



REPORT

Draft Scoping Report: Application for EA and WUL for the proposed Turfvlakte Open Pit Mine Project at Grootegeeluk Coal Mine near Lephalale, Limpopo Province

Exxaro Resources Limited

Submitted to:

Department of Mineral Resources

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Distribution List

1 x Electronic Copy to Exxaro Resources Ltd

1 x Electronic and Hard Copy to Department of Mineral Resources

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Purpose of this Document

Exxaro Resources (Pty) Ltd (Exxaro) operates the Grootegeluk Coal Mine, located approximately 20 km west of Lephalale in the Limpopo Province. Grootegeluk Coal Mine produces three major groups of products i.e. semi-soft coking coal for the metallurgical industry, thermal coal for Matimba and Medupi Power Stations and steam coal for local and international markets.

Exxaro is proposing to expand their existing mining operations by extending the opencast mining operation to the farm Turfvlakte 463 LQ. The farm is located within Grootegeluk Coal Mine's existing Mining Right, LP 46 MRC.

Golder Associates Africa (Pty) Ltd (Golder), an independent environmental and engineering company, was appointed by Exxaro to conduct the required environmental authorisation and licensing processes for the proposed project. The proposed extension opencast operations will consist of two pits, namely Pit 1 and Pit 2. Pit 1 will be 158 ha in size and will be approximately 88 m deep, while Pit 2 will be 64 ha and approximately 109 m deep.

In terms of the Environmental Impact Assessment (EIA) Regulations GN R.324 – GN R.327 of 7 April 2017, Exxaro must submit an application for Environmental Authorisation (EA) to the Department of Mineral Resources (DMR), undertake an EIA and submit an Environmental Impact Assessment Report (EIAR) and an Environmental Management Programme (EMPr), which describes how the environmental impacts of the proposed mining operations will be managed and mitigated, to the DMR.

The proposed mining operations will require a Water Use Licence (WUL) and an Integrated Water and Waste Management Plan (IWWMP). An application for a WUL will be submitted to the Department of Water and Sanitation (DWS).

The first phase of the EIA is the Scoping Phase, during which interested and affected parties are given the opportunity to comment on the proposed activities and the proposed scope of the EIA specialist studies.

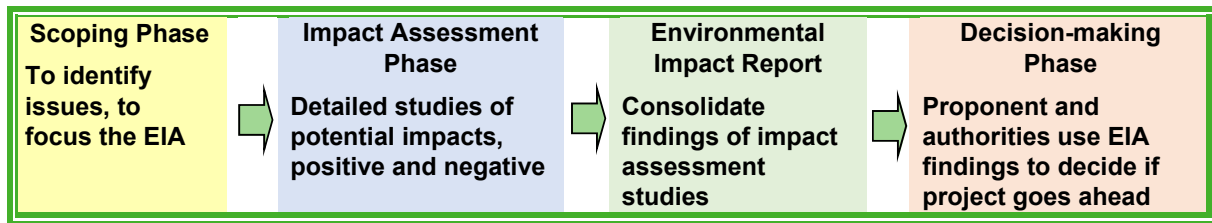
The Scoping Report is being presented to interested and affected parties and stakeholders to provide them with the opportunity to comment on the proposed project.

The due date for comment on this Scoping Report is **Tuesday 25 February 2020**. Comments received during the public review period will be acknowledged and recorded in the draft EIA/EMPr, which will be presented for public comment at a date to be advised.

Summary of what the Scoping Report contains

This report contains:

- A description of the proposed mining activities.
- An overview of the EIA process, including public participation.
- A description of the existing environment in the proposed project area.
- The anticipated environmental issues and impacts which have been identified.
- The proposed scope of specialist studies planned for the Impact Assessment phase.



The figure above shows the various phases of an Environmental Impact Assessment. This EIA is in the Scoping Phase, during which interested and affected parties comment on the proposed project.

PUBLIC REVIEW OF THE DRAFT SCOPING REPORT

This Draft Scoping Report is available for comment for a period of 30 days from **Monday 27 January 2020** until **Tuesday 25 February 2020** at the public places in the project area listed in the table, upon request from the Public Participation Office of Golder Associates, or can be downloaded from Golder's website: <https://www.golder.com/global-locations/africa/south-africa-public-documents/>.

