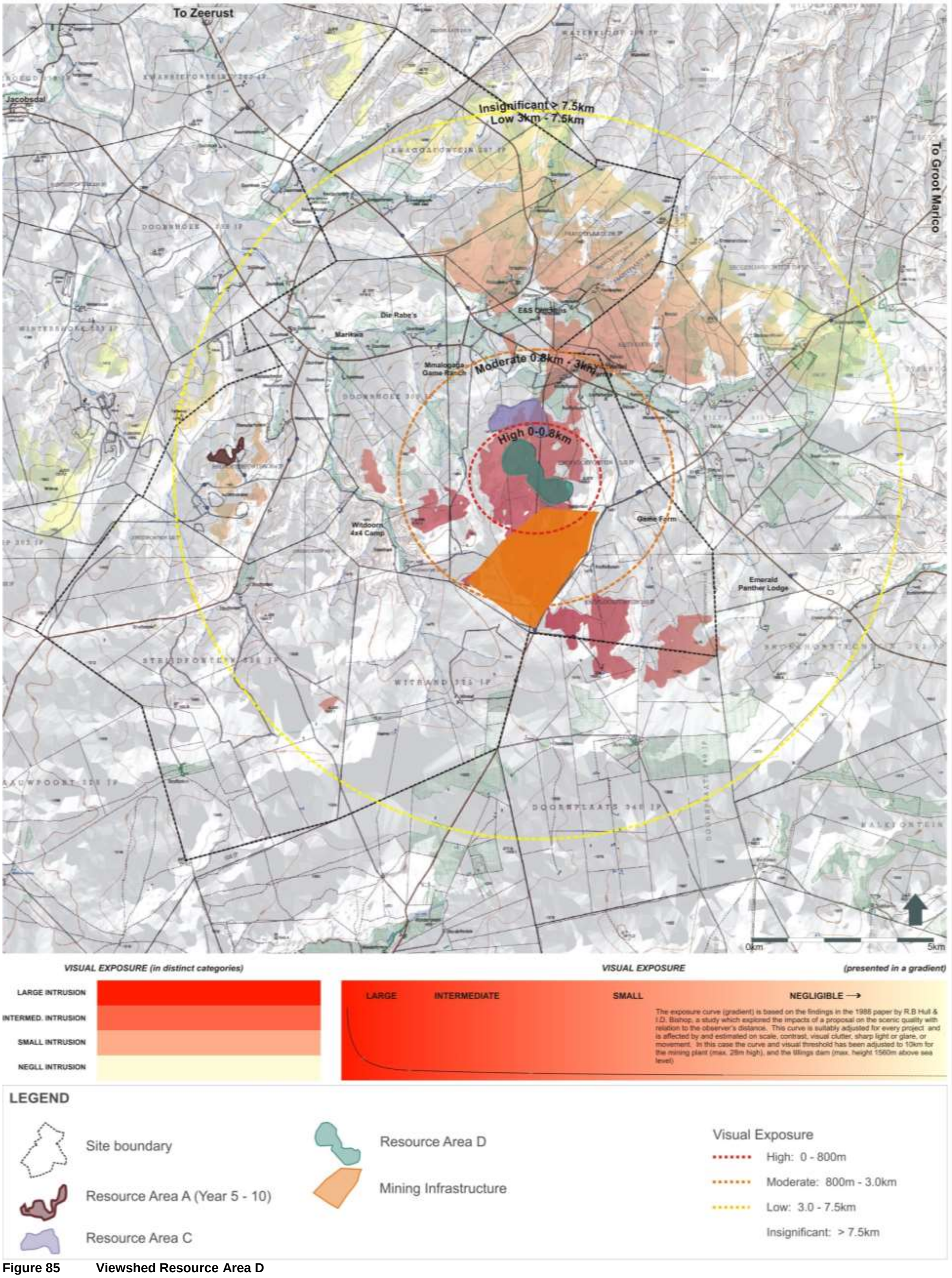


Figure 85 Viewshed Resource Area D

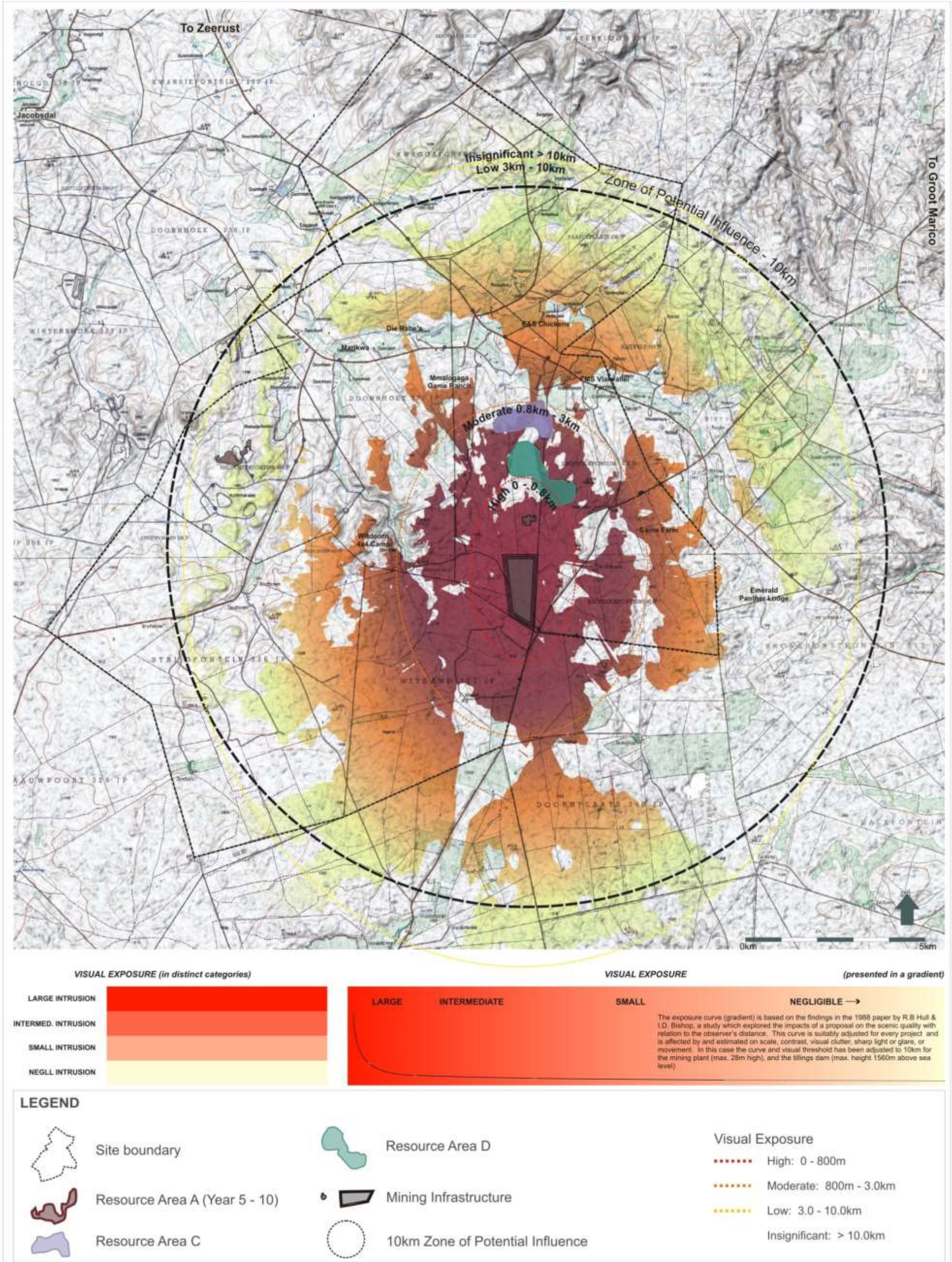
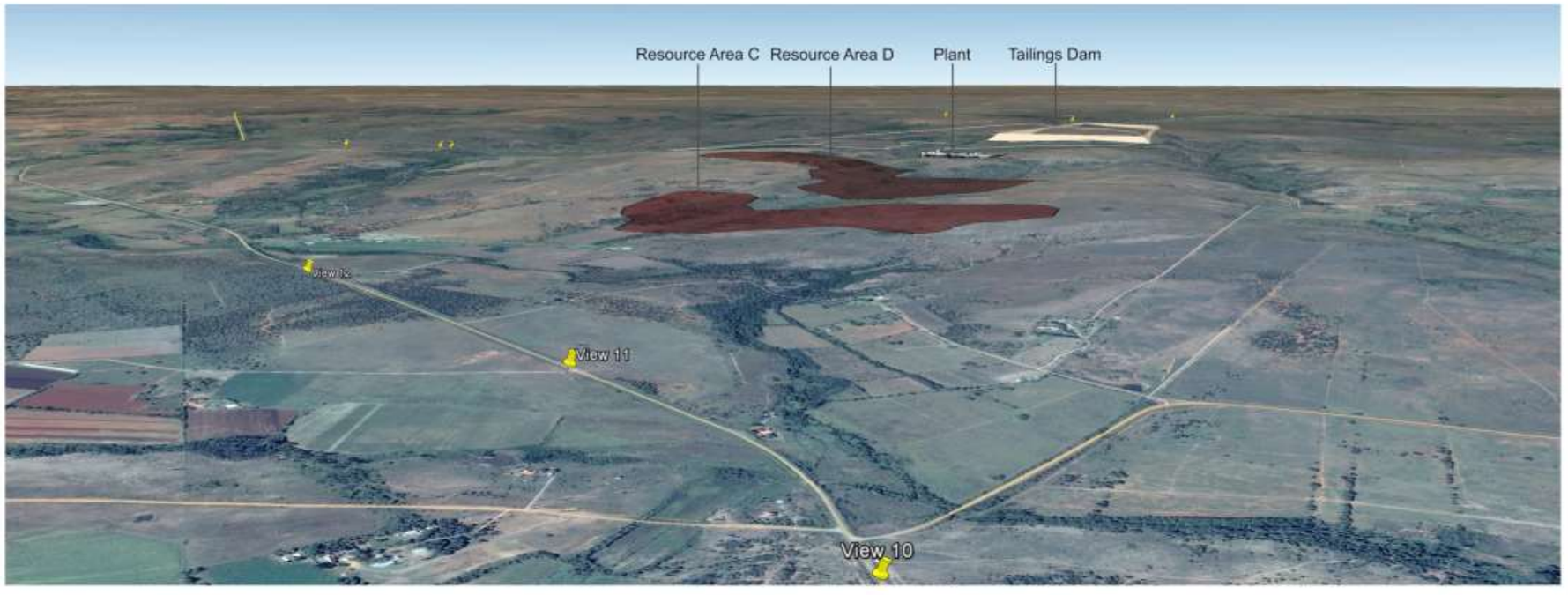


Figure 86 Viewshed Layout Alternative 4



View 10: View from local road towards Resource Area C, photo taken towards the south (2.8km from site).

Figure 28: SIMULATION Layout Alternative 4 - Doornhoek Fluorspar

September 2016

Figure 87 Simulation Layout Alternative 4

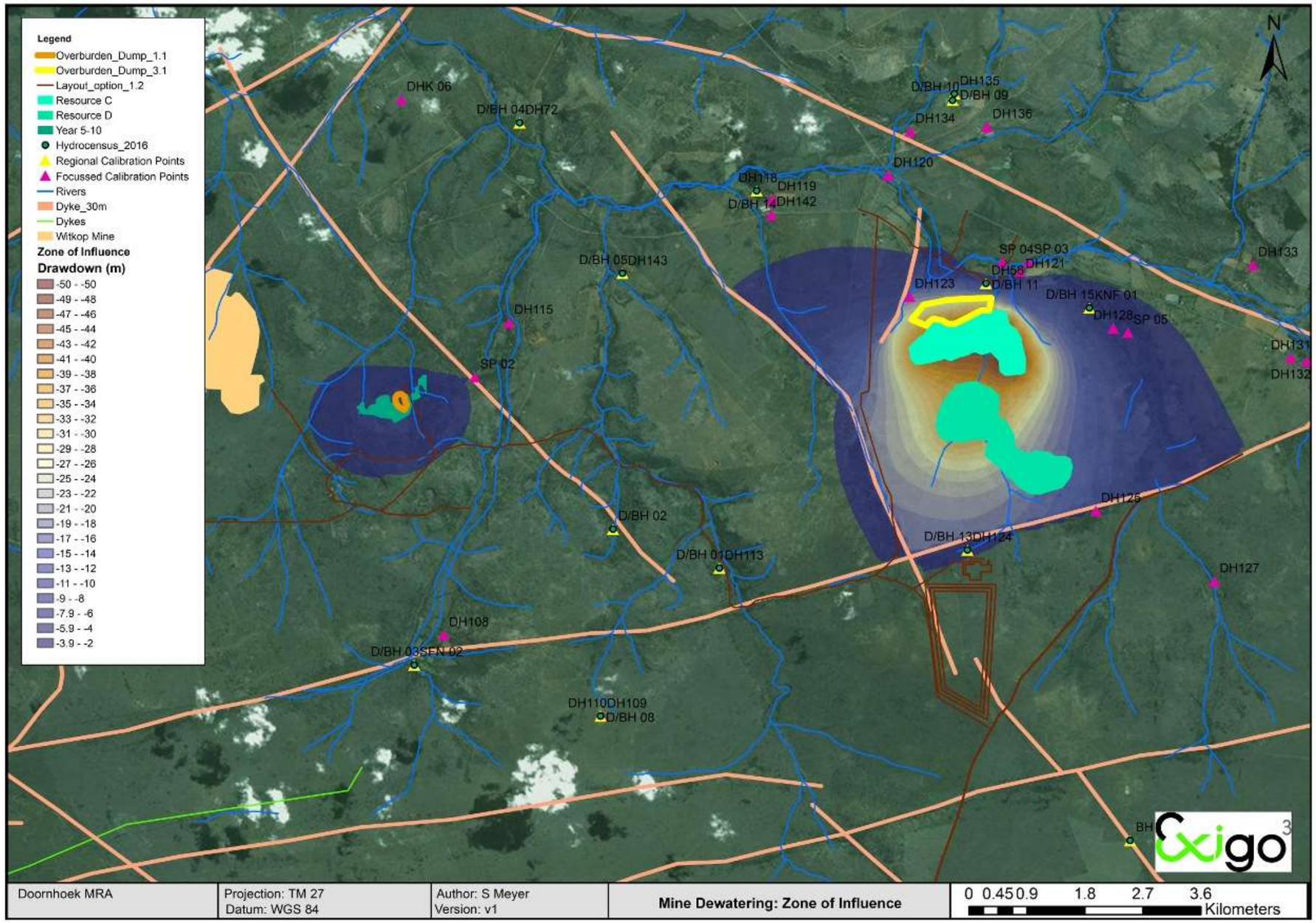


Figure 88 Zone of Influence (ZOI) associated with transient mine dewatering[2]

1. [2] Compartmental dewatering is observed and the simulated impact is limited to compartments 1 and 2 for Resource C and Resource D and Compartment 3 for the 5 – 10 Year pit (Resource A). Dewatering volumes after 10 years of mining will reach an average of 4000 m3/d and peak after 26 years of mining at above 7000 m3/d. Once detailed drilling and long term aquifer testing was conducted within compartment 1, then the model and dewatering simulations should be updated. Maximum simulated inflows from the Klein Marico River reached approximately 900 m³/d resulting in less than 4% impact on the simulated surface water runoff in the A31D quaternary catchment.

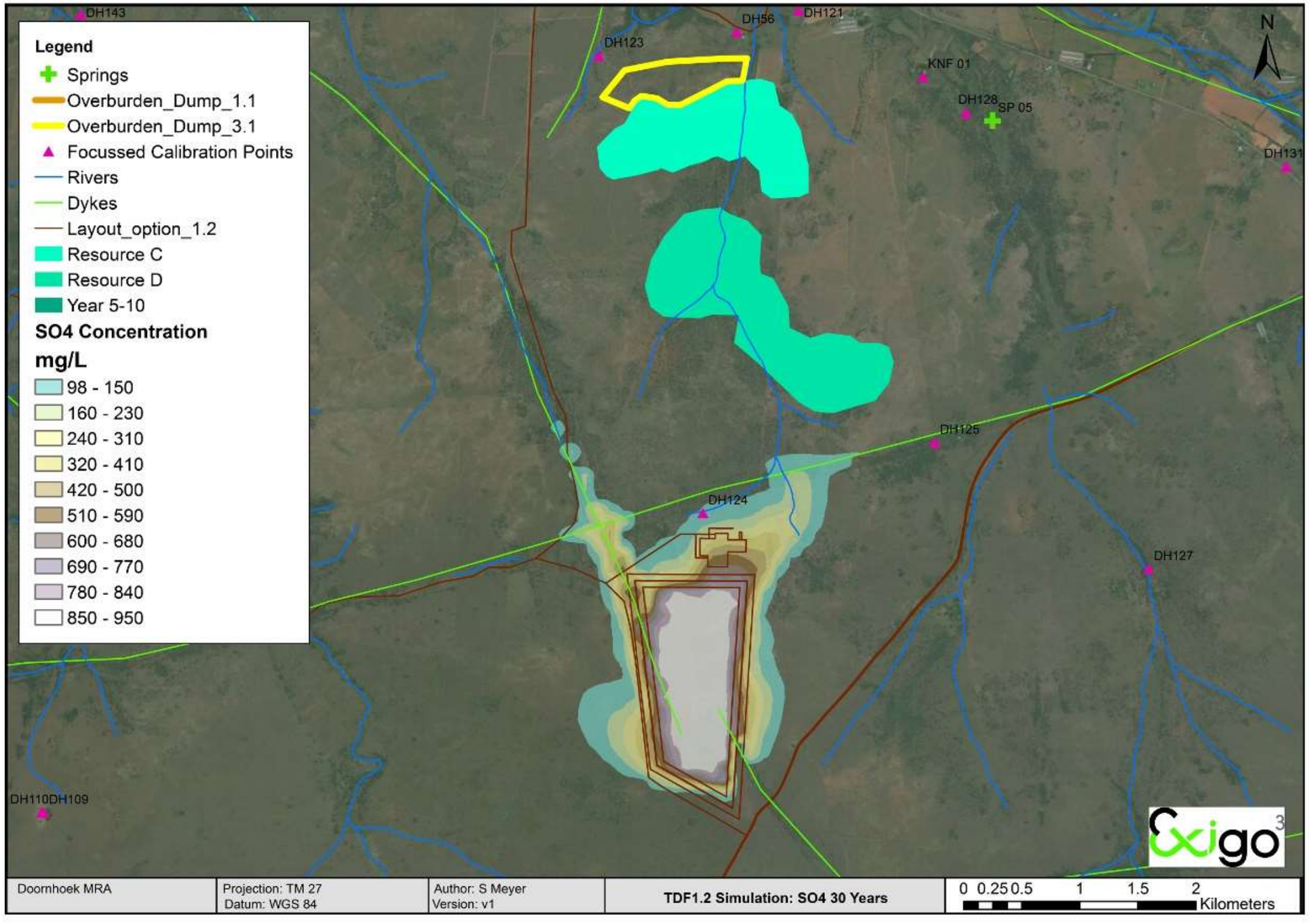


Figure 89 SO4 simulated transport for TSF Option 1 (4)[3]

[3] The simulation indicated that a potential larger impact zone is created by the SO4 simulation if compared to the F simulation due to the difference in potential source and baseline values. Thus, for the TSF alternative simulations (Options 2 and 3) SO4 was used as potential contaminant source. The potential contaminant impacts compartment 4, compartment 5 to the west, compartment 1 and 2 to the north. To mitigate this impact, monitoring and management in all four compartments will be required i.e.

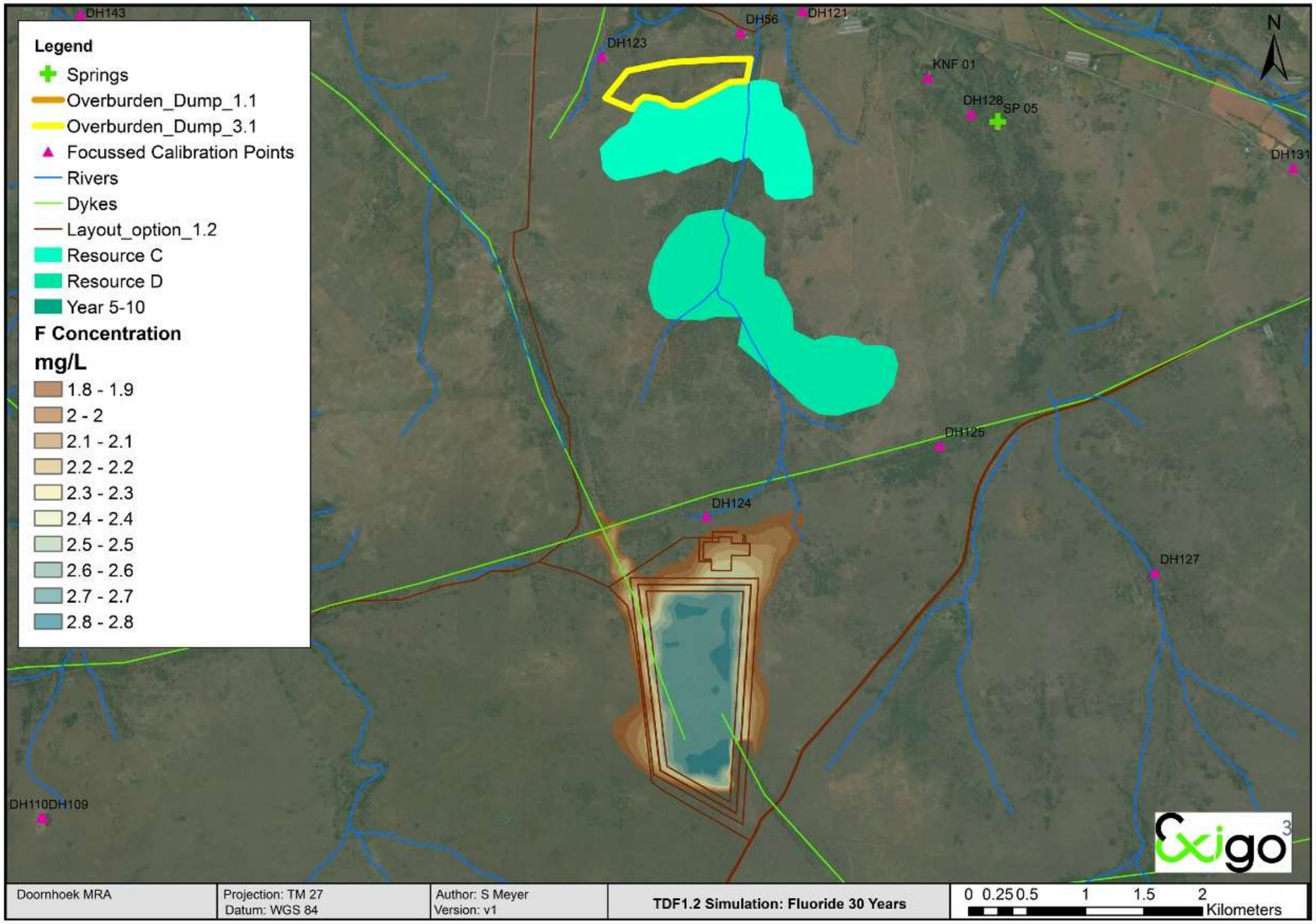


Figure 90 F simulated transport for TSF Option 1 (4)

monitoring boreholes drilled on either side of the dykes, both shallow and deep paired boreholes to monitor deeper fractured flow and shallower perched groundwater flow. As mentioned, moving the TSF position closer to the open pits and within one compartment (4) or two compartments maximum (1 and 4) would be ideal. The open pits and zone of influence due to mine dewatering will act as a mitigation measure capturing the plume and containing it. The placement of the TSF south of the open pits is ideal with regards to possible impacts on the Klein Marico River – the open pits will intercept any possible contaminant and contain this from a groundwater perspective.

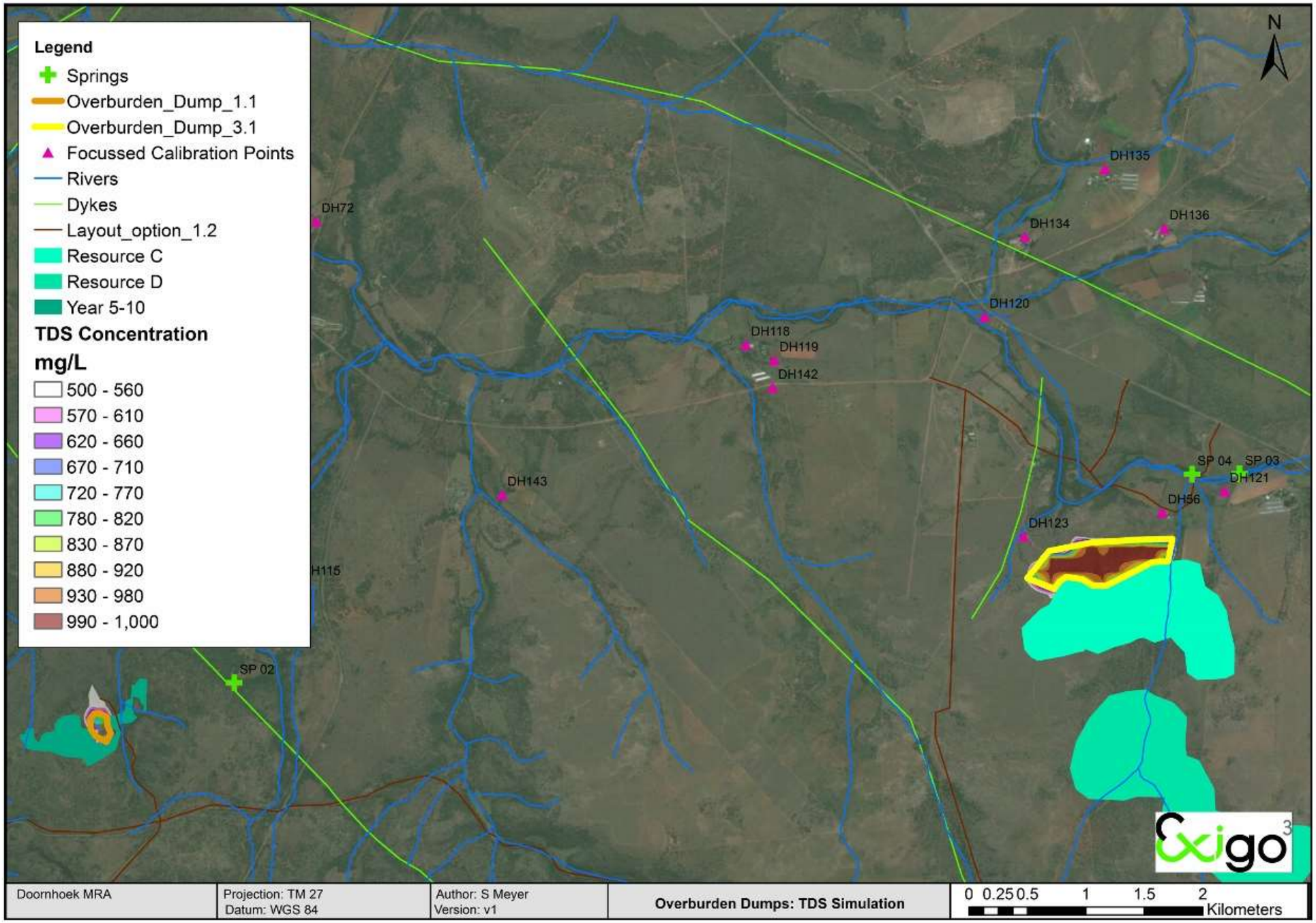


Figure 91 TDS simulated transport for the overburden dumps[4]

[4] The placement of the overburden dumps is ideal i.e. close to the open pits. The hydraulic gradient induced by the mine dewatering contains the possible plume originating from the dumps and act as a mitigation measures.

15. CUMULATIVE IMPACTS

A cumulative impact may result from an additive impact i.e. where it adds to the impact which is caused by other similar impacts or an interactive impact i.e. where a cumulative impact is caused by different impacts that combine to form a new kind of impact. Interactive impacts may either be countervailing (net adverse cumulative impact is less than the sum of the individual impacts) or synergistic (net adverse cumulative impact is greater than the sum of the individual impacts).

The assessment of cumulative impacts on a study area is complex; especially if many of the impacts occur on a much wider scale than the site being assessed and evaluated. It is often difficult to determine at which point the accumulation of many small impacts reaches the point of an undesired or unintended cumulative impact that should be avoided or mitigated. There are often factors which are uncertain when potential cumulative impacts are identified.

The anticipated impacts resulting from the construction and implementation of these developments could potentially result in cumulative effects in the following areas:

- Socio-economic impact
- Increased traffic impact
- Water quantity and quality impact
- Air Quality impact

15.1. REGIONAL SOCIO-ECONOMIC IMPACT

The national, provincial and local levels acknowledge in their policies and strategies the need to develop the mining sector and promote private investment to stimulate growth in the area. The planned mining operations are in line with the national, provincial and local priorities and do not appear to conflict with other activities in the area.

The planned mining activities will further promote the development of an area with a small economy, a high unemployment rate (i.e. 28.4% and 36,3% of unemployed people in the Ditsobotla LM and Ramotshere Moiloa LM respectively), and large disparities between urban and rural areas. The towns of Zeerust and Lichtenburg are well developed, and Zeerust is particularly well developed when focusing on indicators such as income levels and access to basic services. It was indicated that labour for the proposed project is planned to be sourced from the local community as far as possible, and be accommodated in the town of Zeerust.

The assessment of the current socio-economic situation in the local municipalities, the profile of the zone of influence, and the project itself revealed that the proposed mining activity will create numerous positive impacts and will likely stimulate the local economy. The stimulation of the national economy will occur as a result of the increase in production. This has numerous benefits, such as employment creation, a rise in consumption levels, new business sales and a contribution to GDP.

Overall, R1 513.5 million of GDP during construction and R22 564 million of GDP during the operational phase will be created in the South African economy because of the proposed mine's operations. A total of 4 397 FTE person-years will be created during construction in the entire national economy and an additional 1 222 FTE jobs will be supported on an annual basis for the entire mine's operations of 25 years examined in this study. The mine will create at least 222 sustainable employment opportunities on site that will be filled largely by people coming from the local communities and will increase government revenue base. The salaries paid out to local employees will result in an increase in the average household income. Given that both municipalities are relatively poor, an elevated household income will improve their standard of living and reduce poverty. In addition, as income increases, the consumption levels increase will consequently boost the local economy. However, due to the nature of the area where the proposed mine is to be established, some negative socio-economic impacts can also be created as a result of the mine's development and require adequate mitigation.

Mitigation measures: Operational phase

Refer to Table 23 regarding the relevant mitigation measures.

15.2. REGIONAL TRAFFIC

A large portion of the employees to reside in and around Zeerust. The route from the mine via Roads D1194, D139 and R49 will be used for access purposes. The expected peak trip assignments at shift change times are depicted below.

The approaches to the relevant intersections currently operate at acceptable levels of service during both peak hours and will remain so in all the design scenarios. No mitigation is required from a capacity point of view however from a road safety perspective specific recommendations have been made and are included in Appendix 7.14: Traffic Impact Assessment as well as Table 22 and Table 23.

	Mode	Directional split (in/out)	Total number of trips	New trips In	New trips out
Morning shift change (a.m.)	Minibus	50:50	14	7	7
	Own vehicle	50:50	94	63	31
	Trucks	50:50	4	2	2
Total				72	40
Afternoon shift change (p.m.)	Minibus	50:50	14	7	7
	Own vehicle	50:50	94	31	63
	Trucks	50:50	4	2	2
Total				40	72

Mitigation measures: Operational Phase

Specific mitigation measures have been proposed under the following relevant traffic aspects:

1. Preferred access route to the mine.
2. Road upgrade of a section of Road D139
3. Road upgrade of a section of Road D139 to Road 1194
4. Road upgrade of a section of Road D404 to P172-2
5. Road upgrade of a section of Road D404 from P172-2 to N4.

15.3. WATER AVAILABILITY AND QUALITY

Potential water related impacts have a regional nature with regards to the majority of the anticipated impacts associated with this project. Therefore an emphasis has been placed on the scientific studies pertaining to water from the outset even before the EIA/MRA application was lodged. A hydrogeological baseline assessment, fatal flaw analysis and development of a monitoring network for baseline characteristics prior to mine initiation were conducted in 2013. This was followed by a pre-feasibility study (PFS) level assessment during 2015. Based on the outcomes of the baseline assessment as well as PFS study, an updated hydrogeological specialist investigation scope of work was formulated and carried out. The following included come of the activities conducted (refer to Appendix 7.8: Hydrogeological Impact Assessment): Hydrocensus survey update and hydro chemical evaluation, Aquifer characterization – Aquifer testing, Numerical groundwater flow and mass transport model update, Hydrogeological impact assessment and reporting, Environmental Water Balance, and the compilation of a water monitoring protocol.

The simulated drawdown due to mine dewatering and the potential migration of salts associated with the TSF and overburden dumps are simulated in the hydrogeological assessment (Appendix 7.8: Hydrogeological Impact Assessment).

Potential impacts that have been assessed include amongst other the following (refer to Table 19 and Appendix 7.8: Hydrogeological Impact Assessment).

A radius of influence is associated with the mine dewatering during LoM which could impact neighbouring groundwater users and sensitive receptors i.e. springs and the Klein Marico River. Mine dewatering is a function of time and hydraulic parameters, and thus the numerical flow modelling is a management tool that should be used for decision making.

Cumulative dewatering volumes were simulated for the separate open pits. Dewatering volumes after 10 years of mining will reach an average of 4000 m^3/d and peak after 26 years of mining at above 7000 m^3/d.

Depending on the method of abstraction i.e. sumps versus pre-dewatering, the mine dewatering volumes could be as much as 50% less due to evaporation losses. The overburden dumps plumes shows little migration due to the position of these facilities with regards to the zone of influence and position relative to the open pits i.e. the facility is located within the ZOI and hence shows little migration. Adequate monitoring should be conducted around the overburden dumps to assess possible flow in the unsaturated zone beneath the dumps.

The migration of salts form the TSF should be monitored. Plume migration might flow across compartment boundaries and adequate monitoring should be installed to detect and manage.

Water collected in the open pit mine (or dewatering wells) should be sampled and tested with hydrochemical and isotope finger printing monthly to verify the origin. If the origin is established to be from the Klein Marico River, the water should be treated to an acceptable quality and discharged back into the Klein Marico River. If it is confirmed that the water seepage into the open pit mine is a diluted combination between surface water from the Klein Marico River and groundwater, then the dilution ratios should be calculated and the surface water quantities should be released back into the river. The groundwater component should be licensed and could be used in the mine circuit if the license is granted.

Additional water supply boreholes should be drilled to supplement the current wellfield to supply in the majority of the mine's water demand. Additional sources of groundwater should be identified and explored in the future to supply the required make up water demand.

Mitigation measures:

Refer to Table 23 and Appendix 7.8: Hydrogeological Impact Assessment regarding the relevant mitigation measures.

15.4. AIR QUALITY IMPACTS

The main sources likely to contribute to cumulative particulate impact are surrounding mining operations, agricultural activities as well as vehicle entrainment on unpaved road surfaces and household and biomass burning.

Literature states that by adding the peak model concentrations to the background concentrations, this can result in severe overestimation of the source contribution and that a more realistic method is to add twice the annual mean background concentrations to the peak (or 99.9th percentile) (Ministry for the Environment, 2004). If the background PM10 and PM2.5 concentrations for Mahikeng (39 µg/m³ and 16 µg/m³ annual average respectively) are assumed to be representative of the mine and railway siding study areas, the annual and daily cumulative ground level concentrations may increase with a further 39 µg/m³ and 78 µg/m³ respectively for PM10 and 16 µg/m³ and 32 µg/m³ respectively for PM2.5.

The dispersion modeling was conducted accordingly and the results and the main findings of the air quality impact assessment documented in section 4 of the AQIA (Appendix 7.12: Air Quality Impact Assessment). The significance ranking for the proposed project is provided in section 5 and a dust management plan is provided in section 6 of the AQIA.

Mitigation measures:

Refer to Table 23 and Appendix 7.12: Air Quality Impact Assessment regarding the relevant mitigation measures.

16. METHODOLOGY USED IN DETERMINING AND RANKING THE NATURE, SIGNIFICANCE, CONSEQUENCES, EXTENT, DURATION AND PROBABILITY OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

(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 8. 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 19.

Table 20 High Significance Impacts

No	Activity	Impact	Without or With Mitigation	Nature (Negative or Positive Impact)	Significance Magnitude
		Ecology			
Construction Phase					
2	Clearing of vegetation for open pit, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats	WOM	Negative	High
			WM	Negative	High
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	High
			WM	Negative	Moderate
5	Vegetation clearing / vehicle movement	Habitat degradation due to dust	WOM	Negative	High
			WM	Negative	Moderate
Operational Phase					
8	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats	WOM	Negative	High
			WM	Negative	High
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	High
			WM	Negative	Moderate

11	Heavy machinery and vehicle movement on site	Habitat degradation due to dust	WOM	Negative	High
			WM	Negative	Moderate
Wetlands					
Construction Phase					
24	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Wetland and watercourse destruction / fragmentation of wetland habitats	WOM	Negative	High
			WM	Negative	High
25	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Impediment of flow patterns	WOM	Negative	High
			WM	Negative	High
26	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	Negative	High
			WM	Negative	Moderate
Operational Phase					
29	Opencast mining	Dewatering of wetlands causing direct habitat loss / destruction	WOM	Negative	High
			WM	Negative	High
30	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	Negative	High
			WM	Negative	Moderate
Soils					
Construction Phase					

41	Heavy machinery and vehicle movement on site	Soil compaction	WOM	Negative	High
			WM	Negative	Low
42	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	Negative	High
			WM	Negative	Moderate
44	Topsoil & subsoil stripping	Soil destruction and sterilization	WOM	Negative	High
			WM	Negative	High
45	Topsoil & subsoil stripping, Clearing of vegetation through wetlands and water courses for road crossings	Loss of land capability	WOM	Negative	High
			WM	Negative	Moderate
Operational Phase					
46	Heavy machinery and vehicle movement on site, laydown areas of overburden dumps and stockpiles	Soil compaction	WOM	Negative	High
			WM	Negative	High
47	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	Negative	High
			WM	Negative	Moderate
49	Topsoil & subsoil stripping, opencast mining	Soil destruction and sterilization	WOM	Negative	High
			WM	Negative	Moderate
50	Topsoil & subsoil stripping, clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Loss of land capability	WOM	Negative	High
			WM	Negative	Moderate
Heritage					
Construction Phase					

122	Construction / Clearing	Site EXIGO-DFM-IA01 (medium significance)	WOM	Negative	High
			WM	Positive	Negligible
	Traffic				
Construction Phase					
142	Road upgrades	Improved access points resulting in increased safety for all road users	WOM	Positive	High
			WM	Positive	High
143	Road upgrades	Upgrades to roads benefitting all road users	WOM	Positive	High
			WM	Positive	High
Operational Phase					
145	Vehicular operation and usage of roads	Added trips to the surrounding road network resulting in an increase in traffic	WOM	Negative	High
			WM	Negative	Moderate
	Visual				
152	Construction of the plant: physical structure will become more visible	Alteration of the visual quality and sense of place of the area	WOM	Negative	High
			WM	Negative	Moderate
Operational Phase					
154	Physical structure of the plant	Alteration of the visual quality and sense of	WOM	Negative	High

		place of the area	WM	Negative	Moderate
155	Physical structure of the TSF	Alteration of the visual quality and sense of place of the area	WOM	Negative	High
			WM	Negative	Moderate
156	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	High
			WM	Negative	Moderate
157	Topsoil dumps, overburden dumps	Alteration of the visual quality and sense of place of the area	WOM	Negative	High
			WM	Negative	Moderate
Post-Closure Phase					
165	Physical structure of the TSF will remain on site	Alteration of the visual quality and sense of place of the area	WOM	Negative	High
			WM	Negative	Moderate
Hydrogeology					
Operational Phase					
174	Dewatering zone of influence.	Lowering of regional groundwater levels.	**WOM**	**Negative**	High
			WM	**Positive**	Low
175	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	**WOM**	**Negative**	High
			WM	**Positive**	Low
184	Dewatering: Spring flow affected	Deterioration of spring flow quantity	**WOM**	**Negative**	High
			WM	**Positive**	Low
189	Dewatering: Depletion of community water supply boreholes due to dewatering	Depletion of groundwater resource, impact on neighbouring users	**WOM**	**Negative**	High
			WM	**Positive**	Moderate
Post-Closure Phase					
191	Migration of contamination plume from mine contamination sources.	Contamination of regional groundwater and surface water resources.	**WOM**	**Negative**	High
			WM	**Positive**	Negligible
193	Permanent radius of influence due to mine dewatering	Depletion of groundwater resource, impact on neighbouring users	**WOM**	**Negative**	High
			WM	**Positive**	Low
194	Sulphate and Fluoride leaching from the TSF	Deterioration of groundwater quality	**WOM**	**Negative**	High

			WM	**Positive**	Negligible
195	Increased TDS / Nitrate leaching from the overburden dumps	Deterioration of groundwater quality	**WOM**	**Negative**	High
			WM	**Positive**	Negligible
		Aquatic			
Planning Phase					
198	Use of surface runoff and groundwater sources for the supply of production water for the mining project may alter the flow in the receiving systems	Loss of instream flow	**WOM**	Negative	High
			WM	Negative	Low
199	Use of layout option 2 may impact on the instream flow of the receiving systems.	Loss of instream flow	**WOM**	Negative	High
			WM	Negative	Negligible
200	Potentially poor planning leading to extensive and complex dirty water areas which need to be managed may impact on water quality.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Low
201	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.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Negligible
207	Potentially inadequate separation of clean and dirty water areas and the prevention of the release of sediment rich water may alter the aquatic habitat within the receiving environment.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Low

211	Potentially inadequate design of infrastructure leading to contamination of water and sediments in the streams may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Low
Construction Phase					
212	Disturbance of soils during the construction phase could lead to erosion and sedimentation of the aquatic resources present, thus resulting in a loss of instream flow.	Loss of instream flow	**WOM**	Negative	High
			WM	Negative	Negligible
214	Change in surface coverage. Development of the mining rights area will change the surface coverage in some areas from vegetated soil to buildings, hardened gravel roads, paved areas (parking) and compacted earth.	Loss of instream flow	**WOM**	Negative	High
			WM	Negative	Low
215	Clean and dirty water systems not being constructed to the required specifications to prevent contamination of clean water areas may impact on water quality.	Impacts on water quality	**WOM**	Negative	High

			WM	Negative	Low
216	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.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Negligible
217	Poor housekeeping and management may lead to impacts on water quality.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Low
218	Spills and other unplanned events may impact on water quality.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Low
219	Site clearing and the removal of vegetation leading to increased runoff and erosion may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Negligible
221	Earthworks in the vicinity of drainage systems leading to increased runoff and erosion and altered runoff patterns may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Negligible
222	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Negligible

223	Site clearing and the removal of vegetation may lead to a loss in aquatic biodiversity. Site clearing and road construction may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Negligible
224	Earthworks and other mining construction activities in the vicinity of wetland and riparian areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Negligible
225	Placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Negligible
226	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Low
Operational Phase					
227	Loss of MAR from dirty water areas may impact on the instream flow of the receiving systems.	Loss of instream flow	**WOM**	Negative	High

			WM	Negative	Low
228	Loss of water through clean and dirty water separation may alter instream flow on the receiving systems.	Loss of instream flow	**WOM**	Negative	High
			WM	Negative	Negligible
229	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area, with special mention of the formation of an ever increasing cone of depression over the life of the proposed mining project as a result of open cast mining activities and water abstraction, may lead to altered instream flow	Loss of instream flow	**WOM**	Negative	High
			WM	Negative	Moderate
231	Capture of run-off and capture of rainfall (inundation) in the 'dirty'/impacted areas would lower instream flow in the receiving environment.	Loss of instream flow	**WOM**	Negative	High
			WM	Negative	Negligible
232	Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Negligible
233	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	Impacts on water quality	**WOM**	Negative	High

	quality.		**WM**	Negative	Negligible
235	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.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Negligible
236	Spills and other unplanned events during operational phase may impact on water quality.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Negligible
237	Ongoing disturbance of soils during general operational activities may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Negligible
238	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the operational phase.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Low
240	Any activities which lead to the reduction of flow in the system with special mention of the use of surface and groundwater sources for production water may alter the aquatic habitat. It is considered likely that the operational activities will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Moderate
241	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Low

242	Ongoing disturbance of soils with general operational activities may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Negligible
243	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Low
245	Seepage from the discard dumps and overburden stockpiles may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Moderate
246	Potential discharge from the mine process water system with special mention of RWD and any PCD's may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Low
248	It is considered likely that the operational activities, with special mention of the open cast mining activities, will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat as well as a loss of surface water recharge to the wetlands and springs which occur in the vicinity of the proposed mining project.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Moderate

249	Acidification as a result of pyrite oxidation and the release of metals due to tillage and blasting may lead to a loss in aquatic biodiversity	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Moderate
Closure and Decommissioning Phase					
250	Loss of MAR from latent dirty water areas may still impact on the flow even after operational phase.	Loss of instream flow	**WOM**	Negative	High
			WM	Negative	Negligible
253	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.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Negligible
254	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.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Negligible
255	Poor housekeeping and management during decommissioning phase may lead to impacts on water quality.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Negligible
258	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Low
260	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Low

262	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Low
263	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Moderate
264	Inadequate closure leading to post closure impacts on water quality may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Negligible
Post-Closure Phase					
266	Loss of MAR from latent dirty water areas may still impact on the flow even after decommissioning phase.	Loss of instream flow	**WOM**	Negative	High
			WM	Negative	Negligible
268	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post decommissioning phase	Loss of instream flow	**WOM**	Negative	High
			WM	Negative	Negligible
270	Inadequate closure and rehabilitation leading to ongoing pollution from contaminating sources such as discard dumps	Impacts on water quality	**WOM**	Negative	High

	and latent dirty water areas may impact on water quality, with special mention of contaminated dirty water decant degenerated from in-filled opencast pits		**WM**	Negative	Negligible
271	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.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Negligible
272	Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present.	Impacts on water quality	**WOM**	Negative	High
			WM	Negative	Negligible
273	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Low
274	Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Low
275	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Negative	High
			WM	Negative	Negligible
277	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Low
278	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High

			WM	Negative	Moderate
279	Potential post closure impacts on water quality may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Negative	High
			WM	Negative	Moderate
		Socio-economic			
Construction Phase					
285	Sterilisation of land due to construction and mine establishment activities	Loss of agricultural production due to land sterilisation and other environmental impacts	**WOM**	Negative	High
			WM	Negative	Moderate
Operational Phase					
289	Mining operations	Stimulation of production and GDP due to operations	**WOM**	Positive	High
			WM	Positive	High
290	Mining operations	Stimulation of employment creation due to operations	**WOM**	Positive	High
			WM	Positive	High
291	Mining operations	Skills development	**WOM**	Positive	High
			WM	Positive	High
292	Creation of employment at the mine	Improved standard of living due to creation of employment	**WOM**	Positive	High
			WM	Positive	High
293	Mining operations	Increase in government revenue and its ability to deliver services	**WOM**	Positive	High
			WM	Positive	High
295	Presence of the mine and resultant environmental impacts (noise, visual, air quality)	Change in sense of place	**WOM**	Negative	High
			WM	Negative	Moderate

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:

- Ecology:
    - Habitat destruction / fragmentation of fauna habitats
- Wetlands
    - Wetland and watercourse destruction / fragmentation of wetland habitats
    - Impediment of flow patterns
    - Dewatering of wetlands causing direct habitat loss / destruction
- Soils
    - Soil destruction and sterilization
    - Soil compaction
- Traffic
    - **Positive** Improved access points resulting in increased safety for all road users
    - **Positive** Upgrades to roads benefitting all road users
- Socio-economic
    - **Positive** Stimulation of production and GDP due to operations
    - **Positive** Stimulation of employment creation due to operations
    - **Positive** Skills development
    - **Positive** Improved standard of living due to creation of employment
    - **Positive** 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 and traffic 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).

Refer to Table 6 and Table 23.

19. MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

Refer to Section 8.3.1 for alternatives considered.

20. STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION WITHIN THE OVERALL SITE (provide a statement motivating the final site layout that is proposed)

The proposed site layout alternatives have been largely influenced by the ecological, heritage and hydro- and geohydrological 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. Refer to Section 8.3.1 and 8.3.2.

21. FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE (IN RESPECT OF THE FINAL SITE LAYOUT PLAN) THROUGH THE LIFE OF THE ACTIVITY (including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures)

Refer to EIA methodology in section 16 and Table 21 below in section 22.

22. ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties).

Table 21: Potential Impact and Mitigation Type to be implemented

No	Activity	Impact	Without or With Mitigation	Significance	Mitigation Type
				Magnitude	
Ecology					
Planning Phase					
1	Eradication of protected trees / flora through permit applications	Eradication of protected trees	WOM	Negligible	Control through permitting
			WM	Negligible	
Construction Phase					
2	Clearing of vegetation for open pit, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats	WOM	High	Remedy through rehabilitation; access control
			WM	High	
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	High	Erosion, stormwater and dust control
			WM	Moderate	
4	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species	WOM	Moderate	Control of materials brought onto site, Alien Invasive Species control
			WM	Low	

5	Vegetation clearing / vehicle movement	Habitat degradation due to dust	WOM	High	Dust control, remedy through rehabilitation
			WM	Moderate	
6	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Moderate	Pollution control
			WM	Negligible	
7	Heavy machinery and vehicle movement on site; construction of infrastructure, roads etc.	Road mortalities of fauna / impact of human activities on site	WOM	Moderate	Control of speed limits
			WM	Negligible	
Operational Phase					
8	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats	WOM	High	Remedy through rehabilitation
			WM	High	
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	Remedy through rehabilitation; management of topsoil
			WM	Moderate	
10	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species	WOM	Moderate	Control of materials brought onto site, Alien Invasive Species control
			WM	Low	
11	Heavy machinery and vehicle movement on site	Habitat degradation due to dust	WOM	High	Dust control, remedy through rehabilitation
			WM	Moderate	
12	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Moderate	Pollution control
			WM	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	WOM	Moderate	Control of speed limits
			WM	Negligible	

Closure and Decommissioning Phase					
14	Rehabilitation of mining site	Improvement of habitat through revegetation / succession over time	WOM	Low	Remedy through rehabilitation
			WM	Moderate	
15	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	WOM	Moderate	Erosion, stormwater and dust control
			WM	Negligible	
16	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species	WOM	Moderate	Control of materials brought onto site, Alien Invasive Species control
			WM	Negligible	
17	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site / vehicle movement on site	Habitat degradation due to dust	WOM	Moderate	Dust control, remedy through rehabilitation
			WM	Low	
18	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Moderate	Pollution control
			WM	Negligible	
19	Heavy machinery and vehicle movement on site	Road mortalities of fauna / impact of human activities on site	WOM	Moderate	Control of speed limits
			WM	Negligible	
Post-Closure Phase					
20	Natural Successional processes	Improvement of habitat through revegetation / succession over time	WOM	Low	Remedy through rehabilitation
			WM	Moderate	
21	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	WOM	Moderate	Erosion, stormwater and dust control
			WM	Negligible	
22	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	WOM	Moderate	Control of materials brought onto site, Alien Invasive Species control

			WM	Negligible	
Wetlands					
Planning Phase					
23	Obtaining of IWUL for crossings and mining through water courses / wetlands	Delay of mining onset	WOM	Moderate	Control through licencing
			WM	Low	
Construction Phase					
24	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Wetland and watercourse destruction / fragmentation of wetland habitats	WOM	High	Access control
			WM	High	
25	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Impediment of flow patterns	WOM	High	Access control; stormwater management and erosion control
			WM	High	
26	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	Erosion, stormwater and dust control
			WM	Moderate	
27	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species in wetlands	WOM	Moderate	Control of materials brought onto site, Alien Invasive Species control
			WM	Low	
28	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Moderate	Pollution control
			WM	Negligible	
Operational Phase					
29	Opencast mining	Dewatering of wetlands causing direct habitat loss / destruction	WOM	High	Access control, surface and groundwater management
			WM	High	
30	Increased hardened surfaces around infrastructure and exposed areas around open	Soil erosion and sedimentation in wetland / water courses	WOM	High	Erosion, stormwater and dust control

	pits, laydown areas of overburden dumps and stockpiles as well as TSF, road crossings		WM	Moderate	
31	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species in wetlands	WOM	Moderate	Control of materials brought onto site, Alien Invasive Species control
			WM	Low	
32	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in wetlands	WOM	Moderate	Pollution control
			WM	Negligible	
Closure and Decommissioning Phase					
33	Rehabilitation of mining site	Improvement of wetland habitat through revegetation / succession over time	WOM	Low	Remedy through rehabilitation
			WM	Moderate	
34	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation in wetlands	WOM	Moderate	Erosion, stormwater and dust control
			WM	Negligible	
35	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species in wetlands	WOM	Moderate	Control of materials brought onto site, Alien Invasive Species control
			WM	Negligible	
36	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Moderate	Pollution control
			WM	Negligible	
Post-Closure Phase					
37	Natural Successional processes	Improvement of wetland habitat at crossings through revegetation / succession over time	WOM	Low	Remedy through rehabilitation
			WM	Moderate	
38	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	WOM	Moderate	Erosion, stormwater and dust control
			WM	Negligible	
39	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	WOM	Moderate	Control of materials brought onto site, Alien Invasive Species control
			WM	Negligible	
Soils					
Planning Phase					

40	Obtaining of IWUL for crossings (wetland soils) and mining layout on sensitive soils	Delay of mining onset	WOM	Moderate	Control through permitting and licencing
			WM	Low	
Construction Phase					
41	Heavy machinery and vehicle movement on site	Soil compaction	WOM	High	Access control; remedy through rehabilitation
			WM	Low	
42	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	Erosion, stormwater and dust control
			WM	Moderate	
43	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM	Moderate	Pollution control
			WM	Negligible	
44	Topsoil & subsoil stripping	Soil destruction and sterilization	WOM	High	Topsoil management
			WM	High	
45	Topsoil & subsoil stripping, Clearing of vegetation through wetlands and water courses for road crossings	Loss of land capability	WOM	High	Access control
			WM	Moderate	
Operational Phase					
46	Heavy machinery and vehicle movement on site, laydown areas of overburden dumps and stockpiles	Soil compaction	WOM	High	Access control; remedy through rehabilitation
			WM	High	
47	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	Erosion, stormwater and dust control
			WM	Moderate	
48	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in wetlands	WOM	Moderate	Pollution control
			WM	Negligible	
49	Topsoil & subsoil stripping, opencast mining	Soil destruction and sterilization	WOM	High	Remedy through rehabilitation
			WM	Moderate	

50	Topsoil & subsoil stripping, clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Loss of land capability	WOM WM	High Moderate	Access control, remedy through rehabilitation
Closure and Decommissioning Phase					
51	Rehabilitation of mining site	Improvement of eroded soils and compaction / backfilling of pits	WOM WM	Low Moderate	Remedy through rehabilitation
52	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	WOM WM	Moderate Negligible	Erosion, stormwater and dust control
53	Heavy machinery and vehicle movement on site	Soil compaction	WOM WM	Moderate Low	Access control; remedy through rehabilitation
54	Heavy machinery and vehicle movement on site	Spillages of harmful substances	WOM WM	Moderate Negligible	Pollution control
Post-Closure Phase					
55	Natural processes	Improvement of soil compaction and erosion	WOM WM	Low Moderate	Remedy through rehabilitation
56	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	WOM WM	Moderate Negligible	Erosion, stormwater and dust control
Air Quality					
Planning Phase					
57	Existing baseline ambient conditions	PM10 and PM2.5	WOM WM	Low Low	N/A
Construction Phase					
58	Transport and general construction activities	Gaseous and particulate emissions;	WOM	Moderate	Vehicle maintenance and dust

		fugitive dust	WM	Low	control
59	Clearing of groundcover and levelling of area	PM10 and PM2.5	WOM	Moderate	
			WM	Low	Dust control, access control, remedy through rehabilitation
60	Materials handling	PM10 and PM2.5	WOM	Moderate	
			WM	Low	Dust control
61	Wind erosion from open areas	PM10 and PM2.5	WOM	Moderate	
			WM	Low	Dust control, access control, remedy through rehabilitation
Operational Phase					
62	Vehicle activity on paved and unpaved roads	Gaseous and particulate emissions; fugitive dust	WOM	Moderate	
			WM	Moderate	Dust control
63	Materials handling operations	PM10 and PM2.5	WOM	Moderate	
			WM	Moderate	Dust control

64	Mining operations within open pit	PM10 and PM2.5	WOM	Moderate	
			WM	Moderate	Dust control
65	Wind erosion	PM10 and PM2.5	WOM	Moderate	
			WM	Low	Dust control
Closure and Decommissioning Phase					
66	Dust generated during rehabilitation activities	PM10 and PM2.5	WOM	Moderate	
			WM	Low	Dust control
67	Demolition of the structure	PM10 and PM2.5	WOM	Moderate	
			WM	Low	Dust control
68	Tailpipe emissions from vehicles utilised during the closure phase	Gaseous and particulate emissions; fugitive dust	WOM	Moderate	
			WM	Low	Vehicle maintenance and dust control
Post-Closure Phase					
69	Wind erosion from open areas	PM10 and PM2.5	WOM	Low	
			WM	Negligible	Remedy through rehabilitation
Geochemical / Waste Classification					
Operational Phase					
70	Disposal of tailings on tailings facility	Development of acid mine drainage conditions	WOM	Negligible	N/A
			WM	Negligible	
71	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids	WOM	Negligible	N/A
			WM	Negligible	
72	Disposal of tailings on tailings facility	Contamination of groundwater,	WOM	Moderate	Engineering

		surface water and soil by sulphate and fluoride	WM	Negligible	
73	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate	WOM	Low	Pollution control
			WM	Negligible	
74	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids	WOM	Negligible	N/A
			WM	Negligible	
75	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	WOM	Negligible	N/A
			WM	Negligible	
76	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate	WOM	Low	Pollution control
			WM	Negligible	
Post-Closure Phase					
77	Disposal of tailings on tailings facility	Development of acid mine drainage conditions	WOM	Negligible	N/A
			WM	Negligible	
78	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids	WOM	Negligible	N/A
			WM	Negligible	
79	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	WOM	Moderate	Pollution control
			WM	Negligible	
80	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate	WOM	Low	Pollution control
			WM	Negligible	
81	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids	WOM	Negligible	N/A
			WM	Negligible	
82	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	WOM	Negligible	N/A
			WM	Negligible	
83	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate	WOM	Low	Pollution control
			WM	Negligible	
Noise					
Planning Phase					

84	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels	WOM	Negligible	N/A
			WM	Negligible	
Construction Phase					
85	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Operational Phase					
86	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Closure and Decommissioning Phase					
87	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Post-Closure Phase					
88	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Planning Phase					
89	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
90	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Construction Phase					
91	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	

92	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Operational Phase					
93	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
94	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Closure and Decommissioning Phase					
95	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
96	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Post-Closure Phase					
97	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
98	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Planning Phase					
99	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
100	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A

			WM	Negligible	
Construction Phase					
101	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
102	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.	WOM	Low	Noise control measures
			WM	Negligible	
Operational Phase					
103	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
104	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.	WOM	Low	Noise control measures
			WM	Negligible	
Closure and Decommissioning Phase					
105	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A

			WM	Negligible	
106	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.	WOM	Low	Noise control measures
			WM	Negligible	
Post-Closure Phase					
107	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
108	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Planning Phase					
109	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
110	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Construction Phase					
111	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	

112	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Low	Noise control measures
			WM	Negligible	
Operational Phase					
113	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
114	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Low	Noise control measures
			WM	Negligible	
Closure and Decommissioning Phase					
115	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
116	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Low	Noise control measures

			WM	Negligible	
Post-Closure Phase					
117	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
118	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	WOM	Negligible	N/A
			WM	Negligible	
Heritage					
Planning Phase					
119	Planning	Site EXIGO-DFM-IA01 (medium significance)	WOM	Low	
			WM	Negligible	Control through monitoring
120	Planning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
121	Planning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
Construction Phase					
122	Construction / Clearing	Site EXIGO-DFM-IA01 (medium significance)	WOM	High	
			WM	Negligible	Control through monitoring

123	Construction / Clearing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	WOM	Moderate	
			WM	Negligible	Control through monitoring
124	Construction / Clearing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
Operational Phase					
125	Mining / Processing	Site EXIGO-DFM-IA01 (medium significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
126	Mining / Processing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
127	Mining / Processing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
Closure and Decommissioning Phase					
128	Decommissioning	Site EXIGO-DFM-IA01 (medium significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
129	Decommissioning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring

130	Decommissioning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
Post-Closure Phase					
131	Post-Closure	Site EXIGO-DFM-IA01 (medium significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
132	Post-Closure	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
133	Post-Closure	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	WOM	Negligible	
			WM	Negligible	Control through monitoring
Palaeontology					
Construction Phase					
134	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of stromatolites	WOM	Low	
			WM	Low	Control through monitoring
135	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of fossils.	WOM	Negligible	
			WM	Negligible	Control through monitoring

136	Construction of buildings, dams, roads, pylons. Exploration for mining	Preservation of fossils.	WOM	Negligible	
			WM	Low	N/A
Operational Phase					
137	Mining	Destruction of stromatolites	WOM	Low	
			WM	Low	Control through monitoring
138	Mining	Destruction of fossils.	WOM	Negligible	
			WM	Negligible	Control through monitoring
139	Mining	Preservation of fossils.	WOM	Negligible	
			WM	Low	N/A
Traffic					
Planning Phase					
140	Vehicular operation and usage of roads	Increase in traffic	WOM	Negligible	
			WM	Negligible	N/A
Construction Phase					

141	Construction of plant and access roads	Increased traffic volumes: Traffic volumes is very low with the increase in traffic flow still well below road capacity Impeded access	WOM WM	Low Negligible	Control through speed limits and signage, dust control and maintenance
142	Road upgrades	Improved access points resulting in increased safety for all road users	WOM WM	High High	Control through speed limits and signage
143	Road upgrades	Upgrades to roads benefitting all road users	WOM WM	High High	Control through speed limits and signage
144	Road rehabilitation	Rehabilitation of roads benefitting all road users	WOM WM	Moderate High	Control through speed limits and signage
Operational Phase					
145	Vehicular operation and usage of roads	Added trips to the surrounding road network resulting in an increase in traffic	WOM WM	High Moderate	Control through speed limits and signage, dust control and maintenance
Closure and Decommissioning Phase					

146	Vehicular operation and usage of roads	Increase in traffic Deterioration in road quality	WOM WM	Low Negligible	Control through speed limits and signage, dust control and maintenance
Post-Closure Phase					
147	No traffic	No impact	WOM WM	Negligible Negligible	N/A
Visual					
Planning Phase					
148	Implementation of Mitigation Measures such as visual berms / vegetation screens	No negative visual impact	WOM WM	Negligible Negligible	N/A
Construction Phase					
149	Site preparation: clearance of vegetation and dust generation	Alteration of the visual quality and sense of place of the area	WOM WM	Moderate Low	Dust control
150	Construction of the Site Camp / Office	Alteration of the visual quality and sense of place of the area	WOM WM	Low Negligible	Control of mining footprint
151	Removal of topsoil and subsoil for open pit mining: overburden dumps, topsoil dumps and dust generation	Alteration of the visual quality and sense of place of the area	WOM WM	Moderate Moderate	Dust control
152	Construction of the plant: physical structure will become more visible	Alteration of the visual quality and sense of place of the area	WOM WM	High Moderate	Control through plant design
153	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 WM	Moderate Moderate	Control of lighting
Operational Phase					

154	Physical structure of the plant	Alteration of the visual quality and sense of place of the area	WOM	High	
			WM	Moderate	Dust control
155	Physical structure of the TSF	Alteration of the visual quality and sense of place of the area	**WOM**	High	
			WM	Moderate	Remedy through rehabilitation
156	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	Dust control
157	Topsoil dumps, overburden dumps	Alteration of the visual quality and sense of place of the area	WOM	High	
			WM	Moderate	Dust control
158	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	Moderate	
			WM	Moderate	Control of lighting
Closure and Decommissioning Phase					
159	Removal of the plant structures: generation of dust	Alteration of the visual quality and sense of place of the area	WOM	Moderate	
			WM	Moderate	Dust control
160	Removal of the plant structures: physical structures will be gone	Improvement of the visual quality and sense of place of the area	WOM	Low	
			WM	Moderate	Remedy through rehabilitation
161	Closure of the open pit mining areas: generation of dust	Alteration of the visual quality and sense of place of the area	WOM	Moderate	
			WM	Moderate	Dust control
162	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	Moderate	
			WM	Moderate	Dust control
163	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	Moderate	
			WM	Moderate	Control of lighting
Post-Closure Phase					
164	Rehabilitation of cleared areas	Improvement of the visual quality and sense of place of the area	WOM	Moderate	
			WM	Moderate	N/A
165	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	Remedy through rehabilitation

Hydrogeology					
Planning Phase					
166	Stakeholder engagement: aquifer testing arrangements.	Lowering of local water levels caused by pump testing.	**WOM**	Low	Control through monitoring
			WM	Negligible	
167	Establishment and operation of construction camp.	Groundwater and surface water contamination.	**WOM**	Low	Pollution control
			WM	Negligible	
168	Anthropogenic activities on site.	Contamination risk.	**WOM**	Low	Pollution control
			WM	Negligible	
169	Fuelling and movement of construction vehicles.	Risk of hydrocarbon spillage and contamination.	**WOM**	Moderate	Pollution control
			WM	Low	
Construction Phase					
170	Oil, grease and diesel spillages from construction vehicles	Contamination risk.	**WOM**	Low	Pollution control
			WM	Negligible	
171	Pollution of groundwater due to sanitation facilities	Deterioration of groundwater quality	**WOM**	Low	Pollution control
			WM	Negligible	
172	Ground and surface water pollution due to storage of chemicals and building materials	Deterioration of groundwater and surface quality	**WOM**	Low	Pollution control
			WM	Negligible	
173	Spillages from diesel (fuel storage) facilities	Deterioration of groundwater and surface quality	**WOM**	Low	Pollution control
			WM	Negligible	
Operational Phase					
174	Dewatering zone of influence.	Lowering of regional groundwater levels.	**WOM**	High	Control through monitoring
			WM	Low	
175	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	**WOM**	High	Control through monitoring
			WM	Low	
176	Use of explosives for mine pit development.	Contribution to nitrate over-load in groundwater and surface water resources.	**WOM**	Moderate	Control through monitoring
			WM	Low	
177	Hydrocarbon spillages from fuel storage facilities,	Hydrocarbon contamination of	**WOM**	Moderate	Pollution control

	fuelling and wash-bays.	groundwater and surface water resources.	WM	Low	
178	Flooding of the open pit	Unsafe working conditions	WOM	Negligible	Flood control
			WM	Negligible	
179	Pollution of groundwater due to sanitation facilities	Deterioration of groundwater quality	WOM	Moderate	Pollution control
			WM	Negligible	
180	Seepage from overburden dumps	Deterioration of groundwater quality	WOM	Moderate	Control through monitoring
			WM	Negligible	
181	Sulphate and Fluoride leaching from the TDF	Deterioration of groundwater quality	WOM	Moderate	Control through monitoring
			WM	Negligible	
182	Increased TDS / Nitrate leaching from the overburden dumps	Deterioration of groundwater quality	WOM	Moderate	Control through monitoring
			WM	Negligible	
183	Dewatering: Water from the Klein Marico into the open pit	Depletion of surface water resource	WOM	Moderate	Surface water management
			WM	Low	
184	Dewatering: Spring flow affected	Deterioration of spring flow quantity	WOM	High	Control through monitoring
			WM	Low	
185	Water losses: leaking pipes	Insufficient maintenance and increase in water use	WOM	Low	Control of maintenance activities
			WM	Negligible	
186	Water Losses: Transmission losses and evaporation	Insufficient maintenance and increase in water use	WOM	Low	Control of maintenance activities
			WM	Negligible	
187	Dewatering: Depletion of water levels in boreholes due to over pumping - Higher than recommended yield	Depletion of groundwater resource, impact on neighbouring users	WOM	Low	Control through monitoring
			WM	Moderate	
188	Dewatering: Depletion of water levels in boreholes due to over pumping - Longer than recommended pumping time	Depletion of groundwater resource, impact on neighbouring users	WOM	Low	Control through monitoring
			WM	Negligible	
189	Dewatering: Depletion of community water supply	Depletion of groundwater resource,	WOM	High	Control through monitoring

	boreholes due to dewatering	impact on neighbouring users	WM	Moderate	
Post-Closure Phase					
190	Increased groundwater ingress at disturbed/rehabilitated areas.	Potential decanting of groundwater at low elevation areas.	WOM	Moderate	Remedy through rehabilitation
			WM	Negligible	
191	Migration of contamination plume from mine contamination sources.	Contamination of regional groundwater and surface water resources.	WOM	High	Control through monitoring
			WM	Negligible	
192	Post-closure pit flooding and acidification.	Negative impact on regional groundwater resources.	WOM	Low	Control through monitoring
			WM	Negligible	
193	Permanent radius of influence due to mine dewatering	Depletion of groundwater resource, impact on neighbouring users	WOM	High	Remedy through rehabilitation
			WM	Low	
194	Sulphate and Fluoride leaching from the TDF	Deterioration of groundwater quality	WOM	High	Remedy through rehabilitation
			WM	Negligible	
195	Increased TDS / Nitrate leaching from the overburden dumps	Deterioration of groundwater quality	WOM	High	Remedy through rehabilitation
			WM	Negligible	
Aquatic					
Planning Phase					
196	Potentially poor planning leading to extensive dirty water areas which need to be managed which may reduce the mean annual run-off (MAR) to the non-perennial drainage systems in the area.	Loss of instream flow	WOM	Low	Access control; control of dirty water systems
			WM	Negligible	
197	Stormwater designs leading to rapid release of water which in turn may lead to a loss of streamflow regulation capabilities in the area	Loss of instream flow	WOM	Moderate	Access control; stormwater management
			WM	Low	
198	Use of surface runoff and groundwater sources for the supply of production water for the mining	Loss of instream flow	WOM	High	Groundwater management

	project may alter the flow in the receiving systems		**WM**	Low	
199	Use of layout option 2 may impact on the instream flow of the receiving systems.	Loss of instream flow	**WOM**	High	Control through engineering design
			WM	Negligible	
200	Potentially poor planning leading to extensive and complex dirty water areas which need to be managed may impact on water quality.	Impacts on water quality	**WOM**	High	Control of dirty water systems
			WM	Low	
201	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.	Impacts on water quality	**WOM**	High	Access control; control of dirty water systems
			WM	Negligible	
202	Potentially inadequate separation of clean and dirty water areas leading to contaminated water leaving the defined dirty water area may impact in water quality.	Impacts on water quality	**WOM**	Moderate	Control of dirty water systems
			WM	Low	
203	Clean and dirty water systems not being designed adequately to ensure protection of the water resources.	Impacts on water quality	**WOM**	Moderate	Control of dirty water systems
			WM	Negligible	
204	Potentially poor planning leading to the placement of infrastructure within non-perennial drainage lines, with special mention of the waste stockpile areas as well as roads, road crossings and bridges all may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Moderate	Control through engineering design
			WM	Negligible	
205	Potentially inadequate design of infrastructure leading to changes to instream habitat.	Loss of aquatic habitat	**WOM**	Moderate	Control through engineering design
			WM	Negligible	
206	Potentially inadequate design of infrastructure leading to changes to system hydrology may alter	Loss of aquatic habitat	**WOM**	Moderate	Control through engineering design

	the aquatic habitat.		**WM**	Negligible	
207	Potentially inadequate separation of clean and dirty water areas and the prevention of the release of sediment rich water may alter the aquatic habitat within the receiving environment.	Loss of aquatic habitat	**WOM**	High	Control of dirty water systems
			WM	Low	
208	Potentially poor planning leading to the placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Moderate	Control through engineering design
			WM	Negligible	
209	Potentially inadequate design of infrastructure leading to changes to instream habitat may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Moderate	Control through engineering design
			WM	Negligible	
210	Potentially inadequate design of infrastructure leading to changes to system hydrology may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Moderate	Control through engineering design
			WM	Negligible	
211	Potentially inadequate design of infrastructure leading to contamination of water and sediments in the streams may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Control through engineering design
			WM	Low	
Construction Phase					