PUBLIC PLACE	CONTACT PERSON	CONTACT NUMBER
Lephalale Public Library Corner Joe Slovo Lane and Douwater Road, Lephalale	Ms Hazel Mashaba	014 762 1453
Lephalale Police Station (SAPS) 3 Herman Street, Lephalale	Colonel Ramakgwakgwa	014 762 1000
Marapong Public Library 916 Phukubye Street, Marapong	Mr Sophonia Petja	014 762 1617
Golder Associates Africa, Midrand	Ms Mabel Qinisile	(011) 254 4800
The Golder Associates Africa website	https://www.golder.com/global-locations/africa/south-africa-public-documents/	

OPPORTUNITIES FOR PUBLIC REVIEW

Stakeholders who wish to comment on the Draft Scoping Report may do so in any of the following ways:

- Completing the comment sheet enclosed with this report;
- Additional written submissions; and
- Comment by e-mail or telephone.

**DUE DATE FOR COMMENT ON THE DRAFT SCOPING REPORT IS
TUESDAY 25 FEBRUARY 2020.**

Please submit comments to the Public Participation Office:

Mabel Qinisile or Antoinette Pietersen

Golder Associates

P O Box 6001

HALFWAY HOUSE, 1685

Tel: (011) 254 4805 / 4937

Fax: 086 582 1561

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EXECUTIVE SUMMARY

Introduction

Exxaro Resources Limited (Exxaro) is a South Africa-based diversified resources company with business interests in South Africa, Europe and the United States of America.

Exxaro was formed as a result of an empowerment transaction that involved the unbundling of Kumba Resources' iron ore assets and the relisting of Kumba as Exxaro in November 2006. The two companies that were formed through the transaction are:

- Exxaro, which focusses on coal, mineral sands and base metals and industrial minerals; and
- Kumba Iron Ore, which focusses on iron ore.

Exxaro manages six coal mines in the Limpopo and Mpumalanga provinces of South Africa. The six mines jointly produce 39 Mtpa of power station, steam and coking coal. Most of the power station coal is supplied to Eskom. Semi-coke and related products are produced for the ferroalloys industry. The six managed coal mines are:

- Grootegeluk Coal Mine, Lephalale, Limpopo Province;
- Leeuwan Coal Mine, Delmas, Mpumalanga Province;
- Matla Coal Mine, Kriel, Mpumalanga Province;
- North Block Coal Operations, Belfast, Mpumalanga Province;
- Tshikondeni Coal Mine, Musina, Limpopo Province (currently under decommissioning and rehabilitation); and
- Arnot Coal Mine, Emalahleni, Mpumalanga Province (currently under decommissioning, rehabilitation, care and maintenance).

Exxaro is proposing to mine the Turfvlakte coal reserves located on the farm Turfvlakte 463 LQ, near Lephalale in the Limpopo Province. The coal reserves and proposed open pits are located within Grootegeluk Coal Mine's existing Mining Right area.

Authorisation Process

In order to obtain Environmental Authorisation for the proposed project, Exxaro is required to conduct an Environmental Impact Assessment (EIA) in terms of Regulations GN R.324 to GN R.327 under the National Environmental Management Act, 1998 (Act 107 of 1998) (as amended).

Golder Associates Africa (Pty) Ltd, an independent environmental assessment practitioner, is conducting the EIA and is compiling the Environmental Management Programme (EMPr).

This Scoping Report will focus on identifying the key issues, related to the proposed open cast mining operations and associated infrastructure, that will be addressed in the impact assessment phase.

Project Description

Exxaro is proposing to expand their existing mining operations by extending the opencast mining operations to the farm Turfvlakte 463 LQ (Figure 3). The farm is located within Grootegeluk Coal Mine's existing Mining Right, LP 46 MRC. The opencast operations will consist of two pits, namely Pit 1 and Pit 2.