212	Disturbance of soils during the construction phase could lead to erosion and sedimentation of the aquatic resources present, thus resulting in a loss of instream flow.	Loss of instream flow	**WOM**	High	Access control, erosion control
			WM	Negligible	
213	Construction of clean and dirty water separation structures for dirty water management purposes may lead to altered flow levels.	Loss of instream flow	**WOM**	Moderate	Control of dirty water systems
			WM	Negligible	
214	Change in surface coverage. Development of the mining rights area will change the surface coverage in some areas from vegetated soil to buildings, hardened gravel roads, paved areas (parking) and compacted earth.	Loss of instream flow	**WOM**	High	Control of mining footprint
			WM	Low	
215	Clean and dirty water systems not being constructed to the required specifications to prevent contamination of clean water areas may	Impacts on water quality	**WOM**	High	Control of dirty water systems

	impact on water quality.		**WM**	Low	
216	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.	Impacts on water quality	**WOM**	High	Erosion control, pollution control
			WM	Negligible	
217	Poor housekeeping and management may lead to impacts on water quality.	Impacts on water quality	**WOM**	High	Pollution control
			WM	Low	
218	Spills and other unplanned events may impact on water quality.	Impacts on water quality	**WOM**	High	Pollution control
			WM	Low	
219	Site clearing and the removal of vegetation leading to increased runoff and erosion may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	High	Erosion control
			WM	Negligible	
220	Site clearing and road construction and the disturbance of soils leading to increased erosion may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Moderate	Erosion control
			WM	Negligible	
221	Earthworks in the vicinity of drainage systems leading to increased runoff and erosion and altered runoff patterns may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	High	Erosion control
			WM	Negligible	

222	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	High	Control of removal of alien vegetation
			WM	Negligible	
223	Site clearing and the removal of vegetation may lead to a loss in aquatic biodiversity. Site clearing and road construction may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Control of site clearance
			WM	Negligible	
224	Earthworks and other mining construction activities in the vicinity of wetland and riparian areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Access control, control of mining footprint
			WM	Negligible	
225	Placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Control of mining footprint
			WM	Negligible	
226	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Control of dirty water systems
			WM	Low	
Operational Phase					

227	Loss of MAR from dirty water areas may impact on the instream flow of the receiving systems.	Loss of instream flow	**WOM**	High	Pollution control, erosion control, stormwater management
			WM	Low	
228	Loss of water through clean and dirty water separation may alter instream flow on the receiving systems.	Loss of instream flow	**WOM**	High	Pollution control, erosion control, control of dirty water systems
			WM	Negligible	
229	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area, with special mention of the formation of an ever increasing cone of depression over the life of the proposed mining project as a result of open cast mining activities and water abstraction, may lead to altered instream flow	Loss of instream flow	**WOM**	High	Pollution control, erosion control
			WM	Moderate	
230	Intercepting run-off around mining activities and infrastructure could reduce the amount of time that water would take to reach the Klein Marico River and its associated tributaries and may lead to “flash flood” events on varying scales.	Loss of instream flow	**WOM**	Low	Flood control
			WM	Negligible	
231	Capture of run-off and capture of rainfall (inundation) in the ‘dirty’/impacted areas would lower instream flow in the receiving environment.	Loss of instream flow	**WOM**	High	Stormwater management

			WM	Negligible	
232	Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution.	Impacts on water quality	**WOM**	High	Pollution control
			WM	Negligible	
233	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.	Impacts on water quality	**WOM**	High	Control of dirty water systems
			WM	Negligible	
234	Poor housekeeping and management during operational phase may lead to impacts on water quality.	Impacts on water quality	**WOM**	Moderate	Pollution control
			WM	Negligible	
235	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.	Impacts on water quality	**WOM**	High	Pollution control, erosion control
			WM	Negligible	
236	Spills and other unplanned events during operational phase may impact on water quality.	Impacts on water quality	**WOM**	High	Pollution control
			WM	Negligible	
237	Ongoing disturbance of soils during general	Loss of aquatic habitat	**WOM**	High	Control of mining footprint

	operational activities may alter the aquatic habitat.		**WM**	Negligible	
238	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the operational phase.	Loss of aquatic habitat	**WOM**	High	Control of dirty water systems
			WM	Low	
239	Mining related activities leading to increased disturbance of soils and drainage lines may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Moderate	Control of mining footprint
			WM	Negligible	
240	Any activities which lead to the reduction of flow in the system with special mention of the use of surface and groundwater sources for production water may alter the aquatic habitat. It is considered likely that the operational activities will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat.	Loss of aquatic habitat	**WOM**	High	Groundwater and surface water management
			WM	Moderate	
241	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	High	Control of removal of alien vegetation
			WM	Low	
242	Ongoing disturbance of soils with general operational activities may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Control of mining footprint
			WM	Negligible	
243	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Control of dirty water systems
			WM	Low	
244	Loss of instream flow due to abstraction for water for production may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Moderate	Groundwater and water use management

			WM	Negligible	
245	Seepage from the discard dumps and overburden stockpiles may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Pollution control
			WM	Moderate	
246	Potential discharge from the mine process water system with special mention of RWD and any PCD's may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Pollution control
			WM	Low	
247	Sewage discharge from mine offices and camps may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Low	Pollution control
			WM	Negligible	
248	It is considered likely that the operational activities, with special mention of the open cast mining activities, will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat as well as a loss of surface water recharge to the wetlands and springs which occur in the vicinity of the proposed mining project.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Groundwater and surface water management
			WM	Moderate	
249	Acidification as a result of pyrite oxidation and the release of metals due to tillage and blasting may lead to a loss in aquatic biodiversity	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Pollution control
			WM	Moderate	

Closure and Decommissioning Phase					
250	Loss of MAR from latent dirty water areas may still impact on the flow even after operational phase.	Loss of instream flow	**WOM**	High	Control of dirty water systems
			WM	Negligible	
251	Loss of water to inadequately rehabilitated areas may still have an impact on the flow post operational phase.	Loss of instream flow	**WOM**	Moderate	Remedy through rehabilitation
			WM	Negligible	
252	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post operational phase	Loss of instream flow	**WOM**	Moderate	Groundwater and surface water management
			WM	Negligible	
253	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.	Impacts on water quality	**WOM**	High	Remedy through rehabilitation, pollution control
			WM	Negligible	
254	Clean and dirty water systems not being maintained or decommissioned properly to the	Impacts on water quality	**WOM**	High	Remedy through rehabilitation, pollution control

	required specifications to prevent contamination of clean water areas may impact on water quality.		**WM**	Negligible	
255	Poor housekeeping and management during decommissioning phase may lead to impacts on water quality.	Impacts on water quality	**WOM**	High	Remedy through rehabilitation, pollution control
			WM	Negligible	
256	Spills and other unplanned events during decommissioning phase may impact on water quality.	Impacts on water quality	**WOM**	Moderate	Pollution control
			WM	Negligible	
257	Disturbance of soils as part of demolition activities may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Low	Remedy through rehabilitation
			WM	Negligible	
258	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	Loss of aquatic habitat	**WOM**	High	Control of dirty water systems
			WM	Low	
259	Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	Moderate	Pollution control
			WM	Negligible	
260	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	High	Control of removal of alien vegetation
			WM	Low	
261	Disturbance of soils as part of demolition activities may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Low	Remedy through rehabilitation
			WM	Negligible	
262	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Control of dirty water systems

			WM	Low	
263	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Pollution control
			WM	Moderate	
264	Inadequate closure leading to post closure impacts on water quality may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Remedy through rehabilitation, pollution control
			WM	Negligible	
265	Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Moderate	Remedy through rehabilitation, erosion control
			WM	Negligible	
Post-Closure Phase					
266	Loss of MAR from latent dirty water areas may still impact on the flow even after decommissioning phase.	Loss of instream flow	**WOM**	High	Control of dirty water systems
			WM	Negligible	
267	Loss of water to inadequately rehabilitated areas may still have an impact on the flow post decommissioning phase.	Loss of instream flow	**WOM**	Moderate	Remedy through rehabilitation
			WM	Negligible	
268	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the	Loss of instream flow	**WOM**	High	Groundwater and surface water management

	area may impact on the flow post decommissioning phase		**WM**	Negligible	
269	Ongoing erosion and sedimentation of the aquatic resources, which will result in a loss of instream flow due to inadequate rehabilitation of affected areas.	Loss of instream flow	**WOM**	Moderate	Erosion control
			WM	Negligible	
270	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 decant degenerated from in-filled opencast pits	Impacts on water quality	**WOM**	High	Remedy through rehabilitation, pollution control
			WM	Negligible	
271	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.	Impacts on water quality	**WOM**	High	Control of dirty water systems
			WM	Negligible	
272	Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present.	Impacts on water quality	**WOM**	High	Remedy through rehabilitation
			WM	Negligible	
273	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	Loss of aquatic habitat	**WOM**	High	Control of dirty water systems
			WM	Low	
274	Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	High	Remedy through rehabilitation, pollution control
			WM	Low	
275	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	**WOM**	High	Control of removal of alien vegetation

			WM	Negligible	
276	Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	Moderate	Remedy through rehabilitation, erosion control
			WM	Negligible	
277	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Control of dirty water systems
			WM	Low	
278	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Pollution control
			WM	Moderate	
279	Potential post closure impacts on water quality may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	**WOM**	High	Pollution control
			WM	Moderate	
Socio-economic					
Construction Phase					
280	Capital investment into the establishment of the mine	Stimulation of production and GDP due to investment	**WOM**	Moderate	Remedy through local procurement
			WM	Moderate	
281	Capital investment into the establishment of the mine	Stimulation of employment due to investment	**WOM**	Moderate	Remedy through employment

			WM	Moderate	
282	Creation of employment	Improved standard of living due to creation of employment	**WOM**	Moderate	
			WM	Moderate	Remedy through employment
283	Creation of employment	Skills development	**WOM**	Negligible	
			WM	Low	Remedy through skills development and training
284	Capital investment into the establishment of the mine	Government revenue increase	**WOM**	Moderate	
			WM	Moderate	N/A
285	Sterilisation of land due to construction and mine establishment activities	Loss of agricultural production due to land sterilisation and other environmental impacts	**WOM**	High	Remedy through community relations
			WM	Moderate	
286	Construction activities on site	Change in the sense of place among the directly and indirectly affected communities	**WOM**	Moderate	
			WM	Low	Dust, noise and traffic control

287	Influx of job seekers	Added pressure on basic service delivery and economic infrastructure	**WOM**	Moderate	Remedy through community relations
			WM	Negligible	
288	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	**WOM**	Low	Remedy through employment
			WM	Negligible	
Operational Phase					
289	Mining operations	Stimulation of production and GDP due to operations	**WOM**	High	Remedy through local procurement
			WM	High	
290	Mining operations	Stimulation of employment creation due to operations	**WOM**	High	Remedy through local procurement
			WM	High	
291	Mining operations	Skills development	**WOM**	High	Remedy through skills development and training
			WM	High	
292	Creation of employment at the mine	Improved standard of living due to creation of employment	**WOM**	High	Remedy through local procurement
			WM	High	
293	Mining operations	Increase in government revenue and its ability to deliver services	**WOM**	High	N/A
			WM	High	
294	Extraction and processing of minerals	Export earnings	**WOM**	Negligible	Enhance through exportation
			WM	Negligible	
295	Presence of the mine and resultant	Change in sense of place	**WOM**	High	Dust, noise and traffic control

	environmental impacts (noise, visual, air quality)		WM	Moderate	
296	Investment into the local communities through SLP	Improved quality of life and service delivery	WOM	Low	
			WM	Moderate	Remedy through SLP initiatives
Closure					
297	Expenditure on decommissioning and closure	Stimulation of production and GDP and employment	WOM	Low	
			WM	Low	Remedy through local procurement
Blasting					
Operational Phase					
298	Blasting	Ground vibration Impact on houses	WOM	Low	Control of blasting
			WM	Negligible	
299	Blasting	Ground vibration Impact on boreholes	WOM	Negligible	Control of blasting
			WM	Negligible	
300	Blasting	Ground vibration Impact on roads	WOM	Negligible	Control of blasting
			WM	Negligible	
301	Blasting	Ground vibration Impact on animals	WOM	Low	Control of blasting
			WM	Negligible	
302	Blasting	Air blast Impact on houses	WOM	Low	Control of blasting
			WM	Low	
303	Blasting	Air blast Impact on boreholes	WOM	Negligible	Control of blasting
			WM	Negligible	
304	Blasting	Air blast Impact on roads	WOM	Negligible	Control of blasting
			WM	Negligible	
305	Blasting	Air blast Impact on animals	WOM	Low	Control of blasting
			WM	Negligible	
306	Blasting	Fly Rock Impact on houses	WOM	Moderate	Control of blasting
			WM	Negligible	
307	Blasting	Fly Rock Impact on boreholes	WOM	Negligible	Control of blasting
			WM	Negligible	
308	Blasting	Fly Rock Impact on roads	WOM	Negligible	Control of blasting

			WM	Negligible	
309	Blasting	Fly Rock Impact on animals	**WOM**	Low	Control of blasting
			WM	Negligible	
310	Blasting	Impact of Fumes - Houses	**WOM**	Low	Control of blasting
			WM	Negligible	
311	Blasting	Impact of Fumes - Boreholes	**WOM**	Negligible	Control of blasting
			WM	Negligible	
312	Blasting	Impact of Fumes - Roads	**WOM**	Negligible	Control of blasting
			WM	Negligible	
313	Blasting	Impact of Fumes - animals	**WOM**	Low	Control of blasting
			WM	Negligible	
			WM	Low	

The supporting impact assessment conducted by the EAP in included in **Table 19**

23. SUMMARY OF SPECIALIST REPORTS.

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):-

Table 22: Specialist recommendations

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Land Use & Soil Potential Assessment	• Layout option 4 is the preferred option from a soil impact point of view. • Refer to Table 23.	X	Refer to Table 23 and Appendix 7.5: Soils, Agricultural Potential and Land Capability Assessment
Ecological Impact Assessment	• Layout option 3 is the preferred option from an ecological point of view. • Refer to Table 23.	X	Refer to Table 23 and Appendix 7.4: Ecological Impact Assessment
Archaeological Impact Assessment	• A Palaeontological Impact Assessment is recommended where bedrock is to be impacted and, should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should be carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist. • A number of recent period features (Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04) occurring within the proposed Doornhoek Fluorspar Mine Project area 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 the 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	X	Refer to this table and Appendix 7.2: Archaeological Impact Assessment

	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 area 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 the development. In addition to these site-specific recommendations, careful cognizance should be taken of the following: • As Palaeontological remains occur where bedrock has been exposed, all geological features should be regarded as sensitive. • Water sources such as drainage lines, fountains and pans would often have attracted human activity in the past. As Stone Age material the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits.		
Palaeontological Desktop Assessment	• The on-site conservation of exceptional and well-preserved stromatolitic features is strongly recommended. • It is recommended that a palaeontologist should be appointed to do a site visit before the commencement of construction or mining to verify that no fossiliferous cave deposits or stromatolitic domes or columns will be damaged during development.	X	Refer to this table and Appendix 7.3: Palaeontological Impact Assessment

Wetland Delineation & Impact Assessment	• Layout option 3 is the preferred option from a wetland point of view. • Refer to Table 23.	X	Refer to Table 23 and Appendix 7.6: Wetland Impact Assessment
Aquatic Impact Assessment	It is highly recommended that should it nonetheless be deemed appropriate to mine the resource from a cumulative sustainable development point of view, as much infrastructure as possible be moved to the areas where historical disturbance as a result of anthropogenic activity has occurred. In addition, the infrastructure required to access the resource must be kept to the absolute minimum. Furthermore, extensive mitigation must be applied during the construction and operational phases of the project to ensure that no unacceptable impact takes place beyond the surface infrastructure footprint. In this regard particular mention is made of the management of the groundwater, surface water and the dirty water area of the mine footprint and the impact of mining related activities on the aquatic resources both in and further downstream of the mining rights area. Strict monitoring throughout the life of the mine and post-closure is required in order to ensure the health and functioning of the aquatic ecosystems is retained. The water resources will need to be rehabilitated in such a way as to support the larger drainage systems at the same level as those evident in the pre-mining condition and with particular mention of ensuring that no significant impact takes place on the groundwater, surface water and downstream river systems. It is deemed important that a desktop reserve model be run on the Klein Marico river at a point a short distance downstream of the proposed mining operations in order to determine the EWR. This will allow site specific instream flow and water quality requirements to be determined which in turn will allow for improved planning and decision making to ensure that reserve requirements on a local scale can be met. In order to meet this objective, rehabilitation will need to be well planned and a suitably qualified ecologist must form part of the management team through the entire life cycle of the project and to guide the rehabilitation (including concurrent rehabilitation) and closure objectives of the mine.	X	Refer to this table and Appendix 7.7: Aquatic Impact Assessment
Hydrogeological Impact Assessment	• Due to the sensitivity of the model to the characteristics/integrity of the dyke structures it is necessary to conduct geophysics surveys, drill and test sets of boreholes to evaluate the hydraulic connectivity of compartments, the material properties of the dykes and obtain the necessary spatial head distribution for model calibration. Boreholes should be drilled to assess the following compartments: • Compartment 1 and 2 – Resource C and D and mine dewatering impact • Compartment 3 and 2 – Resource A open pit influence • Compartment 4 and 5 – TSF position and possible migration of salts across the dykes • Geophysical surveys and drilling of deep (+- 150 - 200m) groundwater exploration and characterisation boreholes (x10) should be drilled within compartment 1. These boreholes should be subjected to long duration aquifer tests. The data should be used to update the mine dewatering model and possible water supply. Detailed assessments should be conducted on the influence on current groundwater users and water abstracted from storage and mining of the water resource. An analysis should be done to verify suitability of	X	Refer to this table and Appendix 7.8: Hydrogeological Impact Assessment

	the volumes of groundwater in compartment 1 for bulk water supply to the mine. • Detailed geophysical mapping should be completed between the open pits and the Klein Marico River. Boreholes should be drilled on preferential flow paths and long duration testing should commence (96hours+). Isotope sampling and testing should be conducted to verify the origin of the abstracted water and possible mixing ratios between surface water (Klein Marico River) and groundwater. • Flow gauges should be installed in the Klein Marico River upstream and downstream of the proposed mine site to record surface water flow. • Detailed alien vegetation mapping in the riparian zone of the Klein Marico River should be conducted. The possible positive offset of alien vegetation eradication should be investigated and used as input in the water balance updated in the follow up phases. Possible net saving and influences on the water balance for the mine catchment should be validated and possibly included in the IWUL application. • Detailed aquifer characteristics should be obtained for the areas associated with TSF and overburden dumps to assess the inflow rates and possible migration of salts. Shallow core boreholes and packer tests should be completed to obtain hydraulic values for the upper weathered zone. • A trade-off study should be completed on the dewatering method i.e. in-pit dewatering collection in a sump versus pre-dewatering by means of deep wells placed around the open pits. • Subsequent to the hydrogeological assessment and supporting regional water balance it is proposed that water supply be conducted from groundwater resources. Groundwater resources will be developed in Compartment 1 and 2 with the possibility of compartment 8 should sufficient resources not be available in the first two mentioned • Groundwater exploration to supplement the mine make up water demand should be undertaken in the follow up phase. • Moving the TSF position closer to the open pits and within one compartment (4) or two compartments maximum (1 and 4) would be ideal. The open pits and zone of influence due to mine dewatering will act as a mitigation measure capturing the plume and containing it. • A possible change in position of the overburden dump associated with Resource C would be to shift this dump south i.e. away from the Klein Marico River. • Maximum simulated inflows from the Klein Marico River reached approximately 900 m³/d resulting in less than 4% impact on the simulated surface water runoff in the A31D quaternary catchment. Once the possible link between the Klein Marico River and the groundwater has been established, then the possible inflows should be updated with a detailed assessment on the surface water runoff of the Klein Marico River catchment area as well as the Groot Marico river catchment area. • The applicant understands that groundwater development may have a negative impact with regards to water supply in terms of water quantity and quality due to mining activities and water supply to the mine, and will implement mitigation measures such as monitoring to mitigate and limit any impacts in this regard. Any landowners who may be verified to be affected will be subject to compensation or purchase agreements.		

	• Detailed post operational groundwater flow modelling should be conducted. Details such as partially pit backfilling optimisation should be included. • Simulations of post operational impacts of pit flooding, mass transport and pit lake geochemistry should be conducted. • Current monitoring is ongoing and should be supplemented in the follow up phase with cross compartmental drilling of paired boreholes as well as boreholes between the Klein Marico River and the open pits. • The closure plan should be optimised such that the open pits minimise the potential impact on the Klein Marico River (decreased ZOI) while still capturing and containing any possible migration of salts from the TSF and overburden dumps. • A dynamic integrated environmental water balance and salt balance to determine the impacts of the mine on the groundwater and surface water during the operational and post operational phases should be compiled.. • Detailed sustainability modelling, both analytical and numerical should be conducted once the water supply resources have been identified and developed. • The impact of alien vegetation eradication on the riparian zone along the Klein Marico River should be investigated. Detailed offset volumes should be determined and included in the Integrated Water Use License Application process. • The possibility of sink hole formation due to mine dewatering and reduction in pressure head in the dolomitic aquifer should be addressed. The hydrogeological investigation should form part of a detailed geotechnical investigation addressing this risk.		
Water supply options analysis	• From the water supply options analysis study, the preferred water resource identified is groundwater. • Further groundwater exploration should be conducted with the focus on suitable compartments as indicated from the regional groundwater balance calculations. • It is recommended that a separate water supply investigation be conducted in the vicinity of the proposed groundwater exploration areas earmarked to determine the current status quo of the hydrogeological system and the potential for further development. • The water supply investigation should be based on a phased approach consisting of a pre-feasibility study (PFS): approximately 15 boreholes to be drilled with yields evaluated; feasibility study (DFS): further wellfield development followed by an implementation and monitoring period. The PFS study should also be accompanied by an EIA and water use licence application. • Caution should be taken during groundwater exploration as not to impact on sensitive zones to the south and southwest of the proposed mining operation i.e. Malmani-oog and Molopo-oog catchments. • The applicant understands that groundwater development may have a negative impact with regards to water supply in terms of water quantity and quality due to mining activities and water supply to the mine, and will implement mitigation measures such as monitoring to mitigate and limit any impacts in this regard. Any landowners who may be affected will be subject to compensation or purchase agreements”	X	Refer to this table. A water supply options analysis was conducted as part of the decision-making process for the Hydrogeological Impact Assessment.

Geochemical Numerical Model & Waste Classification	• Although the tailings and overburden material classifies as Type 3, i.e. low risk waste, and thus according to NEMWAA Regulation 635 and 636 requires a Type C barrier system, this mitigation measure has been shown in other studies to not be a sustainable option. The recommendation is thus made that the barrier system should only be considered if more sustainable mitigation options cannot be identified and implemented. • Although the overburden material classifies as Type 3, i.e. low risk waste, the recommendation is made to downgrade the material to Type 4, i.e. inert, due to insignificant geochemical risks posed to the local environment, including sensitive receptors. • A monthly monitoring protocol should be implemented and fluoride and sulphate included in the parameters analysed. Any contamination concerns should be flagged and addressed.	X	Refer to this table and Appendix 7.10: Geochemical Risk Assessment
Floodline Determination and Stormwater Management Plan	The proposed diversions as per the Floodline Determination and Stormwater Management Plan should be implemented as well as the recommended clean water and dirty water dams.	X	Refer to this table and Appendix 7.11: Floodline Study & SWMP
Noise Impact Assessment	• Communication channels between the identified receptors and the mine needs to be implemented during all phases, highlighting the outcome of this study. • Berms/barriers are required at certain sections of open cast footprint sections (refer to document highlighting specifications). • A bi-annual measurement programme is recommended before/during all phases up to the end of the operational phase.	X	Refer to this table and Appendix 7.13: Noise Impact Assessment
Air Quality Impact Assessment (AQIA)	• It is recommended that a dust fallout monitoring network be implemented at the proposed project site as recommended in section 6 of the AQIA in order to monitor the impacts from the proposed project activities. • PM 10 monitoring is also recommended. • Due to the close proximity of sensitive receptors to the proposed project activities, it is recommended that mitigation measures on the main sources of fugitive dust (as recommended in Table 6-2 of the AQIA) be implemented to minimise impacts as far as possible.	X	Refer to this table as well as Appendix 7.12: Air Quality Impact Assessment
Visual Impact Assessment (VIA)	• The construction of a visual berm (vegetated) along the northern boundary of the open pit Resource Area C could assist in screening views from sensitive viewers located within the northern arch towards Resource Area C. • It is recommended that a combination of a vegetation screen and berm be constructed along the eastern and southern boundary of the TSF area in order to screen views from viewers driving along the road. • The plant should be constructed on the lowest point (contour) possible and as little vegetation as possible should be removed around the plant area. Further mitigation measures are discussed in section 12 of the VIA.	X	Refer to this table and Appendix 7.15: Visual Impact Assessment
Blasting & Vibration Impact Assessment	• A monitoring programme for recording blasting operations is recommended. Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. Monitoring could be done using permanent installed stations. Audit functions may also be conducted to assist the mine in maintaining a high level of	X	Refer to this table and Appendix 7.16: Blasting and Vibration Study.

	performance with regards to blast results and the effects related to blasting operations. • Regulatory requirements indicate specific requirements for all non-mining structures and installations within 500 m from the mining operation. The Heritage Site and Ruins at Resource Area A and the Heritage Sites, Boreholes and Farm Buildings/Structures at Resource Area C & D are observed within the 500 m. The mine will have to apply for the necessary authorisations as prescribed in the various Acts. • Blast designs can be reviewed prior to first blast planned and done. Specific attention can be given to the possible use of electronic initiation rather than conventional timing systems. This will allow for single blast hole firing instead of multiple blast holes. Single blast hole firing will provide single hole firing – thus less charge mass per delay and less influence. • It is always good to conduct a first test blast to confirm levels and ground vibration and air blast. It is recommended that such a blast be done and detail monitoring done and used to help define blasting operations going forward. This test blast can be based on the existing design and only after this blast it may be necessary to define if changes are required or not. • The current proposed stemming lengths at least must be maintained to ensure control on fly rock. Specific designs where distances and blast is known should be considered with this. • Calculated minimum safe distance is 376 m. The final blast designs that may be used will determine the final decision on safe distance to evacuate people and animals. This distance may be greater pending the final code of practice of the mine and responsible blaster's decision on safe distance. • The option of photographic survey of all structures up to 1500 m from the pit areas is recommended. The mine will be operating for a significant number of years. This will give advantage on any negotiations with regards to complaints from neighbours on structural issues due to blasting. This process can however only succeed if done in conjunction with a proper monitoring program. It is expected that ground vibration levels will be significantly less than proposed limits at 1500 m but this process will ensure record of the pre-blasting status of the nearest structures to the pit areas. • The ground vibration and air blast levels limits recommended for blasting operations in this area are provided in Section 20.9 of the Blasting and Vibration Report. • A further consideration of blasting times is when weather conditions could influence the effects yielded by blasting operations. It is recommended not to blast too early in the morning when it is still cool or when there is a possibility of atmospheric inversion or too late in the afternoon in winter. Do not blast in fog. Do not blast in the dark. Refrain from blasting when wind is blowing strongly in the direction of an outside receptor. Do not blast with low overcast clouds. These 'do nots' stem from the influence that weather has on air blast. The energy of air blast cannot be increased but it is distributed differently and therefore is difficult to mitigate. • It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community of blasting dates and times.		
Socio-Economic Impact Assessment	• Create a community liaison forum (inclusive of an environmental forum).	X	Refer to Table 23 and Appendix 7.1: Socio-

	• Involve the community in the process as far as possible through the relevant forums – encourage co-operative decision-making and management and partnerships with local entrepreneurs; • Refer to Table 23.		Economic Impact Assessment
Traffic Impact Assessment	• Refer to Table 23.	X	Refer to Table 23 and Appendix 7.14: Traffic Impact Assessment
Closure Provision and Rehabilitation Plan	• Develop a funding model for the environmental liability with the assistance of a mine rehabilitation specialist and a qualified financial planner; • Progressive rehabilitation to be addressed through the implementation of an Annual Rehabilitation Plan and areas which can be rehabilitated should be started with as soon as practically possible. It is important to ensure that funds for progressive rehabilitation are made available as part of the annual operational budgets; although now part of this estimate; and • A fully detailed rehabilitation, decommissioning and mine closure plan must be developed and incorporated into the mine's Environmental Management Program (EMPr) closer to the appropriate time of operational closure.	X	Refer to this table and Appendix 7.17: Rehabilitation, Decommissioning and Mine Closure Plan

Attach copies of Specialist Reports as appendices

Refer to Appendix 7: Specialist Reports

24. ENVIRONMENTAL IMPACT STATEMENT

24.1. SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The findings of the specialist studies undertaken within this EIA&EMPR provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed project. The findings conclude that provided that the recommended mitigation and management measures are implemented there are no environmental fatal flaws that should prevent the proposed project from proceeding.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA&EMPR will form part of the contract with the contractors appointed to construct and maintain the proposed mine and associated infrastructure. The EIA&EMPR would be used to ensure compliance with environmental specifications and management measures. The implementation of this EIA&EMPR for key cycle phases (i.e. construction, operation and closure/decommissioning) of the proposed project is considered to be fundamental in achieving the appropriate environmental management standards as detailed for this project.

24.2. FINAL SITE MAP

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers

Refer to Appendix 4: Site Plan

24.3. SUMMARY OF THE POSITIVE AND NEGATIVE IMPLICATIONS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES

Refer to section 17.

25. PROPOSED IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR;

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.

1. Specialist recommendations which could be included as conditions have been discussed in Table 22.
2. Specialist management measures as well as the significance of the impacts prior and post mitigation are provided in Table 19 and contained in the respective studies.

26. FINAL PROPOSED ALTERNATIVES

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

Refer to section 8.

27. ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION

Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation

- Provision of surface lease agreements or purchase agreements with relevant landowners prior to commencement of construction phase/post-authorisation.
- Water supply and/or compensation agreements to be entered into with relevant landowners prior to construction/post-authorisation.
- Refer to Table 22 for conditions which could possibly be included in the Environmental Authorisation.

28. DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

(Which relate to the assessment and mitigation measures proposed)

Assumptions and limitations applicable to specific **to** the assessment process and mitigation measures proposed in specific specialist studies include the following:

- **General**
  - It is anticipated that the project will go through further feasibility assessments post-authorisation and pre-construction. Potentially amendments to the respective authorisation may be required and will be conducted in line with the relevant legislation as may be required at that point in time. The preferred alternatives will be further subjected to a definitive feasibility - and associated engineering study prior to construction.
  - It is assumed that overburden material will be used for construction of any storm water dams, dirty water dams as well as the TSF on site. This use of overburden will be acceptable from a geochemical point of view as per the findings in Appendix 7.10: Geochemical Risk Assessment.
- **Land Use & Soil Potential**
  - In order to obtain a comprehensive understanding of the dynamics of the soils of the study area, surveys should ideally be replicated over several seasons and over a number of years. However, due to project time constraints such long-term studies are not feasible;

- The large study area did not allow for the finer level of assessment that can be obtained in smaller study areas. Therefore, data collection in this study relied heavily on data from representative, homogenous sections of soils, as well as general observations, aerial photograph analysis, generic data and a desktop analysis.

- **Ecological**

- In order to obtain a comprehensive understanding of the dynamics of the flora and fauna of the study area, surveys should ideally be replicated over several seasons and over a number of years. However, due to project time constraints such long-term studies are not feasible and this floral study was conducted over two seasons;
- The large study area did not allow for the finer level of assessment that can be obtained in smaller study areas. Therefore, data collection in this study relied heavily on data from representative, homogenous sections of vegetation units, as well as general observations, aerial photograph analysis, generic data and a desktop analysis;
- Visibility proved to be a constraint in encroached areas where plant species might have been missed beneath the densely overgrown and obstructed by surface vegetation;
- Thus, even though it might be assumed that survey findings are representative of the ecosystem of the project area, it should be stated that the possibility exists that individual plants species might have been missed due to the nature of the terrain (dense vegetation). Therefore, maintaining due cognisance of the integrity and accuracy of the ecological survey, it should be stated that the ecological resources identified during the study do not necessarily represent all the ecological resources present on the property.

- **Archaeological**

- The project site for the Doornhoek Fluorspar Mine Project is accessed from the P172-2 regional road as well as a number of smaller dirt roads. Access control is applied to the properties subject to this study but no restrictions were encountered during the site visit.
- The surrounding vegetation in the study area is mostly comprised out of mixed grasslands and scattered trees as well as pioneering species in disturbed areas. As such, the general visibility at the time of the AIA survey (June 2016) was moderate due to surface vegetation and obstruction. In single cases during the survey sub-surface inspection was possible. Where applied, this revealed no archaeological deposits.
- **Survey Time and Extent:** Survey time proved to be a constraint due to the relatively large surface extent of the footprint area. Therefore, pedestrian site surveys focused around areas tentatively identified as sensitive (i.e. along drainage lines and those noted during the aerial survey) during aerial surveys.
- **Visibility:** Visibility proved to be somewhat of a constraint in areas with denser surface cover, as well as portions where vegetation is more pristine.

- Thus, even though it might be assumed that survey findings are representative of the heritage landscape of the project area for the Doornhoek Fluorspar Mine Project, it should be stated that the possibility exists that individual sites could be missed due to the localised nature of some heritage remains as well as the possible presence of sub-surface archaeology. Therefore, maintaining due cognisance of the integrity and accuracy of the archaeological survey, it should be stated that the heritage resources identified during the study do not necessarily represent all the heritage resources present in the project area. The subterranean nature of some archaeological sites, dense vegetation cover and visibility constraints sometimes distort heritage representations and any additional heritage resources located during consequent development phases must be reported to the Heritage Resources Authority or an archaeological specialist.

- **Wetland**

- The large study area did not allow for the finer level of assessment that can be obtained in smaller study areas. Therefore, data collection in this study relied heavily on data from representative sections, as well as general observations and a desktop analysis.

- **Aquatic**

- **Reference conditions are unknown:** The composition of aquatic biota in aquatic resources associated with the mining right area, prior to major disturbance, is limited and based only on a risk assessment performed in the late low flow season of 2014 and the current baseline assessment performed in the low flow winter season 2016, following severe nation-wide drought conditions in the months preceding the assessment. For this reason, reference conditions are largely hypothetical, as based on professional judgment and/or inferred from limited data available. Based on the reference data available and based on the observations on site, the information available is, however, deemed adequate to provide a reasonable level of understanding of the systems for the study. However, an assessment of the system under summer/high flow conditions is deemed best-practice to inform the environmental assessment and authorization process for the project;
- Temporal variability: The data presented in this report are based on two assessments. One performed in October 2014 and a second assessment performed in May 2016, both of which were performed under very low flow conditions. Only limited analyses of temporal trends are therefore currently possible. As a result, the effects of natural seasonal and long term variation in the ecological conditions and aquatic biota found in the streams are largely unknown. Based on the reference data available and based on the observations on site, the information available is, however, deemed adequate to provide a reasonable level of understanding of the systems for the study. However, an assessment of the system under

high flow conditions is deemed essential to inform the environmental assessment and authorization process for the project;

- Ecological assessment timing: Aquatic and terrestrial ecosystems are dynamic and complex. It is likely that aspects, some of which may be important, could have been overlooked. A more reliable assessment of the biota would require routine seasonal sampling, with sampling being undertaken on a quarterly basis to cover seasonal variability. Based on the reference data available and based on the observations on site the information available is, however, deemed adequate to provide an understanding of the systems for the study. However, an assessment of the system under summer/high flow conditions is deemed best practice to inform the environmental assessment and authorization process for the project;
- Accessibility: The area is relatively remote within the study area and as such access to sampling sites was limited to a small degree. Due to the limitations some aspects of the aquatic ecology of the area, some which may be important may have been overlooked. Based on the reference data available and based on the observations on site the information available is, however, deemed adequate to provide the required level of understanding of the systems for the study.

- **Hydrogeological**

As described above, this model is viewed as high level and has been qualified rather than calibrated. Identified data limitations include:

- Falling head tests as well as aquifer tests were conducted to determine hydraulic conductivity.
- The spatial extent of the aquifer tests were enlarged as to obtain more aquifer parameters to use in the model setup and recalibration. Hydraulic conductivity values are available for the dolomite and dolerite dykes. No hydraulic conductivity values are available for the shale and conglomerate units north of the focus area. As such the hydraulic conductivities of the latter units has been assumed from literature and qualified through development of the model.
- The concept of representative elementary volumes have been applied i.e. a scale has been assumed so that heterogeneity within a system becomes negligible and thus can then be treated as a homogeneous body i.e. the mapped dolomite are treated as a uniform unit.
- Recharge to the aquifer units is unknown and has been assumed from data collected in similar hydrogeological settings.
- Groundwater abstraction rates are based on the WARMS database. Additional abstraction rates were assigned based on the aquifer tests concluded (Table 3-2 of Appendix 7.8: Hydrogeological Impact Assessment).
- The aquifer is assumed to be compartmentalized by semi-impermeable dyke structures.

- As the proposed mining depth is expected to terminate at 90 mbgl, the aquifer thickness is assumed at 150 m. This assumption was made as there is no hydrogeological significant unit delineating the aquifer bottom.
- The rivers in the area have been treated as gaining type streams. As such groundwater is lost from the system via base flow to streams. The aquifer is not however being replenished by losing stream conditions. As the area is characterised by non-perennial rivers this assumption is viewed to be valid.
- Groundwater divides have been assumed to align with surface water divides. It is assumed that groundwater cannot flow across these type of boundaries.
- It is assumed that recharge does not vary seasonally with changes in rainfall.

- **Water Balance**

- The water balance is conceptual and is subject to further feasibility studies and supporting engineering designs.

- **Geochemical Risk Assessment**

- The geochemical models were developed for the Doornhoek geological mine waste systems and should therefore not be applied to other fluorspar ore deposits and associated geological mine waste. Each ore deposit is unique from a geological and therefore also from an environmental geochemical perspective.
- The models were developed for the current ore processing methods. If this should change, the geochemical models will need to be updated to take these changes into consideration.

- **Noise**

Limitations due to environmental acoustical measurements include the following:

- Ambient sound levels are the cumulative effects of innumerable sounds generated at various instances both far and near. A high measurement may not necessarily mean that the area is always noisy. Similarly, a low sound level measurement will not necessarily mean that the area is always quiet, as sound levels will vary over seasons, time of day, and are dependent on faunal characteristics (mating season, dawn chorus[5] early hours of the morning, temperature etc.), vegetation in the area and meteorological conditions (especially wind). This excludes the potential effect of sounds from anthropogenic origin;
- As mentioned above seasonal changes in the surrounding environment can change the measured baseline. Many faunal species are more active during warmer periods than colder periods. Cicadas are usually only active during warmer periods. Certain cicada species can generate noise levels up to 120 dB for mating or distress purposes, sometimes singing in synchronisation, thus magnifying noise levels they produce from

[5] Environ. We Int. Sci. Tech. *Ambient noise levels due to dawn chorus at different habitats in Delhi*. 2001. Pg. 134.

their tymbals6;

- Defining ambient sound levels using the result of one 10-minute measurement may be very inaccurate (very low confidence level in the results) relating to the reasons mentioned above;
- Determination of noise sources of environmental significance are an important factor to consider when compiling an environmental acoustical report;
- Measurements over wind speeds of 3 -5 m/s could provide data influenced by wind-induced noises;
- Ambient sound levels recorded near rivers, streams, wetlands, trees and bushy areas can be high due to faunal activity, which can dominate the sound levels around the measurement point (specifically during summertime, rainfall event or during the dawn chorus of bird songs). This generally is still considered naturally quiet and accepted as features of the natural baseline, and in various cases sought after and pleasing;
- Considering one or more sound descriptors or equivalent can improve an acoustical assessment. Parameters such as LAMin, LAeq, LAMax, LA10, LA90 and spectral analysis forms part of the many variables that can be considered. However, South African legislation requires consideration of the LAIeq setting, and must at all times be considered;
- It is technically difficult and time-consuming to improve the measurement of spectral distribution of large equipment in an industrial setting. This is due to the many correction factors that need to be considered (e.g. other noise sources active in the area, adequacy of average time setting, surrounding field non-uniformity etc. 7 as per SANS 9614-3:2005);
- Exact location of a sound level meter in an area in relation to structures, infrastructure, vegetation, wetlands and external noise sources will influence measurements. It may determine whether you are measuring anthropogenic sounds from a receptors dwelling, or measuring environmental ambient baseline contributors of significance (faunal, roads traffic, railway traffic movement etc.); and
- As a residential area develops, the presence of people will result in increased dwelling-related sounds. These are generally a combination of traffic noises, voices, animals and equipment (including TVs and radios). The result is that ambient sound levels will increase as an area matures.

Calculating noise emissions – Adequacy of predictive methods

Limitations due to the calculations of the noise emissions into the environment include the following:

[6] Clyne, D. *"Cicadas: Sound of the Australian Summer, Australian Geographic"* Oct/Dec Vol 56. 1999.

[7] SANS 9614-3:2005. "Determination of sound power levels of noise sources using sound intensity – Part 3: Precision method for measurement by scanning".

- Many sound propagation models do not consider sound characteristics as calculations are based on an equivalent level (with the appropriate correction implemented e.g. tone or impulse). These other characteristics include intrusive sounds or amplitude modulation;
- Many sound propagation models do not accurately (or at all) calculate the increase of the ambient baseline due to wind shear (masking noise);
- Most sound propagation models do not consider refraction through the various temperature layers (specifically relevant during the night-times);
- Most sound propagation models do not consider the low frequency range (third octave 16 Hz – 31.5 Hz). This would be relevant to facilities with a potentially low frequency issues;
- Many environmental models consider sound to propagate in hemi-spherical way. Certain noise sources (e.g. a speakers, exhausts, fans) emit sound power levels in a directional manner;
- The octave sound power levels selected for processes and equipment accurately represents the sound character and power levels of processes/equipment. The determination of these levels in itself is subject to errors, limitations and assumptions with any potential errors carried over to any model making use of these results;
- Sound power emission levels from processes and equipment may change depending on the load the process and equipment are subject to. While the octave sound power level is the average (equivalent) result of a number of measurements, this measurement relates to a period that the process or equipment was subject to a certain load. Normally these measurements are collected when the process or equipment is under high load. The result is that measurements generally represent a worst-case scenario;
- As it is unknown which exact processes and equipment will be operational, modelling considers a scenario where all processes and equipment are under full load 100% of the time. The result is that projected noise levels would likely over-estimate or over-engineer sound levels;
- The impact of atmospheric absorption is simplified and very uniform meteorological conditions are considered. This is an over-simplification and the effect of this in terms of sound propagation modelling is difficult to quantify;
- Many environmental models are not highly suited for close proximity calculations; and
- Acoustical characteristics of the ground are over-simplified, with ground conditions accepted as uniform. Ground conditions will not be considered in this assessment.
- Due to these assumptions, modelling generally could be out with as much as +10 dBA, although realistic values ranging from 3 dBA to less than 5 dBA are more common in practice.

Adequacy of Underlying Assumptions

- Noise experienced at a certain location is the cumulative result of innumerable sounds

emitted and generated both far and close, each in a different time domain, each having a different spectral character at a different sound level. Each of these sounds is also affected differently by surrounding vegetation, structures and meteorological conditions that result in a total cumulative noise level represented by a few numbers on a sound level meter. As previously mentioned, it is not the purpose of noise modelling to accurately determine a likely noise level at a certain receptor, but to calculate a noise rating level that is used to identify potential issues of concern.

- **Air Quality**
  - Use was made of modelled MM5 meteorological data for the project area;
  - The quantification of sources of emission was restricted to the proposed project activities only;
  - The construction and closure phases were assessed qualitatively due to the temporary nature of these operations, whilst the operational phase was assessed quantitatively;
  - As no on-site ambient PM2.5 (inhalable particulate matter with aerodynamic diameter of <2.5 µm) and PM10 (inhalable particulate matter with aerodynamic diameter of <10 µm) baseline measurements were available for the assessment; cumulative impacts were assessed qualitatively.

- **Visual**
  - The study uses the worst case scenario in predicting impacts (day time and night time);
  - The viewshed analyses considered only the topography of the area and did not factor in any features such as existing trees and other obstacles. This means that the spatial patterns generated in the analyses are inclined towards the worst case-scenario rather than the actual situation;
  - The extent of the study area is determined by the zone of potential influence, which in this study relates to a radius about the project site of 10km. At 10km and beyond the Project would recede into background views;
  - The computer model for the 3D depiction of the project components is based on CAD information provided to NLA by the project engineers / environmental practitioner.

- **Blasting and Vibration**
  - Blast design forms the baseline for determining the possible influences from blasting operations. Planned blast designs were provided for use in the evaluation in this report. It is not certain if the design will be the final design, it may be reviewed prior to the start of drilling and blasting. The planned project is an opencast operation with exposure of the orebody from surface. Opencast operations have possibility of influence specific in relation to aspects such as ground vibration, air blast and fly rock.

- **Socio-economic**
  - Project-related information supplied by the environmental practitioner and the client for the purpose of the analysis is assumed to be reasonably accurate;
  - The secondary data sources used to compile the socio-economic baseline (demographics, dynamics of the economy) although not exhaustive can be viewed as being indicative of broad trends within the study area. Where possible the secondary data was updated with the primary information gathered during interviews;
  - The range of I&APs consulted during the study is considered to be comprehensive from the perspective of the project in question. Therefore, the data collected from various parties is believed to be adequate to confidently predict the potential socio-economic impacts of the proposed project and objectively evaluate their significance. This is under assumption that the information shared by I&APs during engagements with them was truthful and reflected the position of the families or organisations they represented. Furthermore, it is assumed that the attitudes of the respondents towards the project will remain reasonably stable over the short- to medium-term;
  - Possible impacts as well as stakeholder responses to the identified impacts cannot be predicted with complete accuracy, even when circumstances are similar and these predictions are based on research and years of experience, taking the specific set of circumstance into account.

- **Traffic**
  - For the purposes of this study assumptions had to be made for trip generation purposes. Please refer to Appendix 7.14: Traffic Impact Assessment.

- **Closure and Rehabilitation**
  - Physical mining will only begin in / after year 5 after mining license has been granted;
  - • The closure period will commence once the last ton of ore has been extracted;
  - • No third party use of infrastructure will be available at closure (unless otherwise negotiated) and all infrastructure will thus require decommissioning;
  - • Rehabilitation of topsoil and overburden dumps will be undertaken concurrently with mining activities;
  - • All process water will be recycled;
  - • As each successive lift is completed on the different dumps, rehabilitation of the dump faces will be undertaken. This includes appropriate cover material and the establishment of area specific vegetation to minimize dust and contact water generation;
  - • It is assumed that all dumped material not properly rehabilitated during operation will be reshaped to a 1:3 slope to be sustainable in the long term;
  - • It was further assumed that berms and/or storm water retention dams will be required for

storm water management during operations as well as to minimize the risk associated with inadvertent access to the pit.

- o • No engineering and/or specific closure designs were done as part of the closure liability determination process; and
- o • The financial provision required was calculated according to the criteria as set out in the official Mine Closure Quantum Guideline document (DME, 2005). As per the Mine Closure Quantum Guideline, specific weighing factors have been taken into account in these calculations.

29. REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

29.1. REASONS WHY THE ACTIVITY SHOULD BE AUTHORIZED OR NOT

Please refer to section 24.1. The findings of the specialist studies undertaken within this EIA&EMPR provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed project. The findings conclude that provided that the recommended mitigation and management measures are implemented there are no environmental fatal flaws that post the provided mitigation, should prevent the proposed project from proceeding.

30. CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORISATION

30.1. SPECIFIC CONDITIONS TO BE INCLUDED INTO THE COMPILATION AND APPROVAL OF EMPR

Please refer to section 27.

30.2. REHABILITATION REQUIREMENTS

For the mining operations, the following closure objectives and goals are proposed:

- To rehabilitate all disturbed land to a state that is suitable for its post closure use;
- To ensure that affected areas are safe and secure for both human and animal activities;
- The physical and chemical stability of the remaining excavations, dumps and any other structures should be such that risk to the environment through naturally occurring forces is eliminated;
- To rehabilitate all disturbed land to a state where limited or preferably no post closure management is required;
- To rehabilitate all disturbed land to a state that facilitates compliance with current environmental quality objectives (air and water quality included); and
- To limit the impact on personnel whose positions may become redundant on decommissioning of the operations.

Refer to section 6 of Appendix 7.17: Rehabilitation, Decommissioning and Mine Closure Plan.

31. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED.

The life of mine (LoM) will be 30 years and it is therefore requested that the authorization be issued for the same period.

32. UNDERTAKING

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic assessment report and the Environmental Management Programme report.

Please refer to section 38 of Part B.

33. FINANCIAL PROVISION

State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation.

33.1. EXPLAIN HOW THE AFORESAID AMOUNT WAS DERIVED.

The financial provision was calculated according to the criteria as set out in section 9 of the Final Rehabilitation, Decommissioning and Mine Closure Plan using the DMR's Mine Closure Quantum Guideline document. Refer to section 10 of Appendix 7.17: Rehabilitation, Decommissioning and Mine Closure Plan.

33.2. CONFIRM THAT THIS AMOUNT CAN BE PROVIDED FOR FROM OPERATING EXPENDITURE (CONFIRM THAT THE AMOUNT, IS ANTICIPATED TO BE AN OPERATING COST AND IS PROVIDED FOR AS SUCH IN THE MINING WORK PROGRAMME, FINANCIAL AND TECHNICAL COMPETENCE REPORT OR PROSPECTING WORK PROGRAMME AS THE CASE MAY BE).

Please refer to the updated Mine Works Programme (to be submitted with the Final EIA&EMPR to the DMR).

34. DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY

34.1. DEVIATIONS FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation).

Not applicable.

34.2. MOTIVATION FOR THE DEVIATION

Not applicable.

35. OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

35.1. 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:-

35.1.1. 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 7.1 and confirm that the applicable mitigation is reflected in 37.7. herein)

The following socio-economic impacts were assessed and the results thereof are provided in the Socio-Economic Impact Assessment Report (Appendix 7.1: Socio-Economic Impact Assessment). Please note that the attached specialist study assessed a larger area with regards to socio-economic impacts, however the mine project boundary pertains only to the farms as specified in section 2:

- Stimulation of the Local and National Economy
- Creation of Employment in Local and National Economies
- Increase in Household Income and Improved Standard of living
- Skills Development due to the creation of new Employment Opportunities
- Government Revenue Increase due to Capital Expenditure
- Change in Sense of Place
- Loss of Agricultural Production due to Agricultural Land Sterilization and Other Environmental Impacts
- Increase in Social Pathologies
- Added Pressure on Basic Services and Social and Economic infrastructure
- Export Earnings
- Improved Quality of Life and Service Delivery

The assessment of the current socio-economic situation in the local municipalities, the profile of the zone of influence, and the project itself revealed that the proposed mining activity will create numerous positive impacts and will likely stimulate the local economy. It will create at least 222 sustainable employment opportunities that will be filled largely by people coming from the local communities and will increase government revenue base. Income derived during both construction and operation will also assist households in improving their standards of living. However, due to the nature of the area where the proposed mine is to be established, some negative socio-economic impacts can also be created as a result of the mine's development.

- The mine could have a negative effect on the local supply of water, which is currently a major service delivery challenge for the local government.
- It would also impact on the sense of place and transform the rural agricultural areas into an industrial area.
- The people who work and reside on the farms where some of the project infrastructure will be located, as well as people residing and working on the adjacent farms are likely to be the recipients of this change in the sense of place.
- Linked to the change in the sense of place is the possibility of negative effect on the local tourism activities represented by game hunting operations. Moreover, some of the farm

portions where the majority of the mine's footprint will be located are currently used for game hunting activities and are unlikely to be able to proceed if the mine is built.

Some of the above-mentioned negative effects could be mitigated or reduced. The relevant mitigation measures are provided in Table 23 of this report.

35.1.2. 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 7.2 and confirm that the applicable mitigation is reflected in 37.7 herein)

The following heritage impacts were assessed and the results thereof are provided in the Archaeological Impact Assessment (Appendix 7.2: 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 farms as specified in section 2. 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 larger landscape of the Northwest Province is rich in pre-historical and historical remnants and this rings true for the Zeerust area and surrounds. The following recommendations are made based on general observations in the proposed Doornhoek Fluorspar Mine Project area:

- A Palaeontological Impact Assessment is recommended where bedrock is to be impacted and, should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist. Please refer to Appendix 7.3: Palaeontological Impact Assessment.
- A number of recent period features (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 the 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 a regular basis in order to monitor possible impacts 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 the 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 the 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 which 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 the development.

In addition to these site-specific recommendations, careful cognizance should be taken of the following:

- As Palaeontological remains occur where bedrock has been exposed, all geological features should be regarded as sensitive.

- Water sources such as drainage lines, fountains and pans would often have attracted human activity in the past. As Stone Age material the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits.

A relevant mitigation measures are provided in Table 23 of this report.

36. 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 an appendix).

Please refer to the Alternatives Assessment in section 8.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

37. FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

37.1. DETAILS OF THE EAP (confirm that the requirement for the provision of the details and expertise of the EAP are already included in part a, section 1(a) herein as required)

Refer to section 1.1 and 1.2.

37.2. DESCRIPTION OF THE ASPECTS OF THE ACTIVITY (confirm that the requirement to describe the aspects of the activity that are covered by the Final environmental management programme is already included in part a, section (1)(h) herein as required)

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

- Socio-economic aspects (job creation, social investment, health, safety and security, skills training, change of land use)
- Heritage aspect
- Ecological aspect (Fauna and Flora)
- Impact on soils, land use, land capability and agricultural potential
- Wetland and aquatic aspect
- Groundwater aspect
- Surface water aspect
- Stormwater aspect
- Flooding
- Air quality aspect (dust end emissions)
- Noise aspect
- Visual aspect
- Blasting and vibration

Also refer to section 14 and Table 19 in Part A.

37.3. COMPOSITE MAP

(Provide a map **(Attached as an Appendix**) at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers)

Refer to Appendix 4: Site Plan

37.4. DESCRIPTION OF IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

37.4.1. DETERMINATION OF CLOSURE OBJECTIVES (ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

- To rehabilitate all disturbed land to a state that is suitable for its post closure use;
- To ensure that affected areas are safe and secure for both human and animal activities;
- The physical and chemical stability of the remaining excavations, dumps and any other structures should be such that risk to the environment through naturally occurring forces is eliminated;
- To rehabilitate all disturbed land to a state where limited or preferably no post closure management is required;
- To rehabilitate all disturbed land to a state that facilitates compliance with current environmental quality objectives (air and water quality included); and
- To limit the impact on personnel whose positions may become redundant on decommissioning of the operations.

37.4.2. THE PROCESS FOR MANAGING ANY ENVIRONMENTAL DAMAGE, POLLUTION, PUMPING AND TREATMENT OF EXTRANEOUS WATER OR ECOLOGICAL DEGRADATION AS A RESULT OF UNDERTAKING A LISTED ACTIVITY

Refer to Table 23 for the proposed mitigation measures.

37.4.3. POTENTIAL RISK OF ACID MINE DRAINAGE (indicate whether or not the mining can result in acid mine drainage)

A geochemical assessment of mine waste leachate potential, which was aimed at identifying potential geochemical risks associated with the tailings and overburden, was conducted for the Doornhoek Fluorite project by Exigo in 2014. The study included an assessment of acid mine drainage (AMD) by using static acid base accounting (ABA) and net acid generation (NAG) tests. It found that the mine waste posed no risk for the development of AMD conditions, due to the deposit ore and host geology being dominated by carbonate rocks, which have the capacity to neutralise acidity and due to the low sulphide content of the ore and host lithologies.

The risk therefor for the development of acid mine drainage conditions for all geological mine waste, i.e. tailings and overburden, is insignificant. The laboratory data has shown that the tailings and overburden contains > 50 times as much acid neutralising capacity as acid producing capacity.

Although the tailings and overburden material classifies as Type 3, i.e. low risk, waste and thus according to NEMWAA Regulation 635 and 636 a Type C barrier system, this mitigation measure has been shown in other studies to not be a sustainable option. The recommendation is thus made that the barrier system should only be considered if more sustainable mitigation options cannot be identified and implemented. Some options are the capturing of the plume by the open pit (this option was evaluated in the hydrogeological specialist study) or bioremediation through specific tree species or capping of the tailings post-closure to ensure minimal influx of oxygen to specifically the oxidation zone of the tailings.

The recommendation is thus made to downgrade the material to Type 4, i.e. inert, due to insignificant geochemical risks posed to the local environment, including sensitive receptors. A monthly monitoring protocol should be implemented and fluoride and sulphate included in the parameters analysed. Any contamination concerns should be flagged and addressed. Nitrate should be included in the monthly monitoring protocol if ammonium nitrate based explosives are to be used in the mining process. An annual comprehensive analysis should be included in the monitoring protocol and any contamination concerns flagged and addressed. If the ore processing methodologies should change, the geochemical models will need to be updated to take these changes into consideration.

37.4.4. STEPS TAKEN TO INVESTIGATE, ASSESS, AND EVALUATE THE IMPACT OF ACID MINE DRAINAGE.

The impact of acid mine drainage was assessed taking into account the probability, duration, scale and magnitude or severity of the impact in order to determine the significance of the impact, as follows:

No	Impact	Without or With Mitigation	Nature (Negative or Positive Impact)	Probability		Duration		Scale		Magnitude / Severity		Significance	
				Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Score	Magnitude
Operational Phase													
1	Development of acid mine drainage conditions	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
Post-Closure Phase													
2	Development of acid mine drainage	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

	conditions											

The impact for acid mine drainage from mine residue facilities was rated negligible.

37.4.5. ENGINEERING OR MINE DESIGN SOLUTIONS TO BE IMPLEMENTED TO AVOID OR REMEDY ACID MINE DRAINAGE

The geochemical assessment in Appendix 7.10: Geochemical Risk Assessment recommended that the following mitigation measures should be implemented:

- Although the tailings and overburden material classifies as Type 3, i.e. low risk, waste and thus according to NEMWAA Regulation 635 and 636 a Type C barrier system is required, this mitigation measure has been shown in other studies to not be a sustainable option. The recommendation is thus made that the barrier system should only be considered if more sustainable mitigation options cannot be identified and implemented. Some options are the capturing of the plume by the open pit (this option was evaluated in the hydrogeological specialist study) or bioremediation through specific tree species or capping of the tailings post-closure to ensure minimal influx of oxygen to specifically the oxidation zone of the tailings.
- Although the overburden material classifies as Type 3, i.e. low risk waste, the recommendation is made to downgrade the material to Type 4, i.e. inert, due to insignificant geochemical risks posed to the local environment, including sensitive receptors.
- A monthly monitoring protocol should be implemented and fluoride and sulphate included in the parameters analysed. Any contamination concerns should be flagged and addressed.
- Nitrate should be included in the monthly monitoring protocol if ammonium nitrate based explosives are to be used in the mining process.
- An annual comprehensive analysis should be included in the monitoring protocol and any contamination concerns flagged and addressed.
- If the ore processing methodologies should change, the geochemical models will need to be updated to take these changes into consideration.

The above mitigation measures are included in Table 23.

37.4.6. MEASURES THAT WILL BE PUT IN PLACE TO REMEDY ANY RESIDUAL OR CUMULATIVE IMPACT THAT MAY RESULT FROM ACID MINE DRAINAGE

The geochemical assessment in Appendix 7.10: recommended that the following mitigation measures should be implemented:

- A monthly monitoring protocol should be implemented and fluoride and sulphate included in the parameters analysed. Any contamination concerns should be flagged and addressed.
- Nitrate should be included in the monthly monitoring protocol if ammonium nitrate based explosives are to be used in the mining process.
- An annual comprehensive analysis should be included in the monitoring protocol and any contamination concerns flagged and addressed.
- If the ore processing methodologies should change, the geochemical models will need to be updated to take these changes into consideration.

The above mitigation measures are included in Table 23. Also refer to the monitoring protocol in section 37.11 and Table 26 for monitoring recommended in the Hydrogeological Impact Assessment (Appendix 7.8: Hydrogeological Impact Assessment).

37.5. VOLUMES AND RATE OF WATER USE REQUIRED FOR THE MINING, TRENCHING OR BULK SAMPLING OPERATION

A 1:50 year draught and 1:50 flood were also simulated. Make-up water requirements vary between 5901 m3/month (draught) and 871 m3/month (excessive wet year). Provision needs to be made in the storm water management plan to accommodate extra volumes of storm water during flood scenario's. Since the Water Balance is at pre-feasibility level, a safety factor of 20% needs to be applied to accommodate draught periods where storm water an fissure water may not be adequate to supplement the demand. This equates to a monthly make-up volume of 5066 m3/month that would need to be secured from external sources.

From the water supply options analysis study, the preferred water resource identified is groundwater.

It is proposed that the construction water supply component of approximately 5 ℓ/s be sourced from the following boreholes:

Basic Information			Sustainable yield (ℓ/s)					
Label	Longitude	Latitude	FC Analysis Sustainable yield (ℓ/s)	Sustainability Check - Cooper Jacob (ℓ/s)	Average Sustainable yield (ℓ/s)	Radius of Recharge zone (m)	Abstraction duty cycle (h)	Abstraction per annum (m^3/a)
DBH04	-25.685690	26.141840	0.72	0.65	0.69	480.11	12.00	21602.16
DBH05	-25.706600	26.156070	3.66	3.50	3.58	1242.37	12.00	112898.88
DBH09	-25.681480	26.202460	0.14	0.17	0.16	241.57	12.00	4888.08
DBH14	-25.695000	26.174880	2.60	2.75	2.68	914.30	12.00	84358.80
DBH16	-25.760780	26.129220	3.07	2.44	2.76	1322.57	12.00	86881.68

Maximum	**3.66**	**3.50**	**3.58**	**1322.57**	**12.00**	**112898.88**
Minimum	**0.14**	**0.17**	**0.16**	**241.57**	**12.00**	**4888.08**
Average	**2.04**	**1.90**	**1.97**	**840.18**	**12.00**	**62125.92**
Total	**10.19**	**9.51**	**9.85**			**310629.60**

The above average sustainable yield will reduce to 4.925 ℓ/s with an abstraction cycle of 24 hours. Further groundwater exploration should be conducted for water supply for the operational phase, with the focus on Compartment 1 and 2 and possibly Compartment 8 should sufficient groundwater resources not be available in Compartment 1 and 2.

37.6. HAS A WATER USE LICENCE BEEN APPLIED FOR?

An Integrated Water Use Licence Application was submitted to the Department of Water and Sanitation (DWS) along with the Final EIA&EMPR on the 6th of February 2017.

37.7. IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

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

Table 23: Mitigation Measures to rehabilitate the environment

No	Activity	Size and scale of disturbance (Estimated volumes, tonnages and hectares or m2)	Mitigation Measures	Compliance with Standards	Time period for implementation
	Ecology				
Planning Phase				No specific standards other than the NFA for permitting and the relevant SABS standard for infrastructure design	During the planning phase, prior to construction
1	Eradication of protected trees / flora through permit applications	400 Ha	Apply and obtain permits from DAFF/relevant authority for protected trees and other protected plants after liaison with relevant officials and site visit to the area		
Construction Phase					During planning and construction phase
2	Clearing of vegetation for open pit, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	400 Ha	• The removal of the isolated indigenous trees and shrubs should only occur on the construction footprint area of the development and not over the larger area. Where possible, vegetation should be retained in between infrastructural elements associated with the project; • Conduct flora species search and rescue efforts before ground clearing begins in order to reduce negative impacts on species of concern; • Remove and relocate any plants of botanical or ecological significance as indicated by the ecologist or 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; • 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 – do not clear the entire		

			footprint simultaneously; • 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 flora of the area; • The ECO should advise the construction team in all relevant matters to ensure minimum destruction and damage to the 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; • Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during construction. • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. Poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist. • Use existing facilities (e.g., access roads, parking lots, graded areas) to the extent possible to minimize the amount of new disturbance. • Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as possible to the sensitive habitats such as ravines and moist grassland pockets during construction. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance will occur outside these areas		
3	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	400 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. • 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	Vegetation clearing / vehicle movement	400 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; • 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.		
5	Vegetation clearing / vehicle movement	400 Ha	• Daily dampening of dust areas or other dust suppression methods such as dust-aside or more environmentally friendly methods. • Re-vegetation of impacted areas is to be conducted on an on-going basis. • Place dust generating activities where maximum protection can be obtained from natural features. • Locating dust generating activities where prevailing winds will blow dust away from users. • Minimize the need to transport and handle materials by placing adequate storage facilities close to processing areas. • Minimize the re-handling of material which obviously has cost benefits as well. • Exposed material should be protected from the wind by keeping it within voids or protecting 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. • 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.		
6	Heavy machinery and vehicle movement on site	400 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 • Also refer to mitigation measures recommended during the construction phase for similar impacts.		
7	Heavy machinery and vehicle movement on site; construction of infrastructure, roads etc.	400 Ha	• More fauna are normally killed the faster vehicles travel. A speed limit should be enforced (speed on site max 40 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; • Lights should be positioned 5m from the roads or paved areas or as otherwise determined to be more efficient.		
Operational Phase					
8	Storage of tailings, laydown areas of overburden dumps and stockpiles	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: o Concurrent rehabilitation programme		During operations and after cessation of individual activity

			○ Alien invasive programme ○ Fire management programme ○ Educational and training programme on the conservation and ecological systems • Also refer to mitigation measures recommended during the construction phase for similar impacts.		
9	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF	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. • Also refer to mitigation measures recommended during the construction phase for similar impacts.		
10	Heavy machinery and vehicle movement on site	400 Ha	Refer to mitigation measures recommended during the construction phase for similar impacts.		
11	Heavy machinery and vehicle movement on site	400 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 • Also refer to mitigation measures recommended during the construction phase for similar impacts.		
12	Heavy machinery and vehicle movement on site	400 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.	400 Ha	Refer to mitigation measures recommended during the construction phase for similar impacts.		
Closure and Decommissioning Phase					During decommissioning and closure
14	Rehabilitation of mining site	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.		
15	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	400 Ha	Refer to mitigation measures recommended during the closure phase for similar impacts.		
16	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	400 Ha	Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens.		
17	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site / vehicle movement on site	400 Ha	Refer to mitigation measures recommended during the closure phase for similar impacts.		
18	Heavy machinery and vehicle movement on site	400 Ha	Refer to mitigation measures recommended during the closure phase for similar impacts.		
19	Heavy machinery and vehicle movement on site	400 Ha	Refer to mitigation measures recommended during the closure phase for similar impacts.		
Post-Closure Phase					Following decommissioning and closure until rehabilitation and closure objectives have been achieved
20	Natural Successional 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.		
21	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	400 Ha	Refer to mitigation measures for the construction phase that are for similar impacts		
22	Exposed surfaces / poor monitoring of revegetation on site	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				NWA for IWULA GN704 - separation of clean and dirty water	
23	Obtaining of IWUL for crossings and mining through water courses / wetlands	N/A	Apply and obtain IWUL from DWS after liaison with relevant officials and site visit to the area		During the planning phase, prior to construction
Construction Phase					
24	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	175 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 this licence • 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;		During construction

			• 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		
25	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	175 Ha	• 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 in this licence • Appropriate design and mitigation measures must be developed and implemented to minimise impacts on the natural flow regime of the watercourse i.e. through placement of structures/supports and to minimise turbulent flow in the watercourse • The diversion and impeding structures may not restrict river flows by reducing the overall river width or obstructing river flow. Any 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.		
26	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation in wetlands	400 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		
27	Vegetation clearing / vehicle movement	400 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.		
28	Heavy machinery and vehicle movement on site	400 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					
29	Opencast mining	175 Ha	• A detailed surface water - groundwater study should be conducted by a hydrogeological engineer to indicate the extent of potential dewatering of wetlands / springs in the area • Refer to mitigation measures that are similar for impacts during the construction phase.		During operations
30	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	• 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: o Concurrent rehabilitation programme o Alien invasive programme o Fire management programme o 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: o Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify; o Stockpile topsoil separately from subsoil; o Stockpile in an area that is protected from storm water runoff and wind; o Topsoil stockpiles should not exceed 2.0 m in height and should be protected by a mulch cover where possible; o Maintain topsoil stockpiles in a weed free condition; o Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it; o 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 that are similar for impacts during the construction phase.		
31	Heavy machinery and vehicle movement on site	400 Ha	• Encroachment of additional exotic species and terrestrial species in riparian zones must be discouraged • Refer to mitigation measures that are similar for impacts during the construction phase		
32	Heavy machinery and vehicle movement on site	400 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 are similar for impacts during the construction phase		
Closure and Decommissioning Phase					During decommissioning and closure
33	Rehabilitation of mining site	400 Ha	Positive impact - no mitigation required		
34	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	400 Ha	Refer to mitigation measures for the construction phase needed during the decommissioning phase that are similar are similar to the mitigation measures for impacts during the construction phase		
35	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	400 Ha	To leave all affected areas in a safe condition		
36	Heavy machinery and vehicle movement on site	400 Ha	Refer to mitigation measures for the construction phase needed during the decommissioning phase that are similar		
Post-Closure Phase					Following decommissioning and closure until rehabilitation and closure objectives have been achieved
37	Natural Successional processes	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		
38	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	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 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 for written approval within one (1) month prior to a wetland being affected		
39	Exposed surfaces / poor monitoring of revegetation on site	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				No specific standards other than the relevant SABS standard for infrastructure design	During planning phase, prior to construction
40	Obtaining of IWUL for crossings (wetland soils) and mining layout on sensitive soils	400 Ha	Apply and obtain IWUL from DWS after liaison with relevant officials and site visit to the area		
Construction Phase					During construction
41	Heavy machinery and vehicle movement on site	400 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); and • 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.		
42	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation in wetlands	400 Ha	• When possible, topsoil stripping and excavation activities should be scheduled for the low rainfall season (winter); • Cover disturbed soils as completely as possible, using vegetation or other materials; • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Sediment trapping, erosion and 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;		
43	Heavy machinery and vehicle movement on site	400 Ha	• Ensure that mining related waste or spillage and effluent do not affect the sensitive habitat boundaries and associated buffer zones. • This risk of spillages of reagents and hydrocarbons on the soil during transportation can be reduced with proper maintenance of vehicles. This would include a rigorous and proactive maintenance program • This risk can be further reduced through an adequate program of training of drivers and crews. This would include defensive driver training, basic vehicle maintenance, and emergency control of spills. In order for the vehicle crews to be adequately able to control any spills at an early stage, the vehicles must be properly equipped with spill containment equipment (booms, sandbags, spades, absorbent pads, etc.). Responsibility for training lies with the transport contractor. Adequate training, maintenance, and equipment of transport crews		

			should be included as a requirement for transport contracts. • The hydrochloric acid tanks are contained within an epoxy-coated, concrete lined and beamed 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		
44	Topsoil & subsoil stripping	400 Ha	No specific mitigation can be applied during the construction phase of the mine to prevent soil destruction, although an important measure should be the correct handling and stockpiling of topsoil as discussed in section 11 of the Ecological Impact Assessment.		
45	Topsoil & subsoil stripping, Clearing of vegetation through wetlands and water courses for road crossings	324 m2	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 mining. 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					During operations
46	Heavy machinery and vehicle	35 Ha	• During operation, sensitive soils with high risk of compaction (e.g. clayey soils) must be avoided by construction vehicles and equipment, wherever possible,		

	movement on site, laydown areas of overburden dumps and stockpiles		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 that are similar for impacts during the operational phase.		
47	Increased hardened surfaces around infrastructure and exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF, road crossings	225 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: o Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify; o Stockpile topsoil separately from subsoil; o Stockpile in an area that is protected from storm water runoff and wind; o Topsoil stockpiles should not exceed 2.0 m in height and should be protected by a mulch cover where possible; o Maintain topsoil stockpiles in a weed free condition; o Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it; o 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 that are similar for impacts during the construction phase.		
48	Heavy machinery and vehicle movement on site	400 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 that are similar for impacts during the construction phase		
49	Topsoil & subsoil stripping, opencast mining	175 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 Ecological Report for a detailed discussion on the rehabilitation of topsoil after stripping. • Refer to mitigation measures that are similar for impacts during the construction phase		
50	Topsoil & subsoil stripping, clearing of vegetation for open pit through wetlands and water courses as well as road crossings	175 Ha	• Refer to mitigation measures that are similar 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					
51	Rehabilitation of mining site	400 Ha	Positive impact - no mitigation required		During decommissioning and closure
52	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	400 Ha	Refer to mitigation measures for impacts that are similar in the construction and operational phases		
53	Heavy machinery and vehicle movement on site	400 Ha	Refer to mitigation measures for impacts that are similar in the construction and operational phases		
54	Heavy machinery and vehicle movement on site	400 Ha	Refer to mitigation measures for impacts that are similar in the construction and operational phases		
Post-Closure Phase					Following