Grootegeluk Mine is considering two options for mining Pit 1 and Pit 2. The preferred option is to mine Pit 1 and then Pit 2 to produce 1.5 million tonnes per annum run of mine (ROM) coal over a period of twelve (12) years.

The alternative option is to first mine Pit 2 and then Pit 1 to produce 3 million tonnes per annum run of mine (ROM) coal over a period of seven (7) years.

The interburden and coal mined from Pit 1 and Pit 2 will be transported to and handled at the existing Grootegeluk Coal Mine plants.

The proposed infrastructure that will be constructed in support of the mining operations will include roads, water management infrastructure, waste management infrastructure, a substation and vehicle parking areas.

Baseline Environmental Conditions

Section 4.0 of this report describes the biophysical and socio-economic environment that may be affected by the proposed opencast mining development.

This Scoping Report provides a summary of the potentially affected environment. More detailed studies, focusing on significant environmental aspects of the proposed development, will be provided during the impact assessment phase and included in the EIA Report. The environmental aspects considered in this Scoping Report as well as in the forthcoming EIA Report are:

Geology

The regional geology in the area is characterised by the igneous and sedimentary rocks of the Karoo Supergroup. The Turfvlakte Project is situated on the southern portion of the Limpopo Depression, a relatively small corridor between the Limpopo River in the west and the Palala-Pietersburg Plateau in the east.

The project area is located in the Waterberg Coal Field and includes all the major units of the Karoo Supergroup, comprising from surface of the Stormberg Group, Beaufort Group, Ecca Group and the Dwyka group forming the basement.

Climate

The proposed project area is located in the Waterberg region of South Africa, which falls within the subtropical high-pressure belt. The highest temperatures are typically experienced during the summer months of December, January and February, and the lowest during the winter months of June, July and August.

Air Quality

The Turfvlakte project area is located within the Waterberg-Bojanala Priority Area (WBPA). The region is characterised by natural bushveld, interspersed with plots of cultivated land, small scale farming and protected natural reserves.

The Grootegeluk Coal Mine, and the neighbouring Eskom power stations, Medupi and Matimba, are prominent features in the local landscape. Key sources of air pollution in the area are coal mining, power generation, domestic fuel burning, vehicle emissions and the generation of dust on unpaved roads.

Potential sensitive receptors in the vicinity of the current Grootegeluk Coal Mine and the proposed Thabametsi and Turfvlakte mining operations, include dispersed farmsteads, lodges, towns and natural reserves.

Topography

The general topography of the area is described as "Plains", with slopes that vary between 0 and 3%. Elevation around the project area varies from 900 to 922 m above sea level. The area is generally featureless except for elevation differences caused by Nelsonskop (922 m) in the north and the Waterberg range (3,600 m) in the south. Drainage appears to be in an east-north-easterly direction towards the Mogol River and consists mainly of dry sandy gullies such as the "Sandloopspruit".

Soil, Land Use and Land Capacity

The Turfvlakte project area comprise of land types Ae252 and Ah85, as derived from the land type memoirs and associated maps of 2326 Ellisras.

Ecology

The project area is located in the Limpopo Sweet Bushveld (ref. SVcb19) vegetation type of the savanna biome.

The savanna biome is the largest biome in South Africa, covering approximately 35% of the country's land surface. Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, yet distinct woody plant component. Primary determinants of savanna composition, structure and functioning are fire, a distinct seasonal climate, substrate type, and browsing and grazing by large herbivores.

Limpopo Sweet Bushveld extends northwards from the lower reaches of the Crocodile and Marico Rivers to the Limpopo Valley and into Botswana. It is characterised by undulating or irregular plains dominated by open woodland.

A number of statutorily declared nature reserves, as well as informal conservation areas are present in the broader region surrounding the study area. These include Marakele National Park, D'Nyala Nature Reserve, Welgevonden Private Nature Reserve, Hans Strijdom Nature Reserve and the neighbouring Tierkop Private Nature Reserve.

The Waterberg Biosphere Reserve occupies approximately 650 000 ha of the Waterberg district to the south of the Turfvlakte project area

Surface Water

The Grootegeluk Coal Mine and Turfvlakte project area is situated in the A42J quaternary catchment of the Limpopo Water Management Area (WMA). The main water resources in the quaternary catchment are the Sandloopspruit which flows east north-east to join the Mokolo River approximately 40 km south of the Limpopo River.