55	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.		decommissioning and closure until rehabilitation and closure objectives have been achieved
56	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	400 Ha	Refer to mitigation measures for impacts during the other mining phases that are relevant for the closure phase		
	Air Quality				
Planning Phase				Dust and emission control	During the planning phase, prior to construction
57	Existing baseline ambient conditions	N/A	Best engineering practice to minimise impact on surrounding environment where feasible.		
Construction Phase					During construction
58	Transport and general construction activities	225 Ha	Maintenance of vehicles and wet suppression or chemical treatment on unpaved road surfaces.		
59	Clearing of groundcover and levelling of area	226 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.		
60	Materials handling	4 Ha	Wet suppression where feasible on materials handling activities and reducing drop height.		
61	Wind erosion from	400 Ha	• Wet suppression where feasible.		

	open areas		• Minimise extent of disturbed areas. • Reduction of frequency of disturbance. • Early re-vegetation Stabilisation (chemical, rock cladding or vegetative) of disturbed soil.		
Operational Phase					
62	Vehicle activity on paved and unpaved roads	324 m2	Maintenance of vehicles and wet suppression or chemical treatment on unpaved road surfaces.		During operations
63	Materials handling operations	4 Ha	Wet suppression where feasible on materials handling activities and reducing drop height. Enclosure or wet suppression on crushing activities.		
64	Mining operations within open pit	175 Ha	Wet suppression or chemical treatment on unpaved road surfaces.		
65	Wind erosion	225 Ha	Wet suppression where feasible. Stabilisation (chemical, rock cladding or vegetative) of tailings facility.		
Closure and Decommissioning Phase					
66	Dust generated during rehabilitation activities	400 Ha	Wet suppression where feasible.		During decommissioning and closure
67	Demolition of the structure	4 Ha	Wet suppression where feasible.		
68	Tailpipe emissions from vehicles utilised during the closure phase	N/A	Maintenance of vehicles and wet suppression on unpaved road surfaces.		
Post-Closure Phase					
69	Wind erosion from open areas	400 Ha	Vegetation of open areas.		Following decommissioning and closure until rehabilitation and closure objectives have been achieved
Geochemical / Waste Classification					

Operational Phase				No specific standards other than the relevant SABS standard for infrastructure design	During operations
70	Disposal of tailings on tailings facility	150 Ha	No mitigation measures required, natural mitigation processes inherent in the system		
71	Disposal of tailings on tailings facility	150 Ha	No mitigation measures required, natural mitigation processes inherent in the system		
72	Disposal of tailings on tailings facility	150 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: • "Natural" capturing of seepage by open pit • Barrier system		
73	Disposal of tailings on tailings facility	150 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: • "Natural" capturing of seepage by open pit • Barrier system		
74	Disposal of overburden onto overburden dump facility	27.58 Ha	No mitigation measures required, natural mitigation processes inherent in the system		
75	Disposal of overburden onto overburden dump facility	27.58 Ha	No mitigation measures required, natural mitigation processes inherent in the system		
76	Disposal of overburden onto overburden dump facility	27.58 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: • "Natural" capturing of seepage by open pit • Barrier system		
Post-Closure Phase					Following decommissioning and closure until rehabilitation and closure objectives have been achieved
77	Disposal of tailings on tailings facility	150 Ha	No mitigation measures required, natural mitigation processes inherent in the system		
78	Disposal of tailings on tailings facility	150 Ha	No mitigation measures required, natural mitigation processes inherent in the system		
79	Disposal of tailings on tailings facility	150 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: • "Natural" capturing of seepage by open pit • Barrier system		
80	Disposal of tailings	150 Ha	Some options are provided below as more options will become available by		

	on tailings facility		integration of the hydrogeological and geochemical studies: • "Natural" capturing of seepage by open pit • Barrier system		
81	Disposal of overburden onto overburden dump facility	27.58 Ha	No mitigation measures required, natural mitigation processes inherent in the system		
82	Disposal of overburden onto overburden dump facility	27.58 Ha	No mitigation measures required, natural mitigation processes inherent in the system		
83	Disposal of overburden onto overburden dump facility	27.58 Ha	Some options are provided below as more options will become available by integration of the hydrogeological and geochemical studies: • "Natural" capturing of seepage by open pit • Barrier system		
Noise					
Planning Phase				Minimize and control noise	During the planning phase, prior to construction
84	Construction Phase Years 1 - 5 (All receptors)	225 Ha	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).		
Construction Phase					During construction
85	Construction Phase Years 1 - 5 (All receptors)	225 Ha	None required.		
Operational Phase					During operations
86	Construction Phase Years 1 - 5 (All receptors)	225 Ha	None required.		
Closure and Decommissioning Phase					During decommissioning and closure
87	Construction Phase Years 1 - 5 (All receptors)	225 Ha	None required.		

Post-Closure Phase					Following decommissioning and closure until rehabilitation and closure objectives have been achieved
88	Construction Phase Years 1 - 5 (All receptors)	225 Ha	No potential high magnitude noise generating activities envisaged to operate during this phase.		
Planning Phase					During the planning phase, prior to construction
89	Open cast years 5 - 10 (receptor 1 to 5)	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).		
90	Open cast years 5 - 10 (receptor 5 to 10)	N/A			
Construction Phase					During construction
91	Open cast years 5 - 10 (receptor 1 to 5)	250 Ha	None required.		
92	Open cast years 5 - 10 (receptor 5 to 10)	250 Ha	None required.		
Operational Phase					During operations
93	Open cast years 5 - 10 (receptor 1 to 5)	250 Ha	None required.		
94	Open cast years 5 - 10 (receptor 5 to 10)	250 Ha	None required.		
Closure and Decommissioning Phase					During decommissioning and closure
95	Open cast years 5 - 10 (receptor 1 to 5)	250 Ha	None required.		

96	Open cast years 5 - 10 (receptor 5 to 10)	250 Ha	None required.		
Post-Closure Phase					
97	Open cast years 5 - 10 (receptor 1 to 5)	250 Ha	No potential high magnitude noise generating activities envisaged to operate during this phase.		Following decommissioning and closure until rehabilitation and closure objectives have been achieved
98	Open cast years 5 - 10 (receptor 5 to 10)	250 Ha			
Planning Phase					
99	Open cast years 10 - 20 (receptor 1 to 9)	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).		During the planning phase, prior to construction
100	Open cast years 10 - 20 (receptor 10)	N/A			
Construction Phase					
101	Open cast years 10 - 20 (receptor 1 to 9)	325 Ha	None required.		During construction
102	Open cast years 10 - 20 (receptor 10)	325 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 in the WM section is deemed sufficient to ensure a negligible rating.		
Operational Phase					
103	Open cast years 10 - 20 (receptor 1 to 9)	325 Ha	None required.		
104	Open cast years 10 - 20 (receptor 10)	325 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.		During operations

			Implementation of mitigation options above in the WM section is deemed sufficient to ensure a negligible rating.		
Closure and Decommissioning Phase					During decommissioning and closure
105	Open cast years 10 - 20 (receptor 1 to 9)	325 Ha	None required.		
106	Open cast years 10 - 20 (receptor 10)	325 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 in the WM section is deemed sufficient to ensure a negligible rating.		
Post-Closure Phase					Following decommissioning and closure until rehabilitation and closure objectives have been achieved
107	Open cast years 10 - 20 (receptor 1 to 9)	325 Ha	No potential high magnitude noise generating activities envisaged to operate during this phase.		
108	Open cast years 10 - 20 (receptor 10)	325 Ha			
Planning Phase					During the planning phase, prior to construction
109	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	400 Ha	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).		
110	Open cast years 20-30 (receptor 8)	400 Ha			

Construction Phase					
111	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	400 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.		During construction
112	Open cast years 20-30 (receptor 8)	400 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 in the WM section is deemed sufficient to ensure a negligible rating.		
Operational Phase					
113	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	400 Ha	None required.		During operations

114	Open cast years 20-30 (receptor 8)	400 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 in the WM section is deemed sufficient to ensure a negligible rating.		
Closure and Decommissioning Phase					During decommissioning and closure
115	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	400 Ha	None required.		
116	Open cast years 20-30 (receptor 8)	400 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 in the WM section is deemed sufficient to ensure a negligible rating.		
Post-Closure Phase					Following decommissioning and closure until rehabilitation and closure objectives have been achieved
117	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	400 Ha	No potential high magnitude noise generating activities envisaged to operate during this phase.		
118	Open cast years 20-30 (receptor 8)	400 Ha			
	Heritage				
Planning Phase				Apply for a heritage	During the planning

119	Planning	75 Ha	Site Monitoring - 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	destruction permit from SAHRA if required	phase, prior to construction
120	Planning	75 Ha	Site Monitoring - 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		
121	Planning	N/A	Site Monitoring - 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		
Construction Phase					
122	Construction / Clearing	75 Ha	It is 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.		During construction
123	Construction / Clearing	75 Ha	A careful watching brief monitoring process should 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.		
124	Construction / Clearing	N/A	Site Monitoring - 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		
Operational Phase					
125	Mining / Processing	75 Ha	It is 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		During operations

			management and protection) and the necessary permits should be obtained from the relevant Heritage Resources Authorities.		
126	Mining / Processing	75 Ha	A careful watching brief monitoring process should 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.		
127	Mining / Processing	N/A	Site Monitoring - 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		
Closure and Decommissioning Phase					
128	Decommissioning	75 Ha	Site Monitoring - 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		During decommissioning and closure
129	Decommissioning	75 Ha	Site Monitoring - 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		
130	Decommissioning	N/A	Site Monitoring - 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		
Post-Closure Phase					
131	Post-Closure	75 Ha	Site Monitoring - 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		Following decommissioning and closure until rehabilitation and closure objectives have been achieved
132	Post-Closure	75 Ha	Site Monitoring - 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		

133	Post-Closure	N/A	Site Monitoring - 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		
	Palaeontology				
Construction Phase				Apply for a heritage destruction permit from SAHRA if required	During construction
134	Construction of buildings, dams, roads, pylons. Exploration for mining	175 Ha	No mitigation measures are recommended – please refer to specialist recommendations in Table 22.		
135	Construction of buildings, dams, roads, pylons. Exploration for mining	175 Ha	Palaeontological site visit must be done in areas earmarked for construction. In the unlikely event of fossils turning up during the construction process, the ECO should take the responsibility of marking the site and take a GPS reading of the locality. No attempt must be made to excavate fossils before they have been assessed by a palaeontologist. Photographs of the fossil site and fossils or sub-fossils should be taken. The advice of a qualified archaeo-zoologist or palaeontologist should be called in and if necessary a rescue collection could be undertaken by the palaeontologist (after obtaining a SAHRA permit) to remove the fossils from the building site. The fossils should then be taken to a fossil repository such as the Ditsong Museum in Pretoria for safekeeping.		
136	Construction of buildings, dams, roads, pylons. Exploration for mining	175 Ha	Positive impact - no mitigation recommended.		
Operational Phase					During operations
137	Mining	175 Ha	No mitigation measures are recommended – please refer to specialist recommendations in Table 22.		

138	Mining	175 Ha	Palaeontological site visit must be done in areas earmarked for construction. In the unlikely event of fossils turning up during the construction process, the ECO should take the responsibility of marking the site and take a GPS reading of the locality. No attempt must be made to excavate fossils before they have been assessed by a palaeontologist. Photographs of the fossil site and fossils or sub-fossils should be taken. The advice of a qualified archaeo-zoologist or palaeontologist should be called in and if necessary a rescue collection could be undertaken by the palaeontologist (after obtaining a SAHRA permit) to remove the fossils from the building site. The fossils should then be taken to a fossil repository such as the Ditsong Museum in Pretoria for safekeeping.		
139	Mining	175 Ha	Positive impact - no mitigation recommended.		
	Traffic				
Planning Phase				Road upgrades and construction according to standards	During the planning phase, prior to construction
140	Vehicular operation and usage of roads	324 m2	No mitigation recommended.		
Construction Phase					During construction
141	Construction of plant and access roads	7.5 Ha	• Speed limits and signage on gravel roads • Dust suppression on gravel roads • Regular maintenance programmes to ensure a proper road surface and stormwater drainage system.		
142	Road upgrades	25 km	• Speed limits and signage on gravel roads • Dust suppression on gravel roads • Regular maintenance programmes to ensure a proper road surface and stormwater drainage system.		
143	Road upgrades	25 km	• Speed limits and signage on gravel roads • Dust suppression on gravel roads • Regular maintenance programmes to ensure a proper road surface and stormwater drainage system.		

144	Road rehabilitation	324 m2	• Speed limits and signage on gravel roads • Dust suppression on gravel roads • Regular maintenance programmes to ensure a proper road surface and stormwater drainage system.		
Operational Phase					
145	Vehicular operation and usage of roads	25 km	• Speed limits and signage on gravel roads • Dust suppression on gravel roads • Regular maintenance programmes to ensure a proper road surface and stormwater drainage system. • Also refer to the proposed road upgrades in section 13 and Figure 12 of the TIA.		
Closure and Decommissioning Phase					
146	Vehicular operation and usage of roads	25 km	• Speed limits and signage on gravel roads • Dust suppression on gravel roads • Regular maintenance programmes to ensure a proper road surface and stormwater drainage system.		During decommissioning and closure
Post-Closure Phase					Following decommissioning and closure until rehabilitation and closure objectives have been achieved
147	No traffic	N/A	No mitigation recommended.		
	Visual				

Planning Phase				Dust control	During the planning phase, prior to construction
148	Implementation of Mitigation Measures such as visual berms / vegetation screens	N/A	Implementation of Mitigation Measures such as visual berms / vegetation screens		
Construction Phase					During construction
149	Site preparation: clearance of vegetation and dust generation	400 Ha	• It is proposed that as little vegetation as possible be removed during the construction phase, especially the area surrounding Resource Area A and the plant. • Ensure, wherever possible, all existing natural vegetation is retained and incorporated into the project site rehabilitation. • Only the footprint and a small 'construction buffer zone' around the proposed Project should be exposed. In all other areas, the natural vegetation should be retained. • Remove vegetation in sections or as construction proceeds. Implement dust suppression techniques.		
150	Construction of the Site Camp / Office	7 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.		
151	Removal of topsoil and subsoil for open pit mining: overburden dumps, topsoil dumps and dust generation	200 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.		
152	Construction of the plant and access roads: physical structure will become more visible	7.5 Ha	• The plant should be constructed at the lowest point (contour) possible. • The ground level of the plant could be dropped; this will lower the building level. • Buildings should be painted in natural colours - if possible. • Avoid reflective material for buildings / roofs. • Berms or vegetation screens could be used to shield or partially shield views. • Access and haul roads will require an effective dust suppression management programme, such as the use of non-polluting chemicals that will retain moisture on the road surface.		
153	Lighting of the area - security lighting or any other lighting during the evening.	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. • Lighting should be reviewed from an energy management perspective prior to installation.		
Operational Phase					
154	Physical structure of the plant	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.		During operations
155	Physical structure of the TSF	150 Ha	• Where slopes compatible with the surrounding landscape can be achieved, an attempt should be made to visually soften steeper areas by avoiding strait engineered ridges and sharp changes of angle. • TSF should be vegetated as soon as possible - specifically along its northern sides. • The rising wall of the TSF should be rehabilitated / grassed as the wall rises / TSF is constructed. • Rehabilitation should take place concurrent with the rise of the wall and should not wait for closure. • Visual berms / vegetation screens should be considered, especially along the dirty road (south-eastern border)		
156	Operational activities of the open pit mine, including blasting, movement of trucks will create dust	175 Ha	• Dust suppression techniques must be implemented. • Use of visual berms / vegetation screens. • Access and haul roads will require an effective dust suppression management programme, such as the use of non-polluting chemicals that will retain moisture on the road surface.		
157	Topsoil dumps, overburden dumps	28 Ha	• Soil stockpiles and overburden dumps should be shaped and vegetated in order to blend into the surrounding area. • Final shaping and dumping should be engineered such that the sides of the dumps are articulated in a fashion that create areas of light and shadow interplay; • Dust control measures other than water should be considered. Should water be used as a dust suppression measure it is suggested that storm water or rain water be used. The type of dust measure will depend on availability and weather conditions such as drought. • If possible overburden should be used for visual berms. These berms must be shaped and vegetated to blend into the landscape. • Final shaping and dumping should be engineered such that the sides of the dumps are articulated in a fashion that create areas of light and shadow interplay; • Harsh, steep engineered slopes should be avoided if at all possible as these could impose an additional impact on the landscape by contrasting with existing topographic forms.		

			• Maintain the final landform height and slope angles for stockpiles as low as possible. • Where slopes compatible with the surrounding landscape can be achieved, an attempt should be made to visually soften steeper areas by avoiding strait engineered ridges and sharp changes of angle; • Grass seeding of the dumps should be undertaken to emulate the groupings of natural vegetation in nearby hills. • The proposed outer shell dumping method is recommended		
158	Lighting of the area - security lighting or any other lighting during the evening.	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. • Use security lighting at the periphery of the site that is activated by movement and are not permanently switched on.		
Closure and Decommissioning Phase					During decommissioning and closure
159	Removal of the plant structures: generation of dust	7 Ha	• Dust suppression techniques must be implemented. Good house-keeping. • Access and haul roads will require an effective dust suppression management programme, such as the use of non-polluting chemicals that will retain moisture on the road surface.		
160	Removal of the plant structures: physical structures will be gone	7 Ha	• A registered Professional Landscape Architect must be appointed to assist with the rehabilitation plan for the proposed project. • Rehabilitate / restore exposed areas as soon as possible after construction activities are complete. • Only indigenous vegetation should be used for rehabilitation / landscaping purposes. • Berms (vegetated) can be constructed along the northern boundary of Resource Area C; this will assist in mitigating the visual impact of the open cast mining areas. • Good housing keeping		
161	Closure of the open pit mining areas: generation of dust	175 Ha	Dust suppression techniques must be implemented. Good house-keeping.		
162	Removal of topsoil dumps and overburden dumps (note that some of	28 Ha	Dust suppression techniques must be implemented. Good house-keeping.		

	the dumps might form part of the visual berms which will not be removed)				
163	Lighting of the area - security lighting or any other lighting during the evening.	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					Following decommissioning and closure until rehabilitation and closure objectives have been achieved
164	Rehabilitation of cleared areas	400 Ha	Positive impact - No mitigation recommended		
165	Physical structure of the TSF will remain on site	150 Ha	• 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)		
	Hydrogeology				
Planning Phase				NWA for IWULA GN704 - separation of clean and dirty water	During the planning phase, prior to construction
166	Stakeholder engagement: aquifer testing arrangements.	N/A	• Monitor borehole yield and water level during pump test to prevent over-abstraction. • Chemical sanitary facilities to be used and situated down gradient from local drainage systems. • Best practise camp management and house-keeping principles to be implemented. • 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.		
167	Establishment and operation of construction camp.	7 Ha			
168	Anthropogenic activities on site.	400 Ha			
169	Fuelling and movement of construction vehicles.	7.5 Ha			

Construction Phase					
170	Oil, grease and diesel spillages from construction vehicles	400 Ha	• Construction should preferably take place during the dry season. • Adequate fuel containment facilities to be used during construction phase. • The use of all materials, fuels and chemicals which could potentially leach into underground water must be controlled. • All materials, fuels and chemicals must be stored in a specific and secured area to prevent pollution from spillages and leakages. • Construction vehicles and machines must be maintained properly to ensure that oil spillages are kept at a minimum. • Spill trays must be provided if refuelling of construction vehicles are done on site. • Chemical sanitary facilities must be provided for construction workers. Construction workers should only be allowed to use temporary chemical/ permanent toilets on the site. Chemical toilets shall not be within close proximity of the drainage system. Frequent maintenance should include removal without spillages. • No uncontrolled discharges from the construction camp shall be permitted. • Chemical storage areas should be sufficiently contained, and the use of chemical should be controlled. • The removed soil and vegetation should be replaced once construction is complete and the pipeline cavities filled in and re-vegetated where possible. • Real time monitoring should be installed in equipped boreholes and monthly monitoring should be conducted on water levels measurements, groundwater quality and isotope and hydro chemical fingerprinting to establish origin of groundwater if abstracted close to Klein Marico River.		During construction
171	Pollution of groundwater due to sanitation facilities	7 Ha			
172	Ground and surface water pollution due to storage of chemicals and building materials	7 Ha			
173	Spillages from diesel (fuel storage) facilities	7 Ha			
Operational Phase					
174	Dewatering zone of influence.	175 Ha	• The radius of influence should be monitored with local and regional water level measurements monthly. Substitute water should be supplied if it's found and proven that neighbouring water levels and yields are affected. • Detailed geophysics between the open pits and the Klein Marico River should be conducted to map possible preferential flow paths connecting the open pit and the river. Drilling and long term aquifer testing should be conducted as well as ongoing monitoring with isotope analyses and finger printing to establish the source of the dewatered volumes. • Inclined packer testing could be conducted below the Klein Marico River to assess the possible inflows into the open pit mine associated with a possible structure along the Klein Marico River. The groundwater flow model should be updated accordingly. • Long duration aquifer tests should be conducted on any newly drilled water supply, monitoring and/or seepage capturing boreholes drilled during the LoM. • On-going monthly isotope analyses should be conducted on the water supply		During operations
175	Contaminant leaching from mine waste facilities.	180 Ha			
176	Use of explosives for mine pit development.	175 Ha			
177	Hydrocarbon spillages from fuel storage facilities, fuelling and wash-	7 Ha			

	bays.		boreholes as well as the water captured in the open pit mine to confirm the origin of the water in comparison to the surface water from the Klein Marico River.		
178	Flooding of the open pit	175 Ha	• The groundwater flow model should be updated every two years or as soon as additional groundwater exploration and/or monitoring data becomes available.		
179	Pollution of groundwater due to sanitation facilities	7 Ha	• Water seeping into the open pit mine should be directed into a sump and pumped to surface. Real time monitoring should be implemented to record the volumes pumped from the open pit mine.		
180	Seepage from overburden dumps	27.58 Ha	• Water pumped from the open pit mine should be pumped into a dirty water system and should not be allowed to enter any clean water system, natural drainage line, or the aquifer.		
181	Sulphate and Fluoride leaching from the TDF	150 Ha	• Storm water from the TSF and overburden dumps should be contained in a process water dam and included in a closed dirty water system • The pipeline should be properly maintained and inspected at regular intervals for the early detection of leakages, malfunctioning and acts of vandalism.		
182	Increased TDS / Nitrate leaching from the overburden dumps	27.58 Ha	• Pipeline construction at river crossings and in floodlines should be adequate to withstand flood conditions. • The pipeline should be visible and/ or marked to prevent damage to pipeline.		
183	Dewatering: Water from the Klein Marico into the open pit	150 Ha	• The pipeline and related infrastructure should be designed to minimise evaporation and transmission losses. • Pressure gauges should be installed at the pipeline for the early detection of pressure loss that may indicate leakages.		
184	Dewatering: Spring flow affected	25 Ha	• Monthly visual checks for damp areas around borehole equipment and pipeline. • Communities and IAPs should be consulted before construction of the pipeline. Significant issues would be permission to build the pipeline and education about the pipeline.		
185	Water losses: leaking pipes	15 km	• Boreholes and related equipment should be in a fenced in area in a locked pump house for protection against theft and vandalism.		
186	Water Losses: Transmission losses and evaporation	171 870 m3	• Communities should be consulted in advance about the potential lowering of water levels in their boreholes. • Groundwater levels should be monitored in all pumping wells throughout. • Groundwater levels should be monitored at all monitoring boreholes. • A monitoring program must be implemented and honoured.		
187	Dewatering: Depletion of water levels in boreholes due to over pumping - Higher than recommended yield	175 Ha	• All water retention structures, including process water dams; dirty water dams, etc. should be constructed to have adequate freeboard to be able to contain water from 1:50 year rain events. • Monitoring points of surface water features should be identified and monitored.		
188	Dewatering: Depletion of water levels in boreholes due to over pumping	176 Ha	• Groundwater and surface water quality information should be determined by sampling the surface water containment water (from the GN704 storm water management system) and monitoring boreholes located upstream and downstream of the mining and infrastructure.		

	- Longer than recommended pumping time		• Flow measurements in the Klein Marico River should be taken upstream and downstream of the mine site. The flow measures should be recorded on ongoing basis to monitor possible impacts and flow reductions caused by the mine dewatering. Alien vegetation eradication should be implemented to off-set the possible flow reduction and increase the water balance of the local catchment. • The applicant understands that groundwater development may have a negative impact with regards to water supply in terms of water quantity and quality due to mining activities and water supply to the mine, and will implement mitigation measures such as monitoring to mitigate and limit any impacts in this regard. Any landowners who may be affected will be subject to compensation or purchase agreements"		
189	Dewatering: Depletion of community water supply boreholes due to dewatering	177 Ha			
Post-Closure Phase					
190	Increased groundwater ingress at disturbed/rehabilitated areas.	150 Ha	• Rehabilitate the TSF to limit ingress and recharge to these facilities and minimise potential leaching into the groundwater. • Monitoring of water quality in the neighbouring boreholes and monitoring boreholes drilled for that purpose should continue quarterly post closure for at least 12 months. • The radius of influence due to mining will decrease; however, a permanent radius of influence could exist. Affected groundwater users should be compensated. • Simulate post closure geochemical leaching. • Monitoring of groundwater upstream and downstream of the mine overburden dump facilities should be continued. Provision for this should be made in the rehabilitation budget. • Monitoring of surface water features upstream and downstream of the mine should be continued. Provision for this should be made in the rehabilitation budget. • The applicant understands that groundwater development may have a negative impact with regards to water supply in terms of water quantity and quality due to mining activities and water supply to the mine, and will implement mitigation measures such as monitoring to mitigate and limit any impacts in this regard. Any landowners who may be affected will be subject to compensation or purchase agreements.		Following decommissioning and closure until rehabilitation and closure objectives have been achieved
191	Migration of contamination plume from mine contamination sources.	180 Ha			
192	Post-closure pit flooding and acidification.	175 Ha			
193	Permanent radius of influence due to mine dewatering	175 Ha			
194	Sulphate and Fluoride leaching from the TSF	150 Ha			
195	Increased TDS / Nitrate leaching from the overburden dumps	27.58 Ha			
	Aquatic				

Planning Phase					
196	Potentially poor planning leading to extensive dirty water areas which need to be managed which may reduce the mean annual run-off (MAR) to the non-perennial drainage systems in the area.	171 870 m3	• 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 riparian systems near the Klein Marico River and its associated tributaries with a minimum buffer of 100m around all riparian systems maintained in line with the requirements of regulation GN704 of the national Water Act. Layout option 2 (Figure 8) is thus strongly discouraged from an aquatic health perspective • Ensure that sound environmental management is in place during the planning phase • Dirty water dams should be off stream and tributary structures and not within the natural drainage system of the area, thereby minimising impacts loss of instream flow and downstream recharge • Dirty water dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts from inundation and siltation • Minimise loss of aquatic features where possible through planning and suitable layouts. Special mention is made of Layout Option 2, which is not recommended from an aquatic health point of view	SHE Standards	During the planning phase, prior to construction
197	Stormwater designs leading to rapid release of water which in turn may lead to a loss of streamflow regulation capabilities in the area	171 870 m3			
198	Use of surface runoff and groundwater sources for the supply of production water for the mining project may alter the flow in the receiving systems	4800 m3			
199	Use of layout option 2 may impact on the instream flow of the receiving systems.	157 Ha			
200	Potentially poor planning leading to extensive and complex dirty water areas which need to be managed may impact on water quality.	171 870 m3	• 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 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 • Any dirty water facilities should be lined with an HDPE liner system to prevent seepage		
201	Potentially poor planning leading to	171 870 m3			

	placement of polluting structures in non-perennial drainage lines which would increase mobility of pollutants and may impact on water quality.		• Dirty water 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 • Dirty water 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		
202	Potentially inadequate separation of clean and dirty water areas leading to contaminated water leaving the defined dirty water area may impact in water quality.	171 870 m3			
203	Clean and dirty water systems not being designed adequately to ensure protection of the water resources.	171 870 m3			
204	Potentially poor planning leading to the placement of infrastructure within non-perennial drainage lines, with special mention of the waste stockpile areas as well as roads, road crossings and bridges all may alter the aquatic habitat.	171 870 m3	• 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 riparian systems near the Klein Marico River and its associated tributaries with a minimum buffer of 100m around all aquatic resources maintained in line with the requirements of regulation GN704 of the national Water Act • Dirty water dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts loss or transformation of aquatic habitat • Dirty water dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts form inundation and siltation		
205	Potentially inadequate design of infrastructure leading to changes to instream habitat.	7 Ha			

206	Potentially inadequate design of infrastructure leading to changes to system hydrology may alter the aquatic habitat.	7 Ha			
207	Potentially inadequate separation of clean and dirty water areas and the prevention of the release of sediment rich water may alter the aquatic habitat within the receiving environment.	171 870 m3			
208	Potentially poor planning leading to the placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.	190 Ha	• 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 riparian systems near the Klein Marico River and its associated drainage lines with a minimum buffer of 100m around all riparian systems maintained in line with the requirements of regulation GN704 of the national Water Act. Layout option 2 is strongly discouraged from an aquatic health point of view • Dirty water dams must be adequately designed to contain a 1:50 24 hour storm water event • Dirty water dams and tailings facilities should be off stream and tributary structures and not within the natural drainage system of the area, thereby minimising impacts loss of instream flow and downstream recharge • Implement an ongoing alien vegetation control program to be initiated in the pre-construction phase of the project		
209	Potentially inadequate design of infrastructure leading to changes to instream habitat may lead to a loss in aquatic biodiversity.	7 Ha	• The project design should limit the footprint area of the proposed mining activities 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 and the disturbance of soils leading to runoff, erosion and sedimentation • Dirty water dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts loss or transformation of aquatic habitat		
210	Potentially inadequate design of infrastructure leading	7 Ha	• Dirty water dams should be off stream structures and not within the natural drainage system of the area, thereby minimising impacts form inundation and siltation • Ensure that measures to contain seepage as far as possible to prevent		

	to changes to system hydrology may lead to a loss in aquatic biodiversity.		contamination of the groundwater regime are implemented into the design of mining infrastructure • 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 so as to aid in the prevention of the contamination of the groundwater resources without compromising on surface water recharge further downstream;		
211	Potentially inadequate design of infrastructure leading to contamination of water and sediments in the streams may lead to a loss in aquatic biodiversity.	7 Ha			
Construction Phase					
212	Disturbance of soils during the construction phase could lead to erosion and sedimentation of the aquatic resources present, thus resulting in a loss of instream flow.	225 Ha	• 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 * If it is absolutely unavoidable that either the Klein Marico River or its associated tributaries will be affected, disturbance must be minimised and suitably rehabilitated • Ensure that no incision and canalisation of the aquatic resources present takes place as a result of site clearing and construction activities • All erosion noted within the study area should be remedied immediately and included as part of the ongoing rehabilitation plan • During the construction phase of the proposed Doornhoek mining project, erosion berms should be installed on roadways to prevent gully formation and siltation of the aquatic resources. The following points should serve to guide the placement of erosion berms: ○ Where the track has slope of less than 2%, berms every 50m should be installed; ○ Where the track slopes between 2% and 10%, berms every 25m should be installed; ○ Where the track slopes between 10%-15%, berms every 20m should be installed; ○ Where the track has slope greater than 15%, berms every 10m should be installed * All soils compacted as a result of construction activities falling outside of development footprint areas should be ripped and profiled		During construction
213	Construction of clean and dirty water separation structures for dirty water management purposes may lead to altered flow levels.	171 870 m3			

214	Change in surface coverage. Development of the mining rights area will change the surface coverage in some areas from vegetated soil to buildings, hardened gravel roads, paved areas (parking) and compacted earth.	225 Ha	• As much vegetation growth as possible should be promoted within the proposed development area during all phases in order to protect soils and vegetation clearance should be kept to a minimum as the biomass in the area is not very high and so hence the plants will not grow quickly • No use of clean surface water or any groundwater which potentially recharges the watercourses in the area should take place. In this regard specific mention is made of any water use which will affect the instream flow in the Klein Marico River and the associated tributaries • Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised • Permit only essential construction personnel within 100m of all riparian system • All areas of increased ecological sensitivity should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel during the construction phase of the proposed Doornhoek mining project • No crossing of the aquatic resources should take place and the substrate conditions of the aquatic resources and stream connectivity must be maintained • Restrict construction to the drier winter months to avoid sedimentation of the aquatic resources in the vicinity of the proposed Doornhoek mining project • No material may be dumped or stocklined within any rivers, tributaries or drainage lines in the vicinity of the proposed Doornhoek mining project.		
215	Clean and dirty water systems not being constructed to the required specifications to prevent contamination of clean water areas may impact on water quality.	171 870 m3	• 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 • Any dirty water management facilities should be lined with an HDPE liner system 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 the first systems developed on site • 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; • Dirty water dams must be adequately designed to contain a 1:50 24 hour storm water event		
216	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,	400 Ha			

	there is a risk of the release of metals to the surface and groundwater resources as a result of tillage and blasting.		• It must be ensured that the construction of all infrastructure prevents failure • Dirty water 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		
217	Poor housekeeping and management may lead to impacts on water quality.	7 Ha	• 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		
218	Spills and other unplanned events may impact on water quality.	7 Ha	• 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 (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		
219	Site clearing and the removal of vegetation leading to increased runoff and erosion may alter the aquatic habitat.	400 Ha	• 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 riparian systems near the Klein Marico River and its associated tributaries with a minimum buffer of 100m around all aquatic resources maintained in line with the requirements of regulation GN704 of the national Water Act		

220	Site clearing and road construction and the disturbance of soils leading to increased erosion may alter the aquatic habitat.	400 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 • Implement alien vegetation control program within the riparian zones with special mention of water loving tree species and invasive species such as Arundo donax and Typha capensis • Limit the footprint area of the construction activity to what is absolutely essential in order to disturbance of soils leading to runoff, erosion and sedimentation and loss of instream flow and stream recharge • Monitor all systems for erosion and incision • Monitor all affected riparian systems for moisture stress • Monitor all potentially affected riparian zones for changes in riparian vegetation structure • 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		
221	Earthworks in the vicinity of drainage systems leading to increased runoff and erosion and altered runoff patterns may alter the aquatic habitat.	400 Ha			
222	Alien vegetation encroachment will impact on and alter the aquatic habitat.	400 Ha			
223	Site clearing and the removal of vegetation may lead to a loss in aquatic biodiversity. Site clearing and road construction may lead to a loss in aquatic biodiversity.	400 Ha	• No use of clean surface water or any groundwater which potentially recharges the watercourses in the area should take place. In this regard specific mention is made of any water use which will affect the instream flow in the Klein Marico River and the associated tributaries and in turn affect more sensitive taxa which require faster flowing habitat • Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised • 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 • Ongoing implementation of the alien vegetation control program • 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 • All dirty water management facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs • 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 and the disturbance of soils leading to runoff, erosion and sedimentation		
224	Earthworks and other mining construction activities in the vicinity of wetland and riparian areas may lead to a loss in aquatic biodiversity.	400 Ha			
225	Placement of infrastructure within non-perennial drainage lines with	225 Ha			

	special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.		• Ensure that all spills are immediately cleaned up • All hazardous chemicals must be stored on specified surfaces • Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development as well as during the operational phase of the mine • Any areas where active erosion is observed must be rehabilitated and berms utilised to slow movement of water		
226	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	171 870 m3	• Prevent run-off from dirty water areas entering stream systems through ensuring clear separation of clean and dirty water areas • Monitor all systems for erosion and incision • Monitor all affected riparian systems for moisture stress • Monitor all potentially affected riparian zones for changes in riparian vegetation structure • 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		
Operational Phase					
227	Loss of MAR from dirty water areas may impact on the instream flow of the receiving systems.	171 870 m3	• Limit the footprint area of the operational activities 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 * If it is absolutely unavoidable that either the Klein Marico River or its associated tributaries will be affected, disturbance must be minimised and suitably • Ensure that no incision and canalisation of the aquatic resources present takes place as a result of operational activities • All erosion noted within the study area should be remedied immediately and included as part of the ongoing rehabilitation plan • During the construction and operational phases of the proposed Doornhoek mining project, erosion berms should be installed on roadways to prevent gully formation and siltation of the aquatic resources. The following points should serve to guide the placement of erosion berms: o Where the track has slope of less than 2%, berms every 50m should be installed; o Where the track slopes between 2% and 10%, berms every 25m should be installed; o Where the track slopes between 10%-15%, berms every 20m should be installed; o Where the track has slope greater than 15%, berms every 10m		During operations
228	Loss of water through clean and dirty water separation may alter instream flow on the receiving systems.	171 870 m3			
229	Impact on natural streamflow regulation and	175 Ha			

	stream recharge due to altered hydrology in the area, with special mention of the formation of an ever increasing cone of depression over the life of the proposed mining project as a result of open cast mining activities and water abstraction, may lead to altered instream flow		should be installed • 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 transformation of aquatic habitat • As much vegetation growth as possible should be promoted within the proposed development area during the operational phase in order to protect soils and vegetation clearance should be kept to a minimum as the biomass in the area is not very high and so hence the plants will not grow quickly • No use of clean surface water or any groundwater which potentially recharges the watercourses in the area should take place. In this regard specific mention is made of any water use which will affect the instream flow in the Klein Marico River and the associated tributaries • Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised • 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 • Permit only essential personnel within 100m of all riparian systems • All areas of increased ecological sensitivity should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel during the operational phase of the proposed Doornhoek mining project • No crossing of the aquatic resources should take place and the substrate conditions of the aquatic resources and stream connectivity must be maintained • No material may be dumped or stocklined within any rivers, tributaries or drainage lines in the vicinity of the proposed Doornhoek mining project.		
230	Intercepting run-off around mining activities and infrastructure could reduce the amount of time that water would take to reach the Klein Marico River and its associated tributaries and may lead to “flash flood” events on varying scales.	400 Ha			
231	Capture of run-off and capture of rainfall (inundation) in the ‘dirty’/impacted areas would lower instream flow in the receiving environment.	171 870 m3			
232	Mining activities and the establishment of mining waste may	180 Ha	• Any dirty water management facilities should be lined with an HDPE liner system to prevent seepage • Clear separation of clean and dirty water must take place and diversion of		

	impact on water quality and thus needs to be managed to prevent pollution.		clean water around operational areas (if applicable) must ensure minimisation of the loss of catchment yield • 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 • All dirty water management 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 • 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 system to prevent seepage to the groundwater resources • All vehicles must be regularly inspected for leak • 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		
233	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.	171 870 m3			
234	Poor housekeeping and management during operational phase may lead to impacts on water quality.	7 Ha			
235	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.	400 Ha			

236	Spills and other unplanned events during operational phase may impact on water quality.	7,5 Ha	minimum frequency of once a month (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, 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.		
237	Ongoing disturbance of soils during general operational activities may alter the aquatic habitat.	400 Ha	• Permit only essential operational personnel within 100m of all riparian systems • Keep all demarcated sensitive zones outside of the operational area off limits during the operational phase of the development • Implement alien vegetation control program within the riparian zones with special mention of water loving tree species and invasive species such as Arundo donax and Typha capensis • 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 transformation of aquatic habitat areas • Monitor all systems for erosion and incision • Monitor all affected riparian systems for moisture stress • Monitor all potentially affected riparian zones for changes in riparian vegetation structure • An extensive monitoring programme will need to be implemented to tract the cone of depression on an ongoing basis for the life of the mine and suitable mitigation measures will be required to protect surface water recharge in the vicinity of the proposed development. Ongoing aquatic ecological monitoring		
238	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the operational phase.	157 Ha			
239	Mining related activities leading to increased disturbance of soils and drainage lines may alter the aquatic habitat.	400 Ha			

240	Any activities which lead to the reduction of flow in the system with special mention of the use of surface and groundwater sources for production water may alter the aquatic habitat. It is considered likely that the operational activities will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat.	175 Ha	must take place on a 6 monthly basis by an SA RHP Accredited assessor to identify any emerging issues in the receiving environment.		
241	Alien vegetation encroachment will impact on and alter the aquatic habitat.	400 Ha			
242	Ongoing disturbance of soils with general operational activities may lead to a loss in aquatic biodiversity.	400 Ha	• No use of clean surface water or any groundwater which potentially recharges the watercourses in the area should take place. In this regard specific mention is made of any water use which will affect the instream flow in the Klein Marico River and the associated tributaries and in turn affect more sensitive taxa which require faster flowing habitat • Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised • Permit only essential operating personnel within 100m of all riparian systems • Keep all demarcated sensitive zones outside of the operational area off limits during the operational phase of the development Ongoing implementation of the alien vegetation control program		
243	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	157 Ha			

244	Loss of instream flow due to abstraction for water for production may lead to a loss in aquatic biodiversity.	175 Ha	• 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 • All dirty water management facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs • Limit the footprint area of the operational 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 and the disturbance of soils leading to runoff, erosion and sedimentation • Ensure that all spills are immediately cleaned up • All hazardous chemicals must be stored on specified surfaces • 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 transformation of aquatic habitat areas • Any areas where active erosion is observed must be rehabilitated and berms utilised to slow movement of water • Prevent run-off from dirty water areas entering stream systems through ensuring clear separation of clean and dirty water areas • 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 • Implement measures to contain seepage as far as possible to prevent contamination of the groundwater regime • Monitor all systems for erosion and incision • Monitor all affected riparian systems for moisture stress • Monitor all potentially affected riparian zones for changes in riparian vegetation structure • 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; • Monitor all dirty water management facilities using toxicological screening methods and implement the calculation of discharge dilution factors by means of the Direct Estimation of Ecological Effect Potential (DEEEP) protocol • Toxicological monitoring of the receiving and process water systems on a quarterly basis.		
•	Seepage from the discard dumps and overburden stockpiles may lead to a loss in aquatic biodiversity.	28 Ha			
246	Potential discharge from the mine process water system with special mention of RWD and any PCD's may lead to a loss in aquatic biodiversity.	171 870 m3			
247	Sewage discharge from mine offices and camps may lead to a loss in aquatic biodiversity.	7 Ha			
248	It is considered likely that the operational activities, with special mention of the open cast mining activities, will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture	175 Ha			

	stress and a loss of aquatic habitat as well as a loss of surface water recharge to the wetlands and springs which occur in the vicinity of the proposed mining project.				
249	Acidification as a result of pyrite oxidation and the release of metals due to tillage and blasting may lead to a loss in aquatic biodiversity	175 Ha			
Closure and Decommissioning Phase					During decommissioning and closure
250	Loss of MAR from latent dirty water areas may still impact on the flow even after operational phase.	171 870 m3	• Ensure that as far as possible all infrastructures are removed and footprint areas are suitably rehabilitated. It is considered essential that no decommissioning activities take place within the drainage and river areas. In particular mention is made of the need to not encroach on the riparian systems near the Klein Marico River and its associated tributaries with a minimum buffer of 100m around all riparian systems maintained in line with the requirements of regulation GN704 of the national Water Act • Ensure that sound environmental management is in place during the decommissioning phase • Ensure that there is a clear separation of clean and dirty water. No dirty water should be allowed to come into contact with the receiving environment during the decommissioning phase of the proposed Doornhoek mining project • Limit the footprint area of the decommissioning 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 • If it is absolutely unavoidable that either the Klein Marico River or its associated tributaries will be affected, disturbance must be minimised and suitably rehabilitated • Ensure that no incision and canalisation of the aquatic resources present takes place as a result of decommissioning activities • All erosion noted within the study area should be remedied immediately and		
251	Loss of water to inadequately rehabilitated areas may still have an impact on the flow post operational phase.	175 Ha			

252	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post operational phase	175 Ha	included as part of the ongoing rehabilitation plan • Ensure that decommissioning of 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 transformation of aquatic habitat areas • As much vegetation growth as possible should be promoted within the proposed development area during the decommissioning phase in order to protect soils and vegetation clearance should be kept to a minimum as the biomass in the area is not very high and so hence the plants will not grow quickly • Permit only essential personnel within 100m of all riparian systems • All areas of increased ecological sensitivity should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel during the decommissioning phase of the proposed Doornhoek mining project • No crossing of the aquatic resources should take place and the substrate conditions of the aquatic resources and stream connectivity must be maintained • No material may be dumped within any rivers, tributaries or drainage lines in the vicinity of the proposed Doornhoek mining project.		
253	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.	180 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 • Dirty water 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 (when surface water is present) during		
254	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.	171 870 m3			

255	Poor housekeeping and management during decommissioning phase may lead to impacts on water quality.	400 Ha	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 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.		
256	Spills and other unplanned events during decommissioning phase may impact on water quality.	7.5 Ha			
257	Disturbance of soils as part of demolition activities may alter the aquatic habitat.	7 Ha	• Ensure that as far as possible all decommissioning activities take place outside of drainage and river areas. In particular, mention is made of the need to not encroach on the riparian systems near the Klein Marico River and its associated tributaries 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 • Keep all demarcated sensitive zones outside of the decommissioning area off limits during the decommissioning phase of the project • Ongoing adherence to the alien vegetation control program within the riparian zones with special mention of water loving tree species and invasive species such as Arundo donax and Typha capensis • Monitor all systems for erosion and incision • Monitor all affected riparian systems for moisture stress • Monitor all potentially affected riparian zones for changes in riparian vegetation structure • Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor in order to identify any emerging issues in the receiving environment		
258	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	171 870 m3			
259	Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat.	157 Ha			
260	Alien vegetation encroachment will impact on and alter the aquatic habitat.	400 Ha			
261	Disturbance of soils as part of demolition activities may lead to a loss in aquatic	7 Ha	• Ensure that as far as possible all decommissioning activities take place outside of drainage and river areas. In particular mention is made of the need to not encroach on the riparian systems near the Klein Marico River and its		

	biodiversity.		associated drainage lines with a minimum buffer of 100m around all riparian systems maintained in line with the requirements of regulation GN704 of the national Water Act • No use of clean surface water or any groundwater which potentially recharges the watercourses in the area should take place. In this regard specific mention is made of any water use which will affect the instream flow in the Klein Marico River and the associated tributaries and in turn affect more sensitive taxa which require faster flowing habitat • Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised • Permit only essential personnel within 100m of all riparian systems • Keep all demarcated sensitive zones outside of the decommissioning area off limits during the decommissioning phase of the development • Ongoing adherence to the alien vegetation control program • 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 • Limit the footprint area of the decommissioning activities 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 and the disturbance of soils leading to runoff, erosion and sedimentation • Ensure that all spills are immediately cleaned up • All hazardous chemicals must be stored on specified surfaces • Any areas where active erosion is observed must be rehabilitated and berms utilised to slow movement of water • Implement measures to contain seepage from latent dirty water areas as far as possible to prevent contamination of the groundwater regime • Monitor all systems for erosion and incision • Monitor all affected riparian systems for moisture stress • Monitor all potentially affected riparian zones for changes in riparian vegetation structure • 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 • Monitor all dirty water management facilities using toxicological screening methods and implement the calculation of discharge dilution factors by means of the Direct Estimation of Ecological Effect Potential (DEEEP) protocol; • Toxicological monitoring of the receiving and process water systems on a quarterly basis.		
262	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	171 870 m3			
263	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	180 Ha			
264	Inadequate closure leading to post closure impacts on water quality may lead to a loss in aquatic biodiversity.	400 Ha			
265	Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	400 Ha			
Post-Closure Phase					Following

266	Loss of MAR from latent dirty water areas may still impact on the flow even after decommissioning phase.	171 870 m3	• Ongoing monitoring of the process water system and selected boreholes should take place for a period of at least three years post closure to monitor and mitigate any groundwater contamination plume post-closure as a result of seepage from latent dirty water areas • Ensure that no incision and canalisation of the aquatic resources present takes place as a result of inadequately rehabilitated mining areas • All erosion noted within the study area should be remedied immediately and included as part of the ongoing rehabilitation plan for a period of at least three years post-closure • As much vegetation growth as possible should be promoted to protect soils and vegetation clearance should be kept to a minimum as the biomass in the area is not very high and so hence the plants will not grow quickly and an ongoing alien vegetation control programme should be put in place for a period of at least three years post-closure, with special mention of the removal of invasive water loving trees • Permit only essential personnel within 100m of all riparian systems • No crossing of the aquatic resources should take place and the substrate conditions of the aquatic resources and stream connectivity must be maintained.		decommissioning and closure until rehabilitation and closure objectives have been achieved
267	Loss of water to inadequately rehabilitated areas may still have an impact on the flow post decommissioning phase.	175 Ha			
268	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post decommissioning phase	175 Ha			
269	Ongoing erosion and sedimentation of the aquatic resources, which will result in a loss of instream flow due to inadequate rehabilitation of affected areas.	400 Ha			
270	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	180 Ha	• Implement measures to contain seepage as far as possible to prevent contamination of the groundwater regime as a result of latent dirt 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 (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		

	special mention of contaminated dirty water decant degenerated from in-filled opencast pits		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 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		
271	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.	171 870 m3			
272	Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present.	400 Ha			
273	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	171 870 m3	• Ongoing monitoring of the process water system and selected boreholes should take place for a period of at least three years post closure to monitor and mitigate any groundwater contamination plume post-closure as a result of seepage from latent dirty water areas • Ensure that no incision and canalisation of the aquatic resources present takes place as a result of inadequately rehabilitated mining areas • All erosion noted within the study area should be remedied immediately and included as part of the ongoing rehabilitation plan for a period of at least three years post-closure • As much vegetation growth as possible should be promoted to protect soils and vegetation clearance should be kept to a minimum as the biomass in the area is not very high and so hence the plants will not grow quickly • Ongoing adherence to the alien vegetation control program within the riparian zones with special mention of water loving tree species and invasive species such as Arundo donax and Typha capensis • Monitor all affected riparian systems for moisture stress		
274	Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat.	7 Ha			
275	Alien vegetation encroachment will impact on and alter	400 Ha			

	the aquatic habitat.		• Monitor all potentially affected riparian zones for changes in riparian vegetation structure • Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor in order to identify any emerging issues in the receiving environment		
276	Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	400 Ha	• Ongoing monitoring of the process water system and selected boreholes should take place for a period of at least three years post closure to monitor and mitigate any groundwater contamination plume post-closure as a result of seepage from latent dirty water areas • Ensure that no incision and canalisation of the aquatic resources present takes place as a result of inadequately rehabilitated mining areas • All erosion noted within the study area should be remedied immediately and included as part of the ongoing rehabilitation plan for a period of at least three years post-closure • As much vegetation growth as possible should be promoted to protect soils and vegetation clearance should be kept to a minimum as the biomass in the area is not very high and so hence the plants will not grow quickly • Ongoing adherence to the alien vegetation control program within the riparian zones with special mention of water loving tree species and invasive species such as Arundo donax and Typha capensis • Monitor all affected riparian systems for moisture stress • Monitor all potentially affected riparian zones for changes in riparian vegetation structure • Ongoing aquatic ecological monitoring must take place on a 6 monthly basis by an SA RHP Accredited assessor in order to identify any emerging issues in the receiving environment		
277	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	157 Ha			
278	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	180 Ha			
279	Potential post closure impacts on water quality may lead to a loss in aquatic biodiversity.	400 Ha			
	Socio-economic				
Construction Phase				Mine Health and Safety Act (Act 29 of 1996) & the Occupational Health and Safety Act (Act 85 of 1993) World Bank Environmental, Health and Safety guidelines Occupational Health and Safety Act (Act 85 of 1993)	During construction
280	Capital investment into the establishment of the mine	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		

				Skills development initiatives Employment Guideline	
281	Capital investment into the establishment of the mine	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.		
282	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.		
283	Creation of employment	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		
284	Capital investment into the establishment of the mine	N/A	Positive impact - No mitigation required		
285	Sterilisation of land due to construction and mine establishment activities	N/A	Engage with the directly and indirectly affected farmers to investigate the opportunities to minimise the loss of productive agricultural land		

286	Construction activities on site	N/A	Implement mitigation measures proposed by the various specialists. Including traffic, visual, and noise specialists.		
287	Influx of job seekers	N/A	• Engage with local authorities to inform them of the development as well as discuss with them the ability of the municipality to meet the demands for social and basic services created by the migrant construction workers • 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		
288	Capital investment into the establishment of the mine and recruitment of construction workers	N/A	• Establish central recruitment offices in the towns of Zeerust and Lichtenburg and enforce labour and recruitment legislation, if only one recruitment office is deemed necessary the DMR labour related unit must be engaged to amend this commitment. • 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		
Operational Phase					
289	Mining operations	N/A	Encourage procurement of required services, materials and other inputs from local communities		During operations
290	Mining 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		
291	Mining operations	N/A	Devise skills development programmes as part of SLP and implement them		
292	Creation of employment at the mine	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		
293	Mining operations	N/A	Positive impact - No mitigation required		

294	Extraction and processing of minerals	N/A	Seek opportunities to export the mined commodity		
295	Presence of the mine and resultant environmental impacts (noise, visual, air quality)	N/A	Implement mitigation measures proposed by the various specialists. Including traffic, visual, and noise specialists.		
296	Investment into the local communities through SLP	N/A	• Mine is to devise a project that enhances water supply to municipality and subsequently communities as per the SLP and seek alternative water saving initiatives • Devise and implement projects to address the local community needs and create SMME opportunities (as part of SLP)		
Closure					
297	Expenditure on decommissioning and closure	N/A	Encourage procurement of required services, materials and other inputs from local communities		
	Blasting				
Operational Phase					
289 - 313	Blasting	175 Ha	• Reduce charge mass per delay • Specific blast designs • Monitoring • Stemming controls • Use of quality explosives use • Do not sleep blasts for long periods • Proper charging practices	Mine Health and Safety Act, 1996 (Act No. 29 of 1996), Explosives Act (No. 15 of 2003)	During operations

37.8. IMPACT MANAGEMENT OUTCOMES

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph (section xx);

Table 24: Impact Management Outcomes Table

No	Activity	Impact	Mitigation Type	Roles & Responsibility	Standard to be achieved
Ecology					
Planning Phase				Project Proponent/EAP	NEMBA, NEMA, CARA
1	Eradication of protected trees / flora through permit applications	Eradication of protected trees	Control through permitting		
Construction Phase				Contractor/ SHEQ Manager	
2	Clearing of vegetation for open pit, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats	Remedy through rehabilitation; access control		
3	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	Soil erosion and sedimentation	Erosion, stormwater and dust control		
4	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species	Control of materials brought onto site, Alien Invasive Species control		

5	Vegetation clearing / vehicle movement	Habitat degradation due to dust	Dust control, remedy through rehabilitation		
6	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Pollution control		
7	Heavy machinery and vehicle movement on site; construction of infrastructure, roads etc.	Road mortalities of fauna / impact of human activities on site	Control of speed limits		
Operational Phase				Mine Environmental Officer / ECO	
8	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats	Remedy through rehabilitation		
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	Remedy through rehabilitation; management of topsoil		
10	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species	Control of materials brought onto site, Alien Invasive Species control		
11	Heavy machinery and vehicle movement on site	Habitat degradation due to dust	Dust control, remedy through rehabilitation		
12	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Pollution control		
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	Control of speed limits		

Closure and Decommissioning Phase				Mine Environmental Officer / ECO	
14	Rehabilitation of mining site	Improvement of habitat through revegetation / succession over time	Remedy through rehabilitation		
15	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	Erosion, stormwater and dust control		
16	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species	Control of materials brought onto site, Alien Invasive Species control		
17	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site / vehicle movement on site	Habitat degradation due to dust	Dust control, remedy through rehabilitation		
18	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Pollution control		
19	Heavy machinery and vehicle movement on site	Road mortalities of fauna / impact of human activities on site	Control of speed limits		
Post-Closure Phase				Mine Environmental Officer / ECO	
20	Natural Successional processes	Improvement of habitat through revegetation / succession over time	Remedy through rehabilitation		
21	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	Erosion, stormwater and dust control		
22	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	Control of materials brought onto site, Alien Invasive Species control		

Wetlands					
Planning Phase				Project Proponent/EAP	NEMA. NWA and GNR 704, NEMWA
23	Obtaining of IWUL for crossings and mining through water courses / wetlands	Delay of mining onset	Control through licencing		
Construction Phase				Contractor/ SHEQ Manager	
24	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Wetland and watercourse destruction / fragmentation of wetland habitats	Access control		
25	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Impediment of flow patterns	Access control; stormwater management and erosion control		
26	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	Erosion, stormwater and dust control		
27	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species in wetlands	Control of materials brought onto site, Alien Invasive Species control		
28	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Pollution control		
Operational Phase				Mine Environmental Officer / ECO	
29	Opencast mining	Dewatering of wetlands causing direct habitat loss / destruction	Access control, surface and groundwater management		
30	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	Erosion, stormwater and dust control		

31	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species in wetlands	Control of materials brought onto site, Alien Invasive Species control		
32	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in wetlands	Pollution control		
Closure and Decommissioning Phase				Mine Environmental Officer / ECO	
33	Rehabilitation of mining site	Improvement of wetland habitat through revegetation / succession over time	Remedy through rehabilitation		
34	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation in wetlands	Erosion, stormwater and dust control		
35	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species in wetlands	Control of materials brought onto site, Alien Invasive Species control		
36	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Pollution control		
Post-Closure Phase				Mine Environmental Officer / ECO	
37	Natural Successional processes	Improvement of wetland habitat at crossings through revegetation / succession over time	Remedy through rehabilitation		
38	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	Erosion, stormwater and dust control		
39	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species	Control of materials brought onto site, Alien Invasive Species control		
Soils					
Planning Phase				Project Proponent/EAP	NEMA, NEMWA,

40	Obtaining of IWUL for crossings (wetland soils) and mining layout on sensitive soils	Delay of mining onset	Control through permitting and licencing		CARA, MPRDA – Regulation 70
Construction Phase				Contractor/ SHEQ Manager	
41	Heavy machinery and vehicle movement on site	Soil compaction	Access control; remedy through rehabilitation		
42	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	Erosion, stormwater and dust control		
43	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Pollution control		
44	Topsoil & subsoil stripping	Soil destruction and sterilization	Topsoil management		
45	Topsoil & subsoil stripping, Clearing of vegetation through wetlands and water courses for road crossings	Loss of land capability	Access control		
Operational Phase				Mine Environmental Officer / ECO	
46	Heavy machinery and vehicle movement on site, laydown areas of overburden dumps and stockpiles	Soil compaction	Access control; remedy through rehabilitation		
47	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	Erosion, stormwater and dust control		
48	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in wetlands	Pollution control		
49	Topsoil & subsoil stripping, opencast mining	Soil destruction and sterilization	Remedy through rehabilitation		

50	Topsoil & subsoil stripping, clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Loss of land capability	Access control, remedy through rehabilitation	Mine Environmental Officer / ECO	
Closure and Decommissioning Phase					
51	Rehabilitation of mining site	Improvement of eroded soils and compaction / backfilling of pits	Remedy through rehabilitation		
52	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation	Erosion, stormwater and dust control		
53	Heavy machinery and vehicle movement on site	Soil compaction	Access control; remedy through rehabilitation		
54	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Pollution control	Mine Environmental Officer / ECO	
Post-Closure Phase					
55	Natural processes	Improvement of soil compaction and erosion	Remedy through rehabilitation		
56	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation	Erosion, stormwater and dust control		
Air Quality					
Planning Phase				Project proponent	NEM:AQA, National Ambient Air Quality Standards (GNR 1210 and GNR 486), National Dust Control Regulations (GNR 827)
57	Existing baseline ambient conditions	PM10 and PM2.5	N/A		
Construction Phase				Contractor/ SHEQ Manager	
58	Transport and general construction activities	Gaseous and particulate emissions; fugitive dust	Vehicle maintenance and dust control		
59	Clearing of groundcover and levelling of area	PM10 and PM2.5	Dust control, access control, remedy through rehabilitation		
60	Materials handling	PM10 and PM2.5	Dust control		

61	Wind erosion from open areas	PM10 and PM2.5	Dust control, access control, remedy through rehabilitation		
Operational Phase				Mine Environmental Officer / ECO	
62	Vehicle activity on paved and unpaved roads	Gaseous and particulate emissions; fugitive dust	Dust control		
63	Materials handling operations	PM10 and PM2.5	Dust control		
64	Mining operations within open pit	PM10 and PM2.5	Dust control		
65	Wind erosion	PM10 and PM2.5	Dust control		
Closure and Decommissioning Phase				Mine Environmental Officer / ECO	
66	Dust generated during rehabilitation activities	PM10 and PM2.5	Dust control		
67	Demolition of the structure	PM10 and PM2.5	Dust control		
68	Tailpipe emissions from vehicles utilised during the closure phase	Gaseous and particulate emissions; fugitive dust	Vehicle maintenance and dust control		
Post-Closure Phase				Mine Environmental Officer / ECO	
69	Wind erosion from open areas	PM10 and PM2.5	Remedy through rehabilitation		
Geochemical / Waste Classification					

Operational Phase				Mine Environmental Officer / ECO	NEMWA - GNR 632, GNR 634, SANS 10234, MPRDA - Regulation 73, NWA
70	Disposal of tailings on tailings facility	Development of acid mine drainage conditions	N/A		
71	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids	N/A		
72	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	Engineering		
73	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate	Pollution control		
74	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids	N/A		
75	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	N/A		
76	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate	Pollution control		
Post-Closure Phase				Mine Environmental Officer / ECO	
77	Disposal of tailings on tailings facility	Development of acid mine drainage conditions	N/A		
78	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids	N/A		
79	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	Pollution control		
80	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate	Pollution control		
81	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids	N/A		

82	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride	N/A		
83	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate	Pollution control		
Noise					
Planning Phase				Project Proponent	NEMA, ECA - National noise-control regulations (GNR154), SANS 10103:2008, SANS 10210:2004, SANS 10328:2008, SANS 10357:2004 MPRDA – Regulation 66
84	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels	N/A		
Construction Phase				Contractor/ SHEQ Manager	
85	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.	N/A		
Operational Phase				Mine Environmental Officer / ECO	
86	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.	N/A		
Closure and Decommissioning Phase				Mine Environmental Officer / ECO	
87	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.	N/A		
Post-Closure Phase				Mine Environmental Officer / ECO	
88	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.	N/A		
Planning Phase				Project Proponent	
89	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.	N/A		

90	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.	N/A		
Construction Phase				Contractor/ SHEQ Manager	
91	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.	N/A		
92	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.	N/A		
Operational Phase				Mine Environmental Officer / ECO	
93	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.	N/A		
94	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.	N/A		
Closure and Decommissioning Phase				Mine Environmental Officer / ECO	
95	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.	N/A		
96	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.	N/A		
Post-Closure Phase				Mine Environmental Officer / ECO	
97	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.	N/A		

98	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.	N/A		
Planning Phase				Project Proponent	
99	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.	N/A		
100	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.	N/A		
Construction Phase				Contractor/ SHEQ Manager	
101	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.	N/A		
102	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.	Noise control measures		
Operational Phase				Mine Environmental Officer / ECO	
103	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.	N/A		
104	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.	Noise control measures		
Closure and Decommissioning Phase				Mine Environmental Officer / ECO	
105	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.	N/A		

106	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.	Noise control measures		
Post-Closure Phase				Mine Environmental Officer / ECO	
107	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.	N/A		
108	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.	N/A		
Planning Phase				Project Proponent	
109	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	N/A		
110	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	N/A		
Construction Phase				Contractor/ SHEQ Manager	
111	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	N/A		
112	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	Noise control measures		

Operational Phase				Mine Environmental Officer / ECO	
113	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	N/A		
114	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	Noise control measures		
Closure and Decommissioning Phase				Mine Environmental Officer / ECO	
115	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	N/A		
116	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	Noise control measures		
Post-Closure Phase				Mine Environmental Officer / ECO	
117	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.	N/A		
118	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.	N/A		
Heritage					

Planning Phase				Project Proponent/EAP	NHRA
119	Planning	Site EXIGO-DFM-IA01 (medium significance)	Control through monitoring		
120	Planning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	Control through monitoring		
121	Planning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	Control through monitoring		
Construction Phase				Contractor/ SHEQ Manager	
122	Construction / Clearing	Site EXIGO-DFM-IA01 (medium significance)	Control through monitoring		
123	Construction / Clearing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	Control through monitoring		
124	Construction / Clearing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	Control through monitoring		
Operational Phase				Mine Environmental Officer / ECO	
125	Mining / Processing	Site EXIGO-DFM-IA01 (medium significance)	Control through monitoring		
126	Mining / Processing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium	Control through monitoring		

		significance)			
127	Mining / Processing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	Control through monitoring		
Closure and Decommissioning Phase				Mine Environmental Officer / ECO	
128	Decommissioning	Site EXIGO-DFM-IA01 (medium significance)	Control through monitoring		
129	Decommissioning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	Control through monitoring		
130	Decommissioning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	Control through monitoring		
Post-Closure Phase				Mine Environmental Officer / ECO	
131	Post-Closure	Site EXIGO-DFM-IA01 (medium significance)	Control through monitoring		
132	Post-Closure	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)	Control through monitoring		
133	Post-Closure	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)	Control through monitoring		
Palaeontology					

Construction Phase				Contractor/ SHEQ Manager	NHRA
134	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of stromatolites	Control through monitoring		
135	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of fossils.	Control through monitoring		
136	Construction of buildings, dams, roads, pylons. Exploration for mining	Preservation of fossils.	N/A		
Operational Phase				Mine Environmental Officer / ECO	
137	Mining	Destruction of stromatolites	Control through monitoring		
138	Mining	Destruction of fossils.	Control through monitoring		
139	Mining	Preservation of fossils.	N/A		

Traffic					
Planning Phase				Project Proponent/EAP	South African Traffic Impact Standards Site Traffic Assessment Standards and Requirements Manual (2012)
140	Vehicular operation and usage of roads	Increase in traffic	N/A		
Construction Phase				Contractor/ SHEQ Manager	
141	Construction of plant and access roads	Increased traffic volumes: Traffic volumes is very low with the increase in traffic flow still well below road capacity Impeded access	Control through speed limits and signage, dust control and maintenance		
142	Road upgrades	Improved access points resulting in increased safety for all road users	Control through speed limits and signage		
143	Road upgrades	Upgrades to roads benefitting all road users	Control through speed limits and signage		
144	Road rehabilitation	Rehabilitation of roads benefitting all road users	Control through speed limits and signage		
Operational Phase				Mine Environmental Officer /	

145	Vehicular operation and usage of roads	Added trips to the surrounding road network resulting in an increase in traffic	Control through speed limits and signage, dust control and maintenance	ECO	
Closure and Decommissioning Phase				Mine Environmental Officer / ECO	
146	Vehicular operation and usage of roads	Increase in traffic Deterioration in road quality	Control through speed limits and signage, dust control and maintenance		
Post-Closure Phase				Mine Environmental Officer / ECO	
147	No traffic	No impact	N/A		
Visual					
Planning Phase				Project Proponent/EAP	NEMA. NEM: Protected Areas Act, NHRA, Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving
148	Implementation of Mitigation Measures such as visual berms / vegetation screens	No negative visual impact	N/A		
Construction Phase				Contractor/ SHEQ Manager	
149	Site preparation: clearance of vegetation and dust generation	Alteration of the visual quality and sense of place of the area	Dust control		

150	Construction of the Site Camp / Office	Alteration of the visual quality and sense of place of the area	Control of mining footprint		Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)
151	Removal of topsoil and subsoil for open pit mining: overburden dumps, topsoil dumps and dust generation	Alteration of the visual quality and sense of place of the area	Dust control		
152	Construction of the plant and access roads: physical structure will become more visible	Alteration of the visual quality and sense of place of the area	Control through plant design		
153	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 of lighting		
Operational Phase				Mine Environmental Officer / ECO	
154	Physical structure of the plant	Alteration of the visual quality and sense of place of the area	Dust control		
155	Physical structure of the TSF	Alteration of the visual quality and sense of place of the area	Remedy through rehabilitation		
156	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	Dust control		
157	Topsoil dumps, overburden dumps	Alteration of the visual quality and sense of place of the area	Dust control		
158	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 of lighting		
Closure and Decommissioning Phase				Mine Environmental Officer / ECO	
159	Removal of the plant structures: generation of dust	Alteration of the visual quality and sense of place of the area	Dust control		
160	Removal of the plant structures: physical structures will be gone	Improvement of the visual quality and sense of place of the area	Remedy through rehabilitation		
161	Closure of the open pit mining areas: generation of dust	Alteration of the visual quality and sense of place of the area	Dust control		

162	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	Dust control		
163	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 of lighting		
Post-Closure Phase				Mine Environmental Officer / ECO	
164	Rehabilitation of cleared areas	Improvement of the visual quality and sense of place of the area	N/A		
165	Physical structure of the TSF will remain on site	Alteration of the visual quality and sense of place of the area	Remedy through rehabilitation		
Hydrogeology					
Planning Phase				Project Proponent/EAP	NEMA, NWA and GNR 704, MPRDA – Regulation 70
166	Stakeholder engagement: aquifer testing arrangements.	Lowering of local water levels caused by pump testing.	Control through monitoring		
167	Establishment and operation of construction camp.	Groundwater and surface water contamination.	Pollution control		
168	Anthropogenic activities on site.	Contamination risk.	Pollution control		
169	Fuelling and movement of construction vehicles.	Risk of hydrocarbon spillage and contamination.	Pollution control		
Construction Phase				Contractor/ SHEQ Manager	
170	Oil, grease and diesel spillages from construction vehicles	Contamination risk.	Pollution control		
171	Pollution of groundwater due to sanitation facilities	Deterioration of groundwater quality	Pollution control		
172	Ground and surface water pollution	Deterioration of groundwater and	Pollution control		

	due to storage of chemicals and building materials	surface quality			
173	Spillages from diesel (fuel storage) facilities	Deterioration of groundwater and surface quality	Pollution control		
Operational Phase				Mine Environmental Officer / ECO	
174	Dewatering zone of influence.	Lowering of regional groundwater levels.	Control through monitoring		
175	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.	Control through monitoring		
176	Use of explosives for mine pit development.	Contribution to nitrate over-load in groundwater and surface water resources.	Control through monitoring		
177	Hydrocarbon spillages from fuel storage facilities, fuelling and wash-bays.	Hydrocarbon contamination of groundwater and surface water resources.	Pollution control		
178	Flooding of the open pit	Unsafe working conditions	Flood control		
179	Pollution of groundwater due to sanitation facilities	Deterioration of groundwater quality	Pollution control		
180	Seepage from overburden dumps	Deterioration of groundwater quality	Control through monitoring		
181	Sulphate and Fluoride leaching from the TDF	Deterioration of groundwater quality	Control through monitoring		
182	Increased TDS / Nitrate leaching from the overburden dumps	Deterioration of groundwater quality	Control through monitoring		
183	Dewatering: Water from the Klein Marico into the open pit	Depletion of surface water resource	Surface water management		
184	Dewatering: Spring flow affected	Deterioration of spring flow	Control through		

		quantity	monitoring		
185	Water losses: leaking pipes	Insufficient maintenance and increase in water use	Control of maintenance activities		
186	Water Losses: Transmission losses and evaporation	Insufficient maintenance and increase in water use	Control of maintenance activities		
187	Dewatering: Depletion of water levels in boreholes due to over pumping - Higher than recommended yield	Depletion of groundwater resource, impact on neighbouring users	Control through monitoring		
188	Dewatering: Depletion of water levels in boreholes due to over pumping - Longer than recommended pumping time	Depletion of groundwater resource, impact on neighbouring users	Control through monitoring		
189	Dewatering: Depletion of community water supply boreholes due to dewatering	Depletion of groundwater resource, impact on neighbouring users	Control through monitoring		
Post-Closure Phase					
190	Increased groundwater ingress at disturbed/rehabilitated areas.	Potential decanting of groundwater at low elevation areas.	Remedy through rehabilitation	Mine Environmental Officer / ECO	
191	Migration of contamination plume from mine contamination sources.	Contamination of regional groundwater and surface water resources.	Control through monitoring		
192	Post-closure pit flooding and acidification.	Negative impact on regional groundwater resources.	Control through monitoring		
193	Permanent radius of influence due to mine dewatering	Depletion of groundwater resource, impact on neighbouring users	Remedy through rehabilitation		
194	Sulphate and Fluoride leaching from the TDF	Deterioration of groundwater quality	Remedy through rehabilitation		
195	Increased TDS / Nitrate leaching from	Deterioration of groundwater	Remedy through		

	the overburden dumps	quality	rehabilitation		
Aquatic					
Planning Phase				Project Proponent/EAP	MPRDA, NEMA, NWA and GNR 704
196	Potentially poor planning leading to extensive dirty water areas which need to be managed which may reduce the mean annual run-off (MAR) to the non-perennial drainage systems in the area.	Loss of instream flow	Access control; control of dirty water systems		
197	Stormwater designs leading to rapid release of water which in turn may lead to a loss of streamflow regulation capabilities in the area	Loss of instream flow	Access control; stormwater management		
198	Use of surface runoff and groundwater sources for the supply of production water for the mining project may alter the flow in the receiving systems	Loss of instream flow	Groundwater management		
199	Use of layout option 2 may impact on the instream flow of the receiving systems.	Loss of instream flow	Control through engineering design		
200	Potentially poor planning leading to extensive and complex dirty water areas which need to be managed may impact on water quality.	Impacts on water quality	Control of dirty water systems		
201	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.	Impacts on water quality	Access control; control of dirty water systems		