Groundwater

The aquifer at the Turfvlakte Project Area is classified as a minor aquifer system, as defined by the Hydrogeological Map Series published by DWAF (1996). The small western part of the Turfvlakte project area aquifer is classified as a fractured aquifer zone, whereas the greater part (proposed locality of Pit 1 and PIT 2) is classified as intergranular and fractured. Both aquifer zones have an average borehole yield of about 0.5 l/s, which is typical of the Karoo Super Group.

Noise

Ambient noise sources observed at the study area include distant mining activities, power station noise, traffic and domestic noise.

Visual

The wider study area is characterised by a mixture of completely transformed and developed land associated with the adjacent Grootegeluk Coal Mine, Eskom Power Stations, the Marapong residential area as well as large tracts of undeveloped natural bushveld, under either game or livestock management.

The Turfvlakte project area comprises natural bushveld with negligible levels of transformation and disturbance that are limited to a network of game viewing vehicle tracks.

Cultural and Heritage

The proposed Turfvlakte project is located in an area covered by consistent level sandy plains with open savannah bush. A solitary kopje, Nelsonskop, occurs near the project area and is associated with human occupation in the past.

Pistorius (2018) states that the Turfvlakte project area was sparsely populated by humans in the past. However, occupation started at an early period, resulting in the presence of humans in the area over a long time span, but on a limited scale.

Palaeontology

The Karoo Supergroup is renowned for its fossil wealth. It is marked as Undifferentiated Strata of the Karoo Supergroup, but correlates with the Vryheid Formation (Pe, Pv), Eccu Group and the Grootegeluk Formation which is rich in plant fossils such as the *Glossopteris* flora represented by stumps, leaves, pollen and fructifications.

Traffic

The Turfvlakte project site is accessed *via* the existing Grootegeluk Mine entrance, which is accessible from Road D2001 at the intersection with the road to Marapong. The intersection of D2001, that provides access to both Grootegeluk Coal Mine and Marapong, is signalised.

Socio-economic

The Turfvlakte project area falls within the Waterberg District Municipality (DM) and the Lephalale Local Municipality (LM) in the Limpopo Province. The Lephalale LM forms the main growth and development point in the municipal area.

The population within the LM was 115 767 in 2001 and increased significantly to 136 626 in 2016.

Mining, Agriculture and Tourism comprise the main sectors which characterise the economic profile of the Waterberg District. The mining industry in the municipal area contributes to the economic development of the Waterberg District and Limpopo Province. The Lephalale LM has a 44% employment rate, with 42% being economically inactive and 12% unemployed.

OPSOMMING

Inleiding

Exxaro Resources Limited (Exxaro) is 'n Suid-Afrika-gebaseerde gediversifiseerde hulpbronmaatskappy met sakebelange in Suid-Afrika, Europa en die Verenigde State van Amerika.

Exxaro is gevorm na afloop van 'n bemagtigingstransaksie wat die ontbondeling van Kumba Resources se ysterertsbates en die hervestiging van Kumba as Exxaro in November 2006 behels het. Die twee maatskappye wat deur die transaksie gevorm is, is:

- Exxaro, wat fokus op steenkool, minerale sande en basiese metale en industriële minerale; en
- Kumba Ystererts, wat op ystererts fokus.

Exxaro bestuur ses steenkoolmyne in die Limpopo en Mpumalanga provinsies van Suid-Afrika. Die ses myne produseer gesamentlik 39 miljoen ton per jaar kragstasiesteenkool, stoomsteenkool en metallurgiese steenkool. Die meerderheid van die kragstasiesteenkool word aan Eskom verskaf. Semi-metallurgiese steenkool en verwante produkte word vervaardig vir die ferro-allooi bedryf. Die ses steenkoolmyne wat deur Exxaro bestuur word is:

- Grootegeluk Steenkoolmyn, Lephalale, Limpopo Provinsie;
- Leeuwan Steenkoolmyn, Delmas, Mpumalanga Provinsie;
- Matla Steenkoolmyn, Kriel, Mpumalanga Provinsie;
- North Block Steenkoolbedrywighede, Belfast, Mpumalanga Provinsie;
- Tshikondeni Steenkoolmyn, Musina, Limpopo Provinsie (tans in die sluitingsfase); en
- Arnot Steenkoolmyn, Emalaheni, Mpumalanga Provinsie (tans in die sluitingsfase).