202	Potentially inadequate separation of clean and dirty water areas leading to contaminated water leaving the defined dirty water area may impact in water quality.	Impacts on water quality	Control of dirty water systems		
203	Clean and dirty water systems not being designed adequately to ensure protection of the water resources.	Impacts on water quality	Control of dirty water systems		
204	Potentially poor planning leading to the placement of infrastructure within non-perennial drainage lines, with special mention of the waste stockpile areas as well as roads, road crossings and bridges all may alter the aquatic habitat.	Loss of aquatic habitat	Control through engineering design		
205	Potentially inadequate design of infrastructure leading to changes to instream habitat.	Loss of aquatic habitat	Control through engineering design		
206	Potentially inadequate design of infrastructure leading to changes to system hydrology may alter the aquatic habitat.	Loss of aquatic habitat	Control through engineering design		
207	Potentially inadequate separation of clean and dirty water areas and the prevention of the release of sediment rich water may alter the aquatic habitat within the receiving environment.	Loss of aquatic habitat	Control of dirty water systems		
208	Potentially poor planning leading to the placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Control through engineering design		

209	Potentially inadequate design of infrastructure leading to changes to instream habitat may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Control through engineering design		
210	Potentially inadequate design of infrastructure leading to changes to system hydrology may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Control through engineering design		
211	Potentially inadequate design of infrastructure leading to contamination of water and sediments in the streams may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Control through engineering design		
Construction Phase					
212	Disturbance of soils during the construction phase could lead to erosion and sedimentation of the aquatic resources present, thus resulting in a loss of instream flow.	Loss of instream flow	Access control, erosion control	Contractor/ SHEQ Manager	

213	Construction of clean and dirty water separation structures for dirty water management purposes may lead to altered flow levels.	Loss of instream flow	Control of dirty water systems		
214	Change in surface coverage. Development of the mining rights area will change the surface coverage in some areas from vegetated soil to buildings, hardened gravel roads, paved areas (parking) and compacted earth.	Loss of instream flow	Control of mining footprint		
215	Clean and dirty water systems not being constructed to the required specifications to prevent contamination of clean water areas may impact on water quality.	Impacts on water quality	Control of dirty water systems		
216	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.	Impacts on water quality	Erosion control, pollution control		

217	Poor housekeeping and management may lead to impacts on water quality.	Impacts on water quality	Pollution control		
218	Spills and other unplanned events may impact on water quality.	Impacts on water quality	Pollution control		
219	Site clearing and the removal of vegetation leading to increased runoff and erosion may alter the aquatic habitat.	Loss of aquatic habitat	Erosion control		
220	Site clearing and road construction and the disturbance of soils leading to increased erosion may alter the aquatic habitat.	Loss of aquatic habitat	Erosion control		
221	Earthworks in the vicinity of drainage systems leading to increased runoff and erosion and altered runoff patterns may alter the aquatic habitat.	Loss of aquatic habitat	Erosion control		
222	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	Control of removal of alien vegetation		
223	Site clearing and the removal of vegetation may lead to a loss in aquatic biodiversity. Site clearing and	Loss of aquatic biodiversity and sensitive taxa	Control of site clearance		

	road construction may lead to a loss in aquatic biodiversity.				
224	Earthworks and other mining construction activities in the vicinity of wetland and riparian areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Access control, control of mining footprint		
225	Placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Control of mining footprint		
226	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Control of dirty water systems		
Operational Phase					
227	Loss of MAR from dirty water areas may impact on the instream flow of the receiving systems.	Loss of instream flow	Pollution control, erosion control, stormwater management	Mine Environmental Officer / ECO	

228	Loss of water through clean and dirty water separation may alter instream flow on the receiving systems.	Loss of instream flow	Pollution control, erosion control, stormwater management		
229	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area, with special mention of the formation of an ever increasing cone of depression over the life of the proposed mining project as a result of open cast mining activities and water abstraction, may lead to altered instream flow	Loss of instream flow	Pollution control, erosion control		
230	Intercepting run-off around mining activities and infrastructure could reduce the amount of time that water would take to reach the Klein Marico River and its associated tributaries and may lead to “flash flood” events on varying scales.	Loss of instream flow	Flood control		
231	Capture of run-off and capture of rainfall (inundation) in the ‘dirty’/impacted areas would lower instream flow in the receiving environment.	Loss of instream flow	Stormwater management		
232	Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution.	Impacts on water quality	Pollution control		

233	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.	Impacts on water quality	Control of dirty water systems		
234	Poor housekeeping and management during operational phase may lead to impacts on water quality.	Impacts on water quality	Pollution control		
235	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.	Impacts on water quality	Pollution control, erosion control		
236	Spills and other unplanned events during operational phase may impact on water quality.	Impacts on water quality	Pollution control		
237	Ongoing disturbance of soils during general operational activities may alter the aquatic habitat.	Loss of aquatic habitat	Control of mining footprint		
238	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the operational phase.	Loss of aquatic habitat	Control of dirty water systems		
239	Mining related activities leading to	Loss of aquatic habitat	Control of mining		

	increased disturbance of soils and drainage lines may alter the aquatic habitat.		footprint		
240	Any activities which lead to the reduction of flow in the system with special mention of the use of surface and groundwater sources for production water may alter the aquatic habitat. It is considered likely that the operational activities will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat.	Loss of aquatic habitat	Groundwater and surface water management		
241	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	Control of removal of alien vegetation		
242	Ongoing disturbance of soils with general operational activities may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Control of mining footprint		
243	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Control of dirty water systems		
244	Loss of instream flow due to abstraction for water for production may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Groundwater and water use management		

245	Seepage from the discard dumps and overburden stockpiles may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Pollution control		
246	Potential discharge from the mine process water system with special mention of RWD and any PCD's may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Pollution control		
247	Sewage discharge from mine offices and camps may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Pollution control		
248	It is considered likely that the operational activities, with special mention of the open cast mining activities, will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat as well as a loss of surface water recharge to the wetlands and springs which occur in the vicinity of the proposed mining project.	Loss of aquatic biodiversity and sensitive taxa	Groundwater and surface water management		
249	Acidification as a result of pyrite oxidation and the release of metals due to tillage and blasting may lead to a loss in aquatic biodiversity	Loss of aquatic biodiversity and sensitive taxa	Pollution control		
Closure and Decommissioning Phase				Mine Environmental Officer /	

250	Loss of MAR from latent dirty water areas may still impact on the flow even after operational phase.	Loss of instream flow	Control of dirty water systems	ECO	
251	Loss of water to inadequately rehabilitated areas may still have an impact on the flow post operational phase.	Loss of instream flow	Remedy through rehabilitation		
252	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post operational phase	Loss of instream flow	Groundwater and surface water management		
253	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.	Impacts on water quality	Remedy through rehabilitation, pollution control		
254	Clean and dirty water systems not being maintained or decommissioned	Impacts on water quality	Remedy through rehabilitation, pollution		

	properly to the required specifications to prevent contamination of clean water areas may impact on water quality.		control		
255	Poor housekeeping and management during decommissioning phase may lead to impacts on water quality.	Impacts on water quality	Remedy through rehabilitation, pollution control		
256	Spills and other unplanned events during decommissioning phase may impact on water quality.	Impacts on water quality	Pollution control		
257	Disturbance of soils as part of demolition activities may alter the aquatic habitat.	Loss of aquatic habitat	Remedy through rehabilitation		
258	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	Loss of aquatic habitat	Control of dirty water systems		
259	Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat.	Loss of aquatic habitat	Pollution control		
260	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	Control of removal of alien vegetation		
261	Disturbance of soils as part of demolition activities may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Remedy through rehabilitation		

262	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Control of dirty water systems		
263	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Pollution control		
264	Inadequate closure leading to post closure impacts on water quality may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Remedy through rehabilitation, pollution control		
265	Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Remedy through rehabilitation, erosion control		
Post-Closure Phase				Mine Environmental Officer / ECO	
266	Loss of MAR from latent dirty water areas may still impact on the flow even after decommissioning phase.	Loss of instream flow	Control of dirty water systems		
267	Loss of water to inadequately rehabilitated areas may still have an impact on the flow post decommissioning phase.	Loss of instream flow	Remedy through rehabilitation		

268	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post decommissioning phase	Loss of instream flow	Groundwater and surface water management		
269	Ongoing erosion and sedimentation of the aquatic resources, which will result in a loss of instream flow due to inadequate rehabilitation of affected areas.	Loss of instream flow	Erosion control		
270	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 decant degenerated from in-filled opencast pits	Impacts on water quality	Remedy through rehabilitation, pollution control		
271	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.	Impacts on water quality	Control of dirty water systems		
272	Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present.	Impacts on water quality	Remedy through rehabilitation		
273	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	Loss of aquatic habitat	Control of dirty water systems		
274	Ongoing pollution from inappropriately decommissioned structures may alter	Loss of aquatic habitat	Remedy through rehabilitation, pollution		

	the aquatic habitat.		control		
275	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat	Control of removal of alien vegetation		
276	Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Remedy through rehabilitation, erosion control		
277	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Control of dirty water systems		
278	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Pollution control		
279	Potential post closure impacts on water quality may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa	Pollution control		
Socio-economic					
Construction Phase				Contractor/ SHEQ Manager	NEMA New Growth Path Framework (NGPF) (2010) National Development Plan (NDP) 2030 (2011 - 2030)
280	Capital investment into the establishment of the mine	Stimulation of production and GDP due to investment	Remedy through local procurement		
281	Capital investment into the establishment of the mine	Stimulation of employment due to investment	Remedy through employment		

					Industrial Policy Action Plan (IPAP) 2015/2016-2017/2018 North West Provincial Development Plan (PDP) 2030 (2013) Mine Health and Safety Act (Act 29 of 1996) World Bank Environmental, Health and Safety guidelines
282	Creation of employment	Improved standard of living due to creation of employment	Remedy through employment		
283	Creation of employment	Skills development	Remedy through skills development and training		
284	Capital investment into the establishment of the mine	Government revenue increase	N/A		
285	Sterilisation of land due to construction and mine establishment activities	Loss of agricultural production due to land sterilisation and other environmental impacts	Remedy through community relations		
286	Construction activities on site	Change in the sense of place among the directly and indirectly affected communities	Dust, noise and traffic control		
287	Influx of job seekers	Added pressure on basic service delivery and economic infrastructure	Remedy through community relations		

288	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	Remedy through employment		
Operational Phase				Mine Environmental Officer / ECO	
289	Mining operations	Stimulation of production and GDP due to operations	Remedy through local procurement		
290	Mining operations	Stimulation of employment creation due to operations	Remedy through local procurement		
291	Mining operations	Skills development	Remedy through skills development and training		
292	Creation of employment at the mine	Improved standard of living due to creation of employment	Remedy through local procurement		
293	Mining operations	Increase in government revenue and its ability to deliver services	N/A		
294	Extraction and processing of minerals	Export earnings	Enhance through exportation		
295	Presence of the mine and resultant environmental impacts (noise, visual, air quality)	Change in sense of place	Dust, noise and traffic control		
296	Investment into the local communities through SLP	Improved quality of life and service delivery	Remedy through SLP initiatives		
Closure				Mine Environmental Officer / ECO	
297	Expenditure on decommissioning and closure	Stimulation of production and GDP and employment	Remedy through local procurement		
Blasting					

Operational Phase					
289-313	Blasting	• Ground vibration Impact on houses, boreholes, roads and animals • Air blast impact on houses, boreholes, roads and animals • Fly rock impact on houses, boreholes, roads and animals • Impact of fumes on houses, boreholes, roads and animals	Control of blasting	Mine Environmental Officer / ECO	Mine Health and Safety Act, 1996 (Act No. 29 of 1996), Explosives Act (No. 15 of 2003)

37.9. IMPACT MANAGEMENT ACTIONS

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (c) and (d) will be achieved).

Table 25: Impact Management Actions Table

The necessary content required for this table has been included to Table 23 and Table 24 above.

Table 23 include the activity, Size and scale of disturbance, Mitigation Measures, Compliance with Standards, Time period for implementation and Table 24 the Mitigation Type, Roles & Responsibility, and Standard to be achieved.

37.10. FINANCIAL PROVISION

37.10.1. DETERMINATION OF THE AMOUNT OF FINANCIAL PROVISION

37.10.1.1. Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under Regulation 22 (2) (d) as described in 2.4 herein

The post closure land use proposed for the project area is to return the area to wilderness/natural/agricultural area suitable for grazing land. The Soils, Agricultural Potential And Land Capability report (Henning, 2016) conducted for the project area concluded that the agricultural potential, land capability and general characteristics of the soils on the site for the development of the Doornhoek Fluorspar Mine can be classified as having a soil potential that vary from Medium to low. The closure objectives have been determined taking this into account. The following closure objectives and goals are proposed:

1. To rehabilitate all disturbed land to a state that is suitable for its post closure use;
2. To ensure that affected areas are safe and secure for both human and animal activities;
3. The physical and chemical stability of the remaining structures should be such that risk to the environment through naturally occurring forces is eliminated;
4. To rehabilitate all disturbed land to a state where limited or preferably no post closure management is required;
5. To rehabilitate all disturbed land to a state that facilitates compliance with current environmental quality objectives (air and water quality); and
6. To limit the impact on personnel whose positions may become redundant on decommissioning of the operations.

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

The environmental objective in relation to closure was reported in the Draft Scoping which was made available to all registered I&AP's for comment for a period of 30 days. The closure objectives were also discussed in more detail with the relevant landowner's and I&AP's during the Scoping Phase public meeting which took place on the 28th of July 2016 and the various consultation meeting with I&AP's conducted by the applicant. All comments received and the relevant meeting minutes are appended to this report (Appendix 8.4: Public Meeting and Focus Group Meeting Minutes and Attendance Registers).

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

Please refer to the Post Closure Site Layout in Appendix 7.17: Rehabilitation, Decommissioning and Mine Closure Plan. It is proposed that the following infrastructure be transferred to the community or the local municipalities for future use post closure; however this will be subject to agreement with the relevant communities/local municipalities:

- General Mining complex infrastructure;
- Electrical sub-station and reticulation;
- Processing plant;
- Administrative buildings including Change House;
- Workshop and fuel storage facilities;
- Ore loading facility;
- Overburden dump;
- Tailings Storage Facility;
- Stormwater management infrastructure including dams;
- Water supply and distribution infrastructure;
- Water- and wastewater treatment facilities;
- Haul and access roads; and
- Perimeter and internal fencing.

Please note that as the above is subject to agreement with the communities and relevant municipalities, the financial provision for rehabilitation has been calculated to allow for the decommissioning of all infrastructure (including the above infrastructure and excluding the overburden dumps) and rehabilitation of the entire mining footprint, and is therefore considered conservative from a financial provision point of view.

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

The rehabilitation plan has been compiled in accordance with the objectives and goals listed in section 6.2 of Appendix 7.17: Rehabilitation, Decommissioning and Mine Closure Plan is deemed to be satisfactory according to the Mine and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) as amended and GNR 1147 of the National Environmental Management Act, 1988 (Act No. 107 of 1998).

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

As per the GNR 1147 of the NEMA, the calculated provision for closing for the mining operations is as follows:

- Immediate Closure Liability
  - In the event of an immediate 'lights-out' closure event at the end of the first year of operation (Year 8 after development started), the total financial provision required to successfully rehabilitate the mine is R 20 895 922.

- Life-of-Mine Closure Liability
  - Final LoM closure liability for the mine without any progressive rehabilitation actions is estimated to be R 102 421 420;
  - R 92 101 784 of the final LoM liability is to be planned for during the 30 year operational phase of the mine; and
  - R 10 319 636 will be required for the rehabilitation, closure and aftercare in the case of successful progressive rehabilitation during the operational period.

37.10.1.6. Confirm that the financial provision will be provided as determined.

The Immediate Closure Provision amount as determined will be provided by means of the combination of the following methods:

- Approved contribution(s) to a dedicated trust fund as provided for in terms of section 10(1)(cH) of the Income Tax Act, 1962; and
- A financial guarantee from a South African registered bank or any other bank or financial institution approved by the Director-General, guaranteeing the financial provision relating to implement the Environmental Management Plan (EMP) in the format approved by the Director-General from time to time.

37.11. MECHANISMS FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON, INCLUDING

a) Monitoring of Impact Management Actions
b) Monitoring and reporting frequency
c) Responsible persons
d) Time period for implementing impact management actions
e) Mechanism for monitoring compliance

37.11.1. ENVIRONMENTAL MONITORING AND AUDITING

DEAT (2004) defines environmental auditing as "a process whereby an organisation's environmental performance is tested against its environmental policies and objectives." Monitoring and auditing is an essential environmental management tool which is used to assess, evaluate and manage environmental and sustainability issues:

In order to ensure that the objectives of sustainable development and integrated environmental management are met and in order to obtain data which can inform continuous improvement of environmental practices at the site (adaptive management), monitoring and reporting will be an essential component of the proposed operations.

Monitoring and management actions associated with the project are contained in Table 26 of this report as well as in the various specialist reports associated with this project. This section provides a summary of the critical monitoring aspects per specific environmental field.

37.11.2. GENERAL MONITORING AND MANAGEMENT

The appointment of a suitably qualified on-site Environmental Control Officer (ECO) is essential to the successful implementation of this project, although this role can be fulfilled by the SHE Representative. The ECO will be responsible for the implementation of the EMP, applicable environmental legislation and any stipulations/conditions set by the relevant competent authorities (including but not limited to the DMR and DWS). The Environmental officer will conduct formal monthly site inspections and conduct an internal annual audit during the construction and operational phase.

An independent Environmental Control Officer (ECO) should also be appointed to conduct bi-annual (6 monthly) audits for the duration of the construction and operational phase. The Independent ECO should monitor the success and effective implementation of the environmental management measures stipulated by applicable legislation, the EIA&EMPR, and any conditions set by the competent authorities. Following each site visit, the ECO should submit a report to the DMR documenting the success/failure of the implementation of the management measures at the operations.

37.11.3. SPECIFIC MONITORING REQUIREMENTS

Monitoring of the proposed development (both on site and where appropriate in the surrounding environments) should be considered a high priority and should be conducted in accordance with the relevant specialist recommendations as summarized below:

37.11.4. MONITORING PROTOCOL

It is essential that during the construction and operational phase of the proposed development that the monitoring of certain elements are carried out to ensure compliance with regulatory bodies. A monitoring protocol for both the construction phase and the operational phase will be required. The monitoring only includes those activities identified in the EMPR and excludes any monitoring that should take place according to the water use license if and when it will be authorized.

37.11.5. MONITORING REQUIREMENTS AND RECORD KEEPING

To ensure that the procedures outlined throughout the EMPR are implemented effectively it will be necessary to monitor the implementation of the EMPR and evaluate the success of achieving the objectives listed in the EMPR. To ensure that all personnel on site are aware of their obligation to protect the environment, induction training will also include environmental awareness.

The audit procedure will include a Compliance audit, conducted by the Environmental Control Officer. Where the objectives of the EMPR are not being met the reasons will be determined and remedial action or variation to the tasks will be recommended. Major residual effects shall be documented in a Non-Conformance Report, during the construction and operational phases. Follow-up audits will be conducted as per the audit protocol in the EMPR.

37.11.5.1. Construction phase

The following monitoring needs to be conducted:

Refer to Table 26.

Monitoring must continue from the baseline monitoring already conducted, at least one year prior to construction so that seasonal variations are further accounted for over and above what is already known for the site.

37.11.5.2. Operational Phase

The following monitoring must be conducted:

Refer to Table 26.

37.11.6. AUDIT PROTOCOL

It is essential that during the construction and operational phases of the proposed development, the monitoring and auditing of certain elements are carried out to ensure compliance with regulatory bodies. An Audit Protocol for both the construction phase and the actual operational phase will be required. The auditing only includes those activities identified in the EIA&EMPR and excludes any auditing that should take place according to the water use license or any other legislative authorization process if and when they will be authorized.

37.11.6.1. Construction phase

The following audits need to be completed:

- EMPR compliance (on a daily basis): to be checked by an on-site ECO, SHE representative or Environmental manager (EM).
- EMPR compliance (on a bi-annual basis – 6 monthly): to be checked by an independent ECO.

37.11.6.2. Operational Phase

The following audits must be completed:

- External environmental compliance audits (EA and EMPR every 6 months during operations).

37.11.7. ENVIRONMENTAL INCIDENTS

An environmental incident is defined as any unplanned event that results in actual or potential damage to the environment, whether of a serious or non-serious nature. An incident may involve non-conformance with environmental legal requirements, the requirements of the EMPR, or contravention of written or verbal orders given by the ECO or relevant authority.

In the event of any incident, an Environmental Incident Log should be completed and these reports should be kept on file by the Environmental Manager. Such reports should provide the following details:

- Date of the Incident (and time if relevant)
- Description of the nature of the incident (what happened)
- Explanation for current conditions (why it happened), responsible person, supporting photographs etc.
- Description of corrective actions taken

Corrective action to mitigate the impact (appropriate to the nature and scale of the incident) should be conducted immediately and affected parties notified.

In the case of serious incidents or emergencies, the incident report should be sent to the relevant authority as soon as possible after the incident has been recorded.

37.11.8. PENALTIES AND FINES FOR NON-COMPLIANCE OR MISCONDUCT

This EMPR forms part of the contract agreement between the Client and the Principal contractor. As such, non-compliance with conditions of the EMPR will amount to a breach of contract. Penalties will be issued directly to the contractor by the applicant in the event of non-compliance to the EMPR specifications. The issuing of a penalty will be preceded by a verbal warning by the applicant, as well as strict instruction in at least one monthly ECO report to rectify the situation. The ECO and applicant will communicate with regards to realistic time-frames for possible rectification of the contravention, and possible consequences of continued non-compliance to the EMPR.

Penalties incurred do not preclude prosecution under any other law. Cost of rehabilitation and/or repair of environmental resources that were harmed by the actions of the contractor if such actions were in contravention of the specifications of the EMPR will be borne by the contractor himself. Penalties may be issued over and above such costs. The repair or rehabilitation of any environmental damage caused by non-compliance with the EMPR cannot be claimed in the Contract Bill, nor can any extension of time be claimed for such works. Penalty amounts shall be deducted from Certificate payments made to the Contractor.

The following categories of non-compliance are an indication of the severity of the contravention, and the fine or penalty amounts may be adjusted depending on the seriousness of the infringement.

- Category One – Acts of non-compliance that are unsightly, a nuisance or disruptive to adjacent landowners, existing communities, tourists or persons passing through the area.
- Category Two – Acts of non-compliance that cause minor environmental impact or localised disturbance.
- Category Three – Acts of non-compliance that affect significant environmental impact extending beyond point source.
- Category Four – Acts of non-compliance that result in major environmental impact affecting large areas, site character, protected species or conservation areas.

37.11.9. ENVIRONMENTAL AWARENESS PLAN

Environmental awareness training is critical for two primary reasons:

a) The workforce must understand how they can play a role in achieving the objectives specified in the EMPR; and
b) The workforce must understand their obligations in terms of the implementation of the EMPR and adherence to environmental-legislative requirements.

This environmental awareness plan is aimed at ensuring that employees, contractors, subcontractors and other relevant parties are aware of and able to meet their environmental commitments. This plan is to be updated on a yearly basis during the construction and operational phases of the project in light of operational changes, learning experiences and identified training needs.

All full time staff and contractors are required to attend an induction session when they start, which session should include environmental aspects.

It is therefore recommended that the ECO/Environmental Manager be involved in induction training. The induction sessions may be modified / adapted based on the audience attending the specific session, but it should ensure that all employees gain a suitable understanding of:

- Environmental requirements of the project, and how these will be implemented and monitored, including each employee's responsibilities with respect to environmental issues;
- Contents and commitments of the EMPR, including no-go areas, employee conduct, pollution prevention (prohibitions against littering, unauthorized fires, loud music, entry to adjacent properties, road conduct etc.);

- Environmentally sensitive areas on and around the proposed development sites, including why these are deemed important and how these are to be managed. Employees will also be made aware of protected species found on the site and how these are to be conserved, as well as alien invasive species potentially found on the site and how these should be managed; and
- Incident identification, remediation and reporting requirements: what constitutes an environmental incident (spillages, fire etc.) and how to react when such an incident occurs.

Environmental training will not be restricted to induction training sessions alone, but will be conducted on an on-going basis throughout the lifecycle of the project as and when required. Records are to be kept of the type of training given (matters discussed and by whom), date on which training was given and the attendees of each training session.

Table 26 Environmental Monitoring Table

No	Activity	Impact	Roles & Responsibility	Functional Requirements for Monitoring	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
Ecology					
Planning Phase			Project Proponent/EAP	Obtain protected tree permit from DAFF	Once-off, prior to construction
1	Eradication of protected trees / flora through permit applications	Eradication of protected trees			
Construction Phase			Contractor/ SHEQ Manager	Biodiversity monitoring as per the following indicators: • Extent and condition of wetlands; • Habitat transformation; • Distribution and abundance of selected alien plant species; • Viability of populations of endangered endemic species; The implementation of a vegetation monitoring programme is strongly recommended and will be a direct indicator of habitat transformation. Faunal monitoring programme should be implemented: • Assessment of future improvement/deterioration of the faunal biodiversity of the mine lease area (thus a measure of success of	Bi-annually
2	Clearing of vegetation for open pit, construction of infrastructure, access roads etc. causing direct habitat destruction / fragmentation	Habitat destruction / fragmentation of fauna habitats			
3	Topsoil & subsoil stripping, exposure of soils, ore and rock to wind and rain during construction causing erosion and sedimentation	Soil erosion and sedimentation			
4	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species			
5	Vegetation clearing / vehicle movement	Habitat degradation due to dust			

				environmental management). • Increase the accuracy of present status determination (actual species present vs. expected species) of the mine lease area with every survey. • Determination of both temporal and spatial trends in faunal biodiversity on the mine lease area. • Assist in future management of the mine lease area by providing recommendations and guidelines regarding future activities and rehabilitation. • Biodiversity management actions during closure should include controlling and monitoring of numbers of alien invasive fauna numbers by eradication, habitat modification, resource limitation and public education. Appropriate control measures for the Common Myna should be developed in consultation with local conservation agency and should form part of the mine's biodiversity action plan. • Young nutrient rich growth may entice herbivores to rehabilitated areas. The increased grazing pressure may decrease the rate of rehabilitation. Herbivore-proof fencing may be required around the rehabilitation zones in the early stages to protect seedlings from grazers if grazing pressure is found to significantly affect growth.	
6	Heavy machinery and vehicle movement on site	Spillages of harmful substances			
7	Heavy machinery and vehicle movement on site; construction of infrastructure, roads etc.	Road mortalities of fauna / impact of human activities on site			
Operational Phase			Mine Environmental Officer / ECO	Biodiversity monitoring as per the following indicators: • Extent and condition of wetlands; • Habitat transformation; • Distribution and abundance of selected alien plant species; • Viability of populations of endangered	Bi-annually
8	Storage of tailings, laydown areas of overburden dumps and stockpiles	Habitat destruction / fragmentation of fauna habitats			
9	Increased hardened surfaces around infrastructure and	Soil erosion and sedimentation			

	exposed areas around open pits, laydown areas of overburden dumps and stockpiles as well as TSF			endemic species; • Rehabilitation o Presence and percentage of pioneer species in the floral community o Presence/ absence and ratio of exotic versus indigenous species o Ratio of bare soil patches and ground cover o Presence, absence and trends in the occurrence of identified indicator/ sensitive species The implementation of a vegetation monitoring programme is strongly recommended and will be a direct indicator of habitat transformation. Faunal monitoring programme should be implemented: • Assessment of future improvement/deterioration of the faunal biodiversity of the mine lease area (thus a measure of success of environmental management). • Increase the accuracy of present status determination (actual species present vs. expected species) of the mine lease area with every survey. • Determination of both temporal and spatial trends in faunal biodiversity on the mine lease area. • Assist in future management of the mine lease area by providing recommendations and guidelines regarding future activities and rehabilitation. Appropriate control measures for the Common Myna should be developed in consultation with local conservation agency and should form part of the mine's biodiversity action plan. • Young nutrient rich growth may entice herbivores to rehabilitated areas. The increased grazing pressure may decrease the rate of rehabilitation.	
10	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species			
11	Heavy machinery and vehicle movement on site	Habitat degradation due to dust			
12	Heavy machinery and vehicle movement on site	Spillages of harmful substances			
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			

				Herbivore-proof fencing may be required around the rehabilitation zones in the early stages to protect seedlings from grazers if grazing pressure is found to significantly affect growth. • Revegetation programs will include consideration of the possibility of reconstructing fauna habitats. Old salvage logs from cleared areas will be replaced after mining, where possible, to provide habitat for fauna. • Key fauna species will be identified and targeted for re-colonisation where appropriate. Edible seed bearing plants, perennial grasses and sedges may be seeded or planted to encourage re-colonisation by native fauna.	
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	The implementation of a vegetation monitoring programme is strongly recommended and will be a direct indicator of habitat transformation. Monitoring and maintenance of vegetation cover should be done until a self-sustaining plant community is established. • Biodiversity management actions during closure should include controlling and monitoring of numbers of alien invasive fauna numbers by eradication, habitat modification, resource limitation and public education.	Bi-annually until a self-sustaining plant community is established
14	Rehabilitation of mining site	Improvement of habitat through revegetation / succession over time			
15	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation			
16	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site	Spreading and establishment of alien invasive species			
17	Demolition of mining infrastructure / Cessation of mining / rehabilitation of mining site / vehicle movement on site	Habitat degradation due to dust			
18	Heavy machinery and vehicle movement on site	Spillages of harmful substances			

19	Heavy machinery and vehicle movement on site	Road mortalities of fauna / impact of human activities on site			
Post-Closure Phase			Mine Environmental Officer / ECO	The implementation of a vegetation monitoring programme is strongly recommended and will be a direct indicator of habitat transformation. Monitoring and maintenance of vegetation cover should be done until a self-sustaining plant community is established.	Bi-annually until a self-sustaining plant community is established
20	Natural Successional processes	Improvement of habitat through revegetation / succession over time			
21	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation			
22	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species			
Wetlands					
Planning Phase			Project Proponent/EAP	N/A	N/A
23	Obtaining of IWUL for crossings and mining through water courses / wetlands	Delay of mining onset			
Construction Phase			Contractor/ SHEQ Manager	Biodiversity monitoring to establish the: • Extent and condition of wetlands; • Habitat transformation; • Distribution and abundance of selected alien plant species; • Viability of populations of endangered endemic species;	Bi-annually
24	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Wetland and watercourse destruction / fragmentation of wetland habitats			
25	Clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Impediment of flow patterns			
26	Topsoil & subsoil stripping, exposure of soils, ore and rock	Soil erosion and sedimentation			

	to wind and rain during construction causing erosion and sedimentation in wetlands				
27	Vegetation clearing / vehicle movement	Spreading and establishment of alien invasive species in wetlands			
28	Heavy machinery and vehicle movement on site	Spillages of harmful substances			
Operational Phase			Mine Environmental Officer / ECO	Biodiversity monitoring to establish the: • Extent and condition of wetlands; • Habitat transformation; • Distribution and abundance of selected alien plant species; • Viability of populations of endangered endemic species;	Bi-annually
29	Opencast mining	Dewatering of wetlands causing direct habitat loss / destruction			
30	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			
31	Heavy machinery and vehicle movement on site	Spreading and establishment of alien invasive species in wetlands			
32	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in wetlands			
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	Biodiversity monitoring of rehabilitation for the following: o Presence and percentage of pioneer species in the floral community o Presence/ absence and ratio of exotic versus indigenous species o Ratio of bare soil patches and ground cover o Presence, absence and trends in the occurrence of identified indicator/ sensitive species	Bi-annually until rehabilitation has been done according to closure objectives
33	Rehabilitation of mining site	Improvement of wetland habitat through revegetation / succession over time			
34	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation in wetlands			
35	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining	Spreading and establishment of alien invasive species in			

	site	wetlands			
36	Heavy machinery and vehicle movement on site	Spillages of harmful substances			
Post-Closure Phase			Mine Environmental Officer / ECO	Biodiversity monitoring of rehabilitation for the following: o Presence and percentage of pioneer species in the floral community o Presence/ absence and ratio of exotic versus indigenous species o Ratio of bare soil patches and ground cover o Presence, absence and trends in the occurrence of identified indicator/ sensitive species	Bi-annually until rehabilitation has been done according to closure objectives
37	Natural Successional processes	Improvement of wetland habitat at crossings through revegetation / succession over time			
38	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation			
39	Exposed surfaces / poor monitoring of revegetation on site	Spreading and establishment of alien invasive species			
Soils					
Planning Phase			Project Proponent/EAP	N/A	N/A
40	Obtaining of IWUL for crossings (wetland soils) and mining layout on sensitive soils	Delay of mining onset			
Construction Phase			Contractor/ SHEQ Manager	Maintenance and monitoring of soil erosion on an ongoing basis.	Ongoing throughout construction
41	Heavy machinery and vehicle movement on site	Soil compaction			
42	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			
43	Heavy machinery and vehicle movement on site	Spillages of harmful substances			
44	Topsoil & subsoil stripping	Soil destruction and sterilization			

45	Topsoil & subsoil stripping, Clearing of vegetation through wetlands and water courses for road crossings	Loss of land capability			
Operational Phase			Mine Environmental Officer / ECO	Maintenance and monitoring of soil erosion on an ongoing basis.	Ongoing throughout operations
46	Heavy machinery and vehicle movement on site, laydown areas of overburden dumps and stockpiles	Soil compaction			
47	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			
48	Heavy machinery and vehicle movement on site	Spillages of harmful substances leading to water pollution in wetlands			
49	Topsoil & subsoil stripping, opencast mining	Soil destruction and sterilization			
50	Topsoil & subsoil stripping, clearing of vegetation for open pit through wetlands and water courses as well as road crossings	Loss of land capability			
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	Maintenance and monitoring of soil erosion on an ongoing basis.	Bi-annually throughout decommissioning and closure
51	Rehabilitation of mining site	Improvement of eroded soils and compaction / backfilling of pits			
52	Demolition of mining infrastructure / cessation of mining / rehabilitation of mining site	Soil erosion and sedimentation			
53	Heavy machinery and vehicle movement on site	Soil compaction			