Exxaro beplan om die Turfvlakte-steenkoolreserwes op die plaas Turfvlakte 463 LQ, naby Lephalale in die Limpopo Provinsie, te myn. Die steenkoolreserwes en voorgestelde oopgroefpit is geleë binne die bestaande Mynboureg van die Grootegeluk Steenkoolmyn.

Goedkeuringsproses

Ten einde die voorgestelde Omgewingsmagtiging vir die voorgestelde projek te verkry, word daar van Exxaro verwag om 'n Omgewingsimpakstudie (OIS) in terme van Regulasies GN R.324 tot GN R.327 onder die Wet op Nasionale Omgewingsbestuur, 1998 (Wet 107 van 1998) (soos gewysig) te onderneem.

Golder Associates Africa (Pty) Ltd (hierna Golder), 'n onafhanklike omgewingskonsultant, is aangestel om die OIS en die samestelling van die Omgewingsbestuursprogram (OBP) te onderneem.

Hierdie Bestekbepalingsverslag fokus slegs op die identifisering van die belangrikste kwessies en impakte wat verband hou met die voorgestelde ontwikkeling wat dienooreenkomstig aangespreek sal word tydens die impakstudiefase.

Projekbeskrywing

Exxaro se projekvoorstel sluit die uitbreiding van hul oopgroef mynboubedrywighede op die plaas Turfvlakte 463 LQ in. Die plaas is geleë binne die huidige Mynboureg (LP 46 MRC) van die Grootegeluk Steenkoolmyn. Die oopgroef mynboubedrywighede sal bestaan uit twee oopgroewe, naamlik Groef 1 en Groef 2.

Grootegeluk oorweeg tans twee opsies vir die myn van Groef 1 en Groef 2. Die voorkeuropsie is om eers Groef 1 en dan Groef 2 te myn, wat potensieel 1.5 miljoen ton steenkool per jaar oor 'n tydperk van twaalf (12) jaar sal lewer.

Die alternatief is om eers Groef 2 en dan Groef 1 te myn, wat potensieel 3 miljoen ton steenkool per jaar oor 'n tydperk van sewe (7) jaar sal lewer.

Die tussenlae en steenkool vanuit Groef 1 en Groef 2 sal vervoer word na en hanteer word by die bestaande Grootegeluk Steenkoolmyn aanlegte.

Die voorgestelde infrastruktuur wat ter ondersteuning van die Turfvlakte steenkoolmynoperasie opgerig sal word, sluit in paaie, waterbestuursinfrastruktuur, afvalbestuursgebiede, 'n substasie en voertuig parkeerplekke.

Beskrywing van die Potensieel Geëffekteerde Omgewing

Gedeelte 4.0 van hierdie Bestekbepalingsverslag beskryf die biofisiese en sosio-ekonomiese omgewing wat potensieel deur die voorgestelde ontwikkeling geraak sal word.

Hierdie Bestekbepalingsverslag bevat 'n opsomming van die potensieel geëffekteerde omgewing. Meer gedetailleerde studies, wat op belangrike omgewingsaspekte van die voorgestelde ontwikkeling sal fokus, sal gedurende die impakstudiefase onderneem word en in die OIB-verslag saamgevat word. Die omgewingsaspekte wat aangespreek word in hierdie Bestekbepalingsverslag sowel as in die komende OIB-verslag is hier onder aangedui.

Geologie

Die streeksgeologie word gekenmerk deur die stollings- en sedimentêre gesteentes van die Karoo Supergroep. Die Turfvlakteprojek is geleë in die suidelike gedeelte van die Limpopo-depressie, 'n relatief klein korridor tussen die Limpoporivier in die weste en die Palala-Pietersburg-plato in die ooste.

Die projekgebied is geleë in die Waterberg-steenkoolveld en sluit al die hoofeenhede van die Karoo-supergroep in. Dit bestaan uit die Stormberg-groep, Beaufort-groep, Ecca-groep en die Dwyka-groep wat die kelder vorm.

Klimaat

Die voorgestelde projekgebied is in die Waterberg-streek van Suid-Afrika, wat binne die subtropiese hoëdruk gordel val. Die hoogste temperature word tipies gedurende die somermaande van Desember, Januarie en Februarie ervaar, en die laagste gedurende die wintermaande van Junie, Julie en Augustus.

Luggehalte

Die Turfvlakte projekgebied is geleë in die Waterberg-Bojanala Prioriteitsgebied. Die streek word gekenmerk deur natuurlike bosveld, afgewissel met verboude landbougrond, kleinskaalboerdery en beskermde natuurlike gebiede.

Die Grootegeluk Steenkoolmyn, en die naburige Eskom kragstasies, Medupi en Matimba, is prominent in die plaaslike landskap. Sleutelbesoedelingsbronne in die omgewing is steenkoolmynbou, kragopwekking, huishoudelike brandstofverbranding, voertuiguitlaatgasse en die vrylating van stof op ongeteerde paaie.

Potensiële sensitiewe reseptore in die omgewing van die huidige Grootegeluk Steenkoolmyn en die voorgestelde Thabametsi- en Turfvlakte mynboubedrywighede sluit in plaasopstalle, oornagverblyf, dorpe en natuurreservate.

Topografie

Die algemene topografie van die gebied word beskryf as "vlaktes" met hellings wat wissel tussen 0 en 3%. Hoogtes rondom die projekgebied wissel van 900 tot 922 m bo seespieël. Die gebied is oor die algemeen gelyk, behalwe vir die hoogtes verbonde aan Nelsonskop (922 m) in die noorde en die Waterberg-reeks (3.600 m) in die suide. Dreinerings vind in 'n oostelike tot noordoostelike rigting na die Mogolrivier plaas en bestaan hoofsaaklik uit droë sandlope soos die Sandloopspruit.

Grond, Grondgebruik en Grondvermëe

Die Turfvlakte projekgebied bestaan uit landtipes Ae252 en Ah85, soos gelys in die landtipe memoires en geassosieerde karate van 2326 Ellisras.

Biodiversiteit

Die projekgebied is in die Limpopo Soetbosveld (ref. SVcb19) plantegroeitipe van die savanne-bloom geleë.

Die savanne-bloom is die grootste bloom in Suid-Afrika, wat ongeveer 35% van die land se grondoppervlak beslaan. Savannas word gekenmerk deur 'n dominante graslaag, tesame met 'n onderbroke, maar tog kenmerkende houtagtige plantkomponent. Primêre kenmerke van savanna samestelling, struktuur en funksionering is vuur, 'n afsonderlike seisoenale klimaat, substraat tipe, en verkenning en weiding deur groot plantvreters.

Die Limpopo Soetbosveld strek noordwaarts vanaf die onderste lope van die Krokodil- en Maricoriviere na die Limpopovallei en tot in Botswana. Dit word gekenmerk deur golwende of onreëlmatige vlaktes wat deur oop bosveld oorheers word.

'n Aantal statutêre verklaarde natuurreservate, sowel as informele bewaringsgebiede, is teenwoordig in die breër omgewing rondom die studiegebied. Dit sluit in die Marakele Nasionale Park, die D'Nyala natuurreservaat, die Welgevonden private natuurreservaat, die Hans Strijdom natuurreservaat en die naburige Tierkop private natuurreservaat.

Die Waterbergbiosfeerreservaat beslaan ongeveer 650 000 ha van die Waterbergdistrik suid van die Turfvlakte projekgebied

Oppervlakwater

Die Grootegeluk Steenkoolmyn en Turfvlakte projekgebied is geleë in die A42J-kwaternêre opvanggebied van die Limpopo Waterbestuursgebied (WBG). Die belangrikste waterbronne in die kwaternêre opvanggebied is die Sandloopspruit wat oos-noordoos vloei om by die Mokolo-rivier, ongeveer 40 km suid van die Limpoporivier, aan te sluit.