54	Heavy machinery and vehicle movement on site	Spillages of harmful substances			
Post-Closure Phase			Mine Environmental Officer / ECO	Maintenance and monitoring of soil erosion on an ongoing basis.	Bi-annually throughout decommissioning and closure
55	Natural processes	Improvement of soil compaction and erosion			
56	Exposed surfaces / unrehabilitated areas on site post closure / poor monitoring during LoM	Soil erosion and sedimentation			
Air Quality					
Planning Phase			Project proponent	Baseline Ambient Dust Monitoring	Initiate again 1 year prior to construction- continuous monitoring to be implemented facilitating data collection over 1-month averaging period.
57	Existing baseline ambient conditions	PM10 and PM2.5			
Construction Phase			Contractor/ SHEQ Manager	It is recommended that a dust fallout monitoring network be implemented at the proposed project site as recommended in section 6 of the AQIA in order to monitor the impacts from the proposed project activities. It is recommended to implement a dust fallout monitoring network consisting of 8 single dust buckets at the proposed mine and 2 single dust buckets at the railway siding. Dust fallout rates to be below 1200 mg/m²/day in non-residential areas and 600 mg/m2/day in residential areas, averaged over 30 days. It is recommended that PM10 sampling campaign be undertaken at the receptors in the northern operational area once the haul road in the vicinity is active in order to ensure that	On-going, continuous monitoring to be implemented facilitating data collection over 1-month averaging period.
58	Transport and general construction activities	Gaseous and particulate emissions; fugitive dust			
59	Clearing of groundcover and levelling of area	PM10 and PM2.5			
60	Materials handling	PM10 and PM2.5			
61	Wind erosion from open areas	PM10 and PM2.5			

				NAAQS are being met.	
Operational Phase					
62	Vehicle activity on paved and unpaved roads	Gaseous and particulate emissions; fugitive dust	Mine Environmental Officer / ECO	It is recommended that a dust fallout monitoring network be implemented at the proposed project site as recommended in section 6 of the AQIA in order to monitor the impacts from the proposed project activities. It is recommended to implement a dust fallout monitoring network consisting of 8 single dust buckets at the proposed mine and 2 single dust buckets at the railway siding. Dust fallout rates to be below 1200 mg/m²/day in non-residential areas and 600 mg/m2/day in residential areas, averaged over 30 days. It is recommended that PM10 sampling campaign be undertaken at the receptors in the northern operational area once the haul road in the vicinity is active in order to ensure that NAAQS are being met.	On-going, continuous monitoring to be implemented facilitating data collection over 1-month averaging period.
63	Materials handling operations	PM10 and PM2.5			
64	Mining operations within open pit	PM10 and PM2.5			
65	Wind erosion	PM10 and PM2.5			
Closure and Decommissioning Phase					
66	Dust generated during rehabilitation activities	PM10 and PM2.5	Mine Environmental Officer / ECO	It is recommended that a dust fallout monitoring network be implemented at the proposed project site as recommended in section 6 of the AQIA in order to monitor the impacts from the proposed project activities. It is recommended to implement a dust fallout monitoring network consisting of 8 single dust buckets at the proposed mine and 2 single dust buckets at the railway siding. Dust fallout rates to be below 1200 mg/m²/day in non-residential areas and 600 mg/m2/day in residential areas, averaged over 30 days. It is recommended that PM10 sampling campaign be undertaken at the receptors in the northern operational area once the haul road in the vicinity is active in order to ensure that NAAQS are being met.	On-going, continuous monitoring to be implemented facilitating data collection over 1-month averaging period. Monthly until northern haul road no longer in use by mine
67	Demolition of the structure	PM10 and PM2.5			
68	Tailpipe emissions from vehicles utilised during the closure phase	Gaseous and particulate emissions; fugitive dust			

Post-Closure Phase					
69	Wind erosion from open areas	PM10 and PM2.5	Mine Environmental Officer / ECO	Ambient Dust Monitoring	Continuous monitoring to be implemented facilitating data collection over 1-month averaging period - 1 year post closure.
Geochemical / Waste Classification					
Operational Phase			Mine Environmental Officer / ECO	A quarterly monitoring protocol should be implemented and fluoride and sulphate included in the parameters analysed. Nitrate should be included in the quarterly monitoring protocol if ammonium nitrate based explosives are to be used in the mining process. An annual comprehensive analysis should be included in the monitoring protocol.	Quarterly/Annually
70	Disposal of tailings on tailings facility	Development of acid mine drainage conditions			
71	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids			
72	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride			
73	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate			
74	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids			
75	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride			
76	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate			
Post-Closure Phase			Mine Environmental Officer / ECO	A quarterly monitoring protocol should be implemented and fluoride and sulphate included in the parameters	Quarterly/Annually
77	Disposal of tailings on tailings facility	Development of acid mine drainage			

		conditions		analysed. An annual comprehensive analysis should be included in the monitoring protocol	
78	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by metals and metalloids			
79	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by sulphate and fluoride			
80	Disposal of tailings on tailings facility	Contamination of groundwater, surface water and soil by nitrate			
81	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by metals and metalloids			
82	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by sulphate and fluoride			
83	Disposal of overburden onto overburden dump facility	Contamination of groundwater, surface water and soil by nitrate			
Noise					
Planning Phase			Project Proponent	It is highly recommended that baseline measurements are conducted before the construction phases commence (e.g. 1 or 2 measurement runs before construction phase).	Prior to construction
84	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels			
Construction Phase			Contractor/ SHEQ Manager	Noise monitoring is recommended at NSD08 and NSD10.	Bi-annually
85	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.			
Operational Phase			Mine Environmental Officer / ECO	Noise monitoring is recommended at	Bi-annually for the first two

86	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.		NSD08 and NSD10.	years of operations after which the noise monitoring plan can be reviewed.
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	N/A	N/A
87	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.			
Post-Closure Phase			Mine Environmental Officer / ECO	N/A	N/A
88	Construction Phase Years 1 - 5 (All receptors)	Potential increase/change of ambient/rating levels.			
Planning Phase			Project Proponent	It is highly recommended that baseline measurements are conducted before the construction phases commence (e.g. 1 or 2 measurement runs before construction phase).	Prior to construction
89	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.			
90	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.			
Construction Phase			Contractor/ SHEQ Manager	Noise monitoring is recommended at NSD08 and NSD10.	Bi-annually
91	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.			
92	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.			
Operational Phase			Mine Environmental Officer / ECO	Noise monitoring is recommended at NSD08 and NSD10.	Bi-annually for the first two years of operations after which the noise monitoring plan can be reviewed.
93	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.			

94	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.			
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	N/A	N/A
95	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.			
96	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.			
Post-Closure Phase			Mine Environmental Officer / ECO	N/A	N/A
97	Open cast years 5 - 10 (receptor 1 to 5)	Potential increase/change of ambient/rating levels.			
98	Open cast years 5 - 10 (receptor 5 to 10)	Potential increase/change of ambient/rating levels.			
Planning Phase			Project Proponent	It is highly recommended that baseline measurements are conducted before the construction phases commence (e.g. 1 or 2 measurement runs before construction phase).	Prior to construction
99	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.			
100	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.			
Construction Phase			Contractor/ SHEQ Manager	Noise monitoring is recommended at NSD08 and NSD10.	Bi-annually
101	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.			
102	Open cast years 10 - 20 (receptor 10)	Potential increase/change of			

		ambient/rating levels.			
Operational Phase			Mine Environmental Officer / ECO	Noise monitoring is recommended at NSD08 and NSD10.	Bi-annually for the first two years of operations after which the noise monitoring plan can be reviewed.
103	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.			
104	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.			
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	N/A	N/A
105	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.			
106	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.			
Post-Closure Phase			Mine Environmental Officer / ECO	N/A	N/A
107	Open cast years 10 - 20 (receptor 1 to 9)	Potential increase/change of ambient/rating levels.			
108	Open cast years 10 - 20 (receptor 10)	Potential increase/change of ambient/rating levels.			
Planning Phase			Project Proponent	It is highly recommended that baseline measurements are conducted before the construction phases commence (e.g. 1 or 2 measurement runs before construction phase).	Prior to construction
109	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.			

110	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.			
Construction Phase			Contractor/ SHEQ Manager	Noise monitoring is recommended at NSD08 and NSD10.	Bi-annually
111	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.			
112	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.			
Operational Phase			Mine Environmental Officer / ECO	Noise monitoring is recommended at NSD08 and NSD10.	Bi-annually for the first two years of operations after which the noise monitoring plan can be reviewed.
113	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.			
114	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.			
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	N/A	N/A
115	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.			
116	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.			
Post-Closure Phase			Mine Environmental Officer / ECO	N/A	N/A
117	Open cast years 20-30 (receptor 1 to 7 & 9 to 10)	Potential increase/change of ambient/rating levels.			
118	Open cast years 20-30 (receptor 8)	Potential increase/change of ambient/rating levels.			

Heritage					
Planning Phase			Project Proponent/EAP	Phase 2 Archaeological Impact Assessment and SAHRA destruction permit (if required)	Once-off, prior to construction
119	Planning	Site EXIGO-DFM-IA01 (medium significance)			
120	Planning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)			
121	Planning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)			
Construction Phase			Contractor/ SHEQ Manager	Heritage Site Monitoring	Quarterly during first 5 years of construction of roads and plant
122	Construction / Clearing	Site EXIGO-DFM-IA01 (medium significance)			
123	Construction / Clearing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)			
124	Construction / Clearing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)			
Operational Phase			Mine Environmental Officer / ECO	Heritage Site Monitoring	Monthly for a year for each resource during construction
125	Mining / Processing	Site EXIGO-DFM-IA01 (medium significance)			
126	Mining / Processing	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)			

127	Mining / Processing	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)			
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	N/A	N/A
128	Decommissioning	Site EXIGO-DFM-IA01 (medium significance)			
129	Decommissioning	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)			
130	Decommissioning	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)			
Post-Closure Phase			Mine Environmental Officer / ECO	N/A	N/A
131	Post-Closure	Site EXIGO-DFM-IA01 (medium significance)			
132	Post-Closure	Site EXIGO-DFM-IA02 & Site EXIGO-DFM-IA03 (medium significance)			
133	Post-Closure	Site EXIGO-DFM-FT01 - Site EXIGO-DFM-FT04 (low significance)			
Palaeontology					
Construction Phase			Contractor/ SHEQ Manager	Site Monitoring	Quarterly during first 5 years of construction of roads and plant
134	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of stromatolites			
135	Construction of buildings, dams, roads, pylons. Exploration for mining	Destruction of fossils.			

136	Construction of buildings, dams, roads, pylons. Exploration for mining	Preservation of fossils.			
Operational Phase			Mine Environmental Officer / ECO	Site Monitoring	Monthly for a year for each resource during construction
137	Mining	Destruction of stromatolites			
138	Mining	Destruction of fossils.			
139	Mining	Preservation of fossils.			
Traffic					
Planning Phase			Project Proponent/EAP	N/A	N/A
140	Vehicular operation and usage of roads	Increase in traffic			
Construction Phase			Contractor/ SHEQ Manager	N/A	N/A
141	Construction of plant and access roads	Increased traffic volumes: Traffic volumes is very low with the increase in traffic flow still well below road capacity Impeded access			
142	Road upgrades	Improved access points resulting in increased safety for all road users			
143	Road upgrades	Upgrades to roads benefitting all road users			
144	Road rehabilitation	Rehabilitation of roads			

		benefitting all road users			
Operational Phase			Mine Environmental Officer / ECO	N/A	N/A
145	Vehicular operation and usage of roads	Added trips to the surrounding road network resulting in an increase in traffic			
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	N/A	N/A
146	Vehicular operation and usage of roads	Increase in traffic Deterioration in road quality			
Post-Closure Phase			Mine Environmental Officer / ECO	N/A	N/A
147	No traffic	No impact			
Visual					
Planning Phase			Project Proponent/EAP	Refer to the relevant ecological monitoring requirements	Refer to the relevant ecological monitoring requirements
148	Implementation of Mitigation Measures such as visual berms / vegetation screens	No negative visual impact			
Construction Phase			Contractor/ SHEQ Manager	"	"
149	Site preparation: clearance of vegetation and dust generation	Alteration of the visual quality and sense of place of the area			
150	Construction of the Site Camp / Office	Alteration of the visual quality and sense of place of the area			
151	Removal of topsoil and subsoil for open pit mining: overburden dumps, topsoil dumps and dust generation	Alteration of the visual quality and sense of place of the area			
152	Construction of the plant and access roads: physical structure will become more visible	Alteration of the visual quality and sense of place of the area			
153	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			
Operational Phase			Mine Environmental Officer / ECO	"	"
154	Physical structure of the plant	Alteration of the visual quality and sense of place of the area			
155	Physical structure of the TSF	Alteration of the visual quality and sense of place of the area			
156	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			
157	Topsoil dumps, overburden dumps	Alteration of the visual quality and sense of place of the area			
158	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			
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	"	"
159	Removal of the plant structures: generation of dust	Alteration of the visual quality and sense of place of the area			
160	Removal of the plant structures: physical structures will be gone	Improvement of the visual quality and sense of place of the area			
161	Closure of the open pit mining areas: generation of dust	Alteration of the visual quality and sense of place of the area			
162	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			
163	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			
Post-Closure Phase			Mine Environmental Officer / ECO	"	"
164	Rehabilitation of cleared areas	Improvement of the visual quality and sense of place of the area			
165	Physical structure of the TSF will remain on site	Alteration of the visual quality and sense of place of the area			
Hydrogeology					
Planning Phase			Project Proponent/EAP	N/A	N/A
166	Stakeholder engagement: aquifer testing arrangements.	Lowering of local water levels caused by pump testing.			
167	Establishment and operation of construction camp.	Groundwater and surface water contamination.			
168	Anthropogenic activities on site.	Contamination risk.			
169	Fuelling and movement of construction vehicles.	Risk of hydrocarbon spillage and contamination.			
Construction Phase			Contractor/ SHEQ Manager	Ground and surface water monitoring: • In addition to the current monitoring points as per Table 10-1 of the Hydrogeological Impact Assessment, the following additional monitoring points are also recommended: 1. Detailed monitoring points between the open pits and the Klein Marico River, both shallow and deep paired boreholes. 2. Monitoring points on both sides of the dykes separating the following	Water level and water quality monitoring should be done monthly Isotope sampling should be done monthly
170	Oil, grease and diesel spillages from construction vehicles	Contamination risk.			
171	Pollution of groundwater due to sanitation facilities	Deterioration of groundwater quality			
172	Ground and surface water pollution due to storage of chemicals and building materials	Deterioration of groundwater and surface quality			
173	Spillages from diesel (fuel storage) facilities	Deterioration of groundwater and surface quality			

				compartments: (a) Compartment 3 and 2 – monitoring of impact of Resource A open pit. (b) Compartment 4 and 5 – monitoring of impact of preferred TSF position (c) Compartment 1 and 2 – monitoring of potential ZOI created by the open pit dewatering. • Monitoring points to be drilled around the proposed TSF and overburden dumps. These points should consist of shallow and deep boreholes to effectively monitor shallow and deep migration of salts both in the perched and deeper fractured rock aquifer. • Any additional water supply boreholes to be drilled in the future should be included in the monitoring protocol. • Constant isotope sampling and analyses should be conducted to ensure that water abstracted at the water supply boreholes as well as water pumped from the open pit mine workings does not originate from the Klein Marico River. This sampling should be done monthly.	
Operational Phase					
174	Dewatering zone of influence.	Lowering of regional groundwater levels.	Mine Environmental Officer / ECO	Ground and surface water monitoring: • In addition to the current monitoring points as per Table 10-1 of the Hydrogeological Impact Assessment, the following additional monitoring points are also recommended:	Water level and water quality monitoring should continue for LoM on a quarterly basis Isotope sampling should be done monthly
175	Contaminant leaching from mine waste facilities.	Groundwater and surface water contamination.			

176	Use of explosives for mine pit development.	Contribution to nitrate over-load in groundwater and surface water resources.		1. Detailed monitoring points between the open pits and the Klein Marico River, both shallow and deep paired boreholes. 2. Monitoring points on both sides of the dykes separating the following compartments: (a) Compartment 3 and 2 – monitoring of impact of Resource A open pit. (b) Compartment 4 and 5 – monitoring of impact of preferred TSF position (c) Compartment 1 and 2 – monitoring of potential ZOI created by the open pit dewatering. • Monitoring points to be drilled around the proposed TSF and overburden dumps. These points should consist of shallow and deep boreholes to effectively monitor shallow and deep migration of salts both in the perched and deeper fractured rock aquifer. • Any additional water supply boreholes to be drilled in the future should be included in the monitoring protocol. • Constant isotope sampling and analyses should be conducted to ensure that water abstracted at the water supply boreholes as well as water pumped from the open pit mine workings does not originate from the Klein Marico River. This sampling should be done monthly.	
177	Hydrocarbon spillages from fuel storage facilities, fuelling and wash-bays.	Hydrocarbon contamination of groundwater and surface water resources.			
178	Flooding of the open pit	Unsafe working conditions			
179	Pollution of groundwater due to sanitation facilities	Deterioration of groundwater quality			
180	Seepage from overburden dumps	Deterioration of groundwater quality			
181	Sulphate and Fluoride leaching from the TDF	Deterioration of groundwater quality			
182	Increased TDS / Nitrate leaching from the overburden dumps	Deterioration of groundwater quality			
183	Dewatering: Water from the Klein Marico into the open pit	Depletion of surface water resource			
184	Dewatering: Spring flow affected	Deterioration of spring flow quantity			
185	Water losses: leaking pipes	Insufficient maintenance and increase in water use			
186	Water Losses: Transmission losses and evaporation	Insufficient maintenance and increase in water use			
187	Dewatering: Depletion of water	Depletion of			

	levels in boreholes due to over pumping - Higher than recommended yield	groundwater resource, impact on neighbouring users			
188	Dewatering: Depletion of water levels in boreholes due to over pumping - Longer than recommended pumping time	Depletion of groundwater resource, impact on neighbouring users			
189	Dewatering: Depletion of community water supply boreholes due to dewatering	Depletion of groundwater resource, impact on neighbouring users			
Post-Closure Phase			Mine Environmental Officer / ECO	Ground and surface water monitoring: • In addition to the current monitoring points as per Table 10-1 of the Hydrogeological Impact Assessment, the following additional monitoring points are also recommended: 1. Detailed monitoring points between the open pits and the Klein Marico River, both shallow and deep paired boreholes. 2. Monitoring points on both sides of the dykes separating the following compartments: (a) Compartment 3 and 2 – monitoring of impact of Resource A open pit. (b) Compartment 4 and 5 – monitoring of impact of preferred TSF position (c) Compartment 1 and 2 – monitoring of potential ZOI created by the open pit dewatering. • Monitoring points to be drilled around the proposed TSF and overburden dumps. These points should consist of shallow and deep boreholes to effectively	Water level and water quality monitoring should be done for 5 years post-closure of the mine on a quarterly basis Isotope sampling should be done monthly *Monitoring results during the operational phase will be used to verify the post-closure monitoring term.*
190	Increased groundwater ingress at disturbed/rehabilitated areas.	Potential decanting of groundwater at low elevation areas.			
191	Migration of contamination plume from mine contamination sources.	Contamination of regional groundwater and surface water resources.			
192	Post-closure pit flooding and acidification.	Negative impact on regional groundwater resources.			
193	Permanent radius of influence due to mine dewatering	Depletion of groundwater resource, impact on neighbouring users			
194	Sulphate and Fluoride leaching from the TDF	Deterioration of groundwater quality			
195	Increased TDS / Nitrate leaching from the overburden dumps	Deterioration of groundwater quality			

				• monitor shallow and deep migration of salts both in the perched and deeper fractured rock aquifer. • Any additional water supply boreholes to be drilled in the future should be included in the monitoring protocol. • Constant isotope sampling and analyses should be conducted to ensure that water abstracted at the water supply boreholes as well as water pumped from the open pit mine workings does not originate from the Klein Marico River. This sampling should be done monthly.	
Aquatic					
Planning Phase			Project Proponent/EAP	• A baseline toxicological assessment of the groundwater and surface water resources prior to construction • Toxicity testing of the proposed Doornhoek mining project's process water facilities, the groundwater and surface water resources present should take place quarterly and concurrently with the biomonitoring program • Biomonitoring	Once-off Quarterly Initial quarterly assessment prior to major construction
196	Potentially poor planning leading to extensive dirty water areas which need to be managed which may reduce the mean annual run-off (MAR) to the non-perennial drainage systems in the area.	Loss of instream flow			
197	Stormwater designs leading to rapid release of water which in turn may lead to a loss of streamflow regulation capabilities in the area	Loss of instream flow			
198	Use of surface runoff and groundwater sources for the supply of production water for the mining project may alter the flow in the receiving systems	Loss of instream flow			
199	Use of layout option 2 may impact on the instream flow of	Loss of instream flow			

	the receiving systems.				
200	Potentially poor planning leading to extensive and complex dirty water areas which need to be managed may impact on water quality.	Impacts on water quality			
201	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.	Impacts on water quality			
202	Potentially inadequate separation of clean and dirty water areas leading to contaminated water leaving the defined dirty water area may impact in water quality.	Impacts on water quality			
203	Clean and dirty water systems not being designed adequately to ensure protection of the water resources.	Impacts on water quality			
204	Potentially poor planning leading to the placement of infrastructure within non-perennial drainage lines, with special mention of the waste stockpile areas as well as roads, road crossings and bridges all may alter the aquatic habitat.	Loss of aquatic habitat			
205	Potentially inadequate design of infrastructure leading to changes to instream habitat.	Loss of aquatic habitat			
206	Potentially inadequate design of infrastructure leading to changes to system hydrology may alter the aquatic habitat.	Loss of aquatic habitat			

207	Potentially inadequate separation of clean and dirty water areas and the prevention of the release of sediment rich water may alter the aquatic habitat within the receiving environment.	Loss of aquatic habitat			
208	Potentially poor planning leading to the placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
209	Potentially inadequate design of infrastructure leading to changes to instream habitat may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
210	Potentially inadequate design of infrastructure leading to changes to system hydrology may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
211	Potentially inadequate design of infrastructure leading to contamination of water and sediments in the streams may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			

Construction Phase					
212	Disturbance of soils during the construction phase could lead to erosion and sedimentation of the aquatic resources present, thus resulting in a loss of instream flow.	Loss of instream flow	Contractor/ SHEQ Manager	Aquatic Ecological Monitoring by an SA RHP Accredited assessor. It is recommended that a biannual high flow (Summer) and low flow (Winter) biomonitoring strategy be implemented	Bi-annually
213	Construction of clean and dirty water separation structures for dirty water management purposes may lead to altered flow levels.	Loss of instream flow			
214	Change in surface coverage. Development of the mining rights area will change the surface coverage in some areas from vegetated soil to buildings, hardened gravel roads, paved areas (parking) and compacted earth.	Loss of instream flow			
215	Clean and dirty water systems not being constructed to the required specifications to	Impacts on water quality			

	prevent contamination of clean water areas may impact on water quality.				
216	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.	Impacts on water quality			
217	Poor housekeeping and management may lead to impacts on water quality.	Impacts on water quality			
218	Spills and other unplanned events may impact on water quality.	Impacts on water quality			
219	Site clearing and the removal of vegetation leading to increased runoff and erosion may alter the aquatic habitat.	Loss of aquatic habitat			
220	Site clearing and road construction and the disturbance of soils leading to increased erosion may alter the aquatic habitat.	Loss of aquatic habitat			
221	Earthworks in the vicinity of drainage systems leading to	Loss of aquatic habitat			

	increased runoff and erosion and altered runoff patterns may alter the aquatic habitat.				
222	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat			
223	Site clearing and the removal of vegetation may lead to a loss in aquatic biodiversity. Site clearing and road construction may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
224	Earthworks and other mining construction activities in the vicinity of wetland and riparian areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
225	Placement of infrastructure within non-perennial drainage lines with special mention of the overburden stockpile areas, road crossings and bridges may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
226	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			

Operational Phase			Mine Environmental Officer / ECO	Aquatic Ecological Monitoring by an SA RHP Accredited assessor. It is recommended that a biannual high flow (Summer) and low flow (Winter) biomonitoring strategy be implemented	Bi-annually
227	Loss of MAR from dirty water areas may impact on the instream flow of the receiving systems.	Loss of instream flow			
228	Loss of water through clean and dirty water separation may alter instream flow on the receiving systems.	Loss of instream flow			
229	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area, with special mention of the formation of an ever increasing cone of depression over the life of the proposed mining project as a result of open cast mining activities and water abstraction, may lead to altered instream flow	Loss of instream flow			
230	Intercepting run-off around mining activities and infrastructure could reduce the amount of time that water would take to reach the Klein Marico River and its associated tributaries and may lead to “flash flood” events on varying scales.	Loss of instream flow			

231	Capture of run-off and capture of rainfall (inundation) in the 'dirty'/impacted areas would lower instream flow in the receiving environment.	Loss of instream flow			
232	Mining activities and the establishment of mining waste may impact on water quality and thus needs to be managed to prevent pollution.	Impacts on water quality			
233	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.	Impacts on water quality			
234	Poor housekeeping and management during operational phase may lead to impacts on water quality.	Impacts on water quality			
235	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.	Impacts on water quality			

236	Spills and other unplanned events during operational phase may impact on water quality.	Impacts on water quality			
237	Ongoing disturbance of soils during general operational activities may alter the aquatic habitat.	Loss of aquatic habitat			
238	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the operational phase.	Loss of aquatic habitat			
239	Mining related activities leading to increased disturbance of soils and drainage lines may alter the aquatic habitat.	Loss of aquatic habitat			
240	Any activities which lead to the reduction of flow in the system with special mention of the use of surface and groundwater sources for production water may alter the aquatic habitat. It is considered likely that the operational activities will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat.	Loss of aquatic habitat			
241	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat			
242	Ongoing disturbance of soils with general operational activities may lead to a loss in	Loss of aquatic biodiversity and sensitive taxa			

	aquatic biodiversity.				
243	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
244	Loss of instream flow due to abstraction for water for production may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
245	Seepage from the discard dumps and overburden stockpiles may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
246	Potential discharge from the mine process water system with special mention of RWD and any PCD's may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
247	Sewage discharge from mine offices and camps may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
248	It is considered likely that the operational activities, with special mention of the open	Loss of aquatic biodiversity and sensitive taxa			

	cast mining activities, will result in a cone of depression in the groundwater aquifers, which will spread outwards as dewatering occurs over the life of the project, thereby resulting in moisture stress and a loss of aquatic habitat as well as a loss of surface water recharge to the wetlands and springs which occur in the vicinity of the proposed mining project.				
249	Acidification as a result of pyrite oxidation and the release of metals due to tillage and blasting may lead to a loss in aquatic biodiversity	Loss of aquatic biodiversity and sensitive taxa			
Closure and Decommissioning Phase			Mine Environmental Officer / ECO	Aquatic Ecological Monitoring by an SA RHP Accredited assessor. It is recommended that a biannual high flow (Summer) and low flow (Winter) biomonitoring strategy be implemented	Bi-annually
250	Loss of MAR from latent dirty water areas may still impact on the flow even after operational phase.	Loss of instream flow			
251	Loss of water to inadequately rehabilitated areas may still have an impact on the flow post operational phase.	Loss of instream flow			

252	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post operational phase	Loss of instream flow			
253	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.	Impacts on water quality			
254	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.	Impacts on water quality			
255	Poor housekeeping and management during decommissioning phase may lead to impacts on water quality.	Impacts on water quality			
256	Spills and other unplanned events during decommissioning phase may impact on water quality.	Impacts on water quality			
257	Disturbance of soils as part of demolition activities may alter the aquatic habitat.	Loss of aquatic habitat			
258	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	Loss of aquatic habitat			

259	Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat.	Loss of aquatic habitat			
260	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat			
261	Disturbance of soils as part of demolition activities may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
262	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
263	Seepage from any latent discard dumps and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
264	Inadequate closure leading to post closure impacts on water quality may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			

265	Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
Post-Closure Phase			Mine Environmental Officer / ECO	Aquatic Ecological Monitoring by an SA RHP Accredited assessor. It is recommended that a biannual high flow (Summer) and low flow (Winter) biomonitoring strategy be implemented for a period of 1 year post closure	bi-annually 1 year after closure
266	Loss of MAR from latent dirty water areas may still impact on the flow even after decommissioning phase.	Loss of instream flow			
267	Loss of water to inadequately rehabilitated areas may still have an impact on the flow post decommissioning phase.	Loss of instream flow			
268	Impact on natural streamflow regulation and stream recharge due to altered hydrology in the area may impact on the flow post decommissioning phase	Loss of instream flow			
269	Ongoing erosion and sedimentation of the aquatic resources, which will result in a loss of instream flow due to inadequate rehabilitation of affected areas.	Loss of instream flow			
270	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 decant degenerated from in-filled opencast pits	Impacts on water quality			
271	Clean and dirty water systems not being maintained or	Impacts on water quality			

	decommissioned properly to the required specifications to prevent contamination of clean water areas may impact on water quality.				
272	Inadequate rehabilitation of mining areas leading to erosion and sedimentation of the aquatic resources present.	Impacts on water quality			
273	Inadequate separation of clean and dirty water areas may alter the aquatic habitat during the decommissioning phase.	Loss of aquatic habitat			
274	Ongoing pollution from inappropriately decommissioned structures may alter the aquatic habitat.	Loss of aquatic habitat			
275	Alien vegetation encroachment will impact on and alter the aquatic habitat.	Loss of aquatic habitat			
276	Ongoing erosion of disturbed areas that have not been adequately rehabilitated may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
277	Inadequate separation of clean and dirty water areas may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
278	Seepage from any latent discard dumps and dirty water	Loss of aquatic biodiversity and			

	areas may lead to a loss in aquatic biodiversity.	sensitive taxa			
279	Potential post closure impacts on water quality may lead to a loss in aquatic biodiversity.	Loss of aquatic biodiversity and sensitive taxa			
Socio-economic					
Construction Phase			Social Monitor	A social monitor with appropriate qualifications should be appointed by the mine to ensure that the impacts are managed and monitored throughout the life of the project.	Quarterly
280	Capital investment into the establishment of the mine	Stimulation of production and GDP due to investment			
281	Capital investment into the establishment of the mine	Stimulation of employment due to investment			
282	Creation of employment	Improved standard of living due to creation of employment			
283	Creation of employment	Skills development			
284	Capital investment into the establishment of the mine	Government revenue increase			
285	Sterilisation of land due to construction and mine establishment activities	Loss of agricultural production due to land sterilisation and other environmental impacts			
286	Construction activities on site	Change in the sense of place among the directly and indirectly affected communities			
287	Influx of job seekers	Added pressure on basic service delivery and economic infrastructure			

288	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			
Operational Phase			Mine Environmental Officer / ECO	A social monitor with appropriate qualifications should be appointed by the mine to ensure that the impacts are managed and monitored throughout the life of the project.	Quarterly
289	Mining operations	Stimulation of production and GDP due to operations			
290	Mining operations	Stimulation of employment creation due to operations			
291	Mining operations	Skills development			
292	Creation of employment at the mine	Improved standard of living due to creation of employment			
293	Mining operations	Increase in government revenue and its ability to deliver services			
294	Extraction and processing of minerals	Export earnings			
295	Presence of the mine and resultant environmental impacts (noise, visual, air quality)	Change in sense of place			
296	Investment into the local communities through SLP	Improved quality of life and service delivery			
Closure			Mine Environmental Officer / ECO	N/A	N/A
297	Expenditure on decommissioning and closure	Stimulation of production and GDP and employment			
Blasting					
Operational Phase			Mine Environmental Officer / ECO	Photographic Structure Inspections Ground Vibration and Air Blast	Pre-blasting survey Monitoring for duration of
289-313	Blasting	• Ground vibration			

		Impact on houses, boreholes, roads and animals • Air blast impact on houses, boreholes, roads and animals • Fly rock impact on houses, boreholes, roads and animals • Impact of fumes on houses, boreholes, roads and animals		Monitoring: Phase 1 - 3 monitoring points, Resource C & D - 11 monitoring points	blasting activities

37.12. INDICATE THE FREQUENCY OF THE SUBMISSION OF THE PERFORMANCE ASSESSMENT REPORT

Yearly performance assessment reports are recommended.

37.13. ENVIRONMENTAL AWARENESS PLAN

37.13.1. MANNER IN WHICH THE APPLICANT INTENDS TO INFORM HIS OR HER EMPLOYEES OF ANY ENVIRONMENTAL RISK WHICH MAY RESULT FROM THEIR WORK.

Refer to section 37.11.9.

37.13.2. MANNER IN WHICH RISKS WILL BE DEALT WITH IN ORDER TO AVOID POLLUTION OR THE DEGRADATION OF THE ENVIRONMENT.

Refer to Table 23 for the recommended mitigation measures to limit environmental impacts.

37.14. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

(among others, confirm that the financial provision will be reviewed annually).

The Immediate Closure Provision will be updated yearly as part of the annual liability assessment required by the MPRDA and GNR 1147 in terms of the NEMA, once operations commence.

38. UNDERTAKING

The EAP herewith confirms

f) the correctness of the information provided in the reports ☒

g) the inclusion of comments and inputs from stakeholders and I&APs ; ☒

h) the inclusion of inputs and recommendations from the specialist reports where relevant; ☒and

i) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; ☒

-END-

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40. APPENDIX 1: EAP'S CURRICULUM VITAE & QUALIFICATIONS

41. APPENDIX 2: COMPANY PROFILE

42. APPENDIX 3: LOCALITY MAP

43. APPENDIX 4: SITE PLAN

44. APPENDIX 5: DMR PRE-APPLICATION MEETING DOCUMENTATION AND CORRESPONDENCE

45. APPENDIX 6: DWS PRE-APPLICATION MEETING DOCUMENTATION AND CORRESPONDENCE

46. APPENDIX 7: SPECIALIST REPORTS

46.1. APPENDIX 7.1: SOCIO-ECONOMIC IMPACT ASSESSMENT

46.2. APPENDIX 7.2: ARCHAEOLOGICAL IMPACT ASSESSMENT

46.3. APPENDIX 7.3: PALAEONTOLOGICAL IMPACT ASSESSMENT

46.4. APPENDIX 7.4: ECOLOGICAL IMPACT ASSESSMENT

46.5. APPENDIX 7.5: SOILS, AGRICULTURAL POTENTIAL AND LAND CAPABILITY ASSESSMENT

46.6. APPENDIX 7.6: WETLAND IMPACT ASSESSMENT

46.7. APPENDIX 7.7: AQUATIC IMPACT ASSESSMENT

46.8. APPENDIX 7.8: HYDROGEOLOGICAL IMPACT ASSESSMENT

46.9. APPENDIX 7.9: REGIONAL WATER BALANCE

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46.14. APPENDIX 7.14: TRAFFIC IMPACT ASSESSMENT

46.15. APPENDIX 7.15: VISUAL IMPACT ASSESSMENT

46.16. APPENDIX 7.16: BLASTING AND VIBRATION STUDY

46.17. APPENDIX 7.17: REHABILITATION, DECOMMISSIONING AND MINE CLOSURE PLAN

46.18. APPENDIX 7.18: SOCIAL AND LABOUR PLAN (SLP)

47. APPENDIX 8: PUBLIC PARTICIPATION DOCUMENTATION

47.1. APPENDIX. 8.1: PROOF OF ADVERT

47.2. APPENDIX 8.2: PROOF OF SITE NOTICE

47.3. APPENDIX 8.3: PROOF OF NOTIFICATION

47.4. APPENDIX 8.4: PUBLIC MEETING AND FOCUS GROUP MEETING MINUTES AND ATTENDANCE REGISTERS

47.5. APPENDIX 8.5 I&AP CORRESPONDENCE

47.6. APPENDIX 9 PROPERTY LIST

47.7. APPENDIX 10 INTEGRATED WATER USE LICENCE APPLICATION (IWULA)