Grondwater

Die waterdraende geologiese struktuur in die Turfvlakte projekgebied word geklassifiseer as 'n klein waterdraende sisteem, soos gedefinieer deur die Hidrogeologiese Kaartreeks gepubliseer deur die DWAF (1996). Die klein westelike deel van die Turfvlakte projekgebied is as 'n gebreekte waterdraende sone geklassifiseer, terwyl die grootste gedeelte (voorgestelde ligging van Groef 1 en Groef 2) geklassifiseer word as intergranulêre en gebroke. Albei waterdraende sones het 'n gemiddelde boorgatopbrengs van tussen 0.5 l/s, wat tipies van die Karoo Supergroep is.

Geraas

Omliggende geraasbronne wat by die studiegebied waargeneem kan word, sluit in mynbou-aktiwiteite, geraas vanaf die twee kragstasies, verkeer en huishoudelike geraas.

Visueel

Die wyer studiegebied word gekenmerk deur 'n mengsel van heeltemal getransformeerde en ontwikkelde grond wat verband hou met die aangrensende Grootegeluksteeenkoolmyn, Eskom-kragstasies, die Marapongwoongebied asook groot dele van onontwikkelde natuurlike bosveld, onder wild- of veebestuur.

Die Turfvlakte projekgebied bestaan uit natuurlike bosveld met onbeduidende vlakke van transformasie en versteuring wat beperk is tot 'n netwerk van wildkyk-voertuigroetes.

Kultuur en erfenis

Die Turfvlakte projekgebied is geleë in 'n gebied van aaneenlopende en gelyke sanderige vlaktes wat met oop savannebosse bedek is. 'n Alleenstaande koppie, Nelsonskop, kom naby die projekgebied voor en word geassosieer met menslike besetting in die verlede. Pistorius (2018) noem dat die Turfvlakte projekgebied in die verlede yl bevolk was deur mense. Besetting het in 'n vroeë stadium plaasgevind, wat gelei het tot die teenwoordigheid van mense in die omgewing oor 'n lang tydperk, maar op 'n beperkte skaal.

Palaeontologie

Die Karoo Supergroep is bekend vir sy rykdom aan fossiele. Dit word aangedui as Ongedifferensieerde Strata van die Karoo Supergroep, maar dit korreleer met die Vryheid Struktuur (Pe, Pv), Eccia Groep en die Grootegeluk Struktuur wat ryk is aan plantfossiele soos die *Glossopteris* flora wat verteenwoordig word deur stompe, blare, stuifmeel en vrug-vormende strukture.

Verkeer

Toegang tot die Turfvlakte projekgebied is via die bestaande Grootegeluk myningang wat vanaf D2001 by die kruising met die pad na Marapong toeganklik is. Die D2001 kruising, wat toegang verleen tot beide Grootegeluk Steenkoolmyn en Marapong, word met 'n verkeerslig beheer.

Sosio-ekonomie

Die Turfvlakte projekgebied val binne die Waterberg Distriksmunisipaliteit (DM) en die Lephalale Plaaslike Munisipaliteit (PM) in die Limpopo Provinsie. Die Lephalale PM is die belangrikste groei- en ontwikkelingspunt in die munisipale gebied.

Die bevolking van die PM was 115 767 in 2001 en het teen 2016 aansienlik toegeneem tot 136 626.

Mynbou, landbou en toerisme is die hoofsektore wat die ekonomiese profiel van die Waterbergdistrik uitmaak. Die mynbou wat in die munisipale gebied bedryf word, dra grootliks by tot die ekonomiese ontwikkeling van die Waterberg Distrik en Limpopo Provinsie. Die Lephalale PM het 'n indiensnemingsyfer van 44%, met 42% ekonomies onaktief en 12% werkloos.

KAKARETŠO YA MOTHEO

Matseno

Exxaro Resources Limited (Exxaro) ke khamphani ya methopo ya go fapana ya Afrika Borwa yeo e nago le dikganyogo Afrika Borwa, Yuropa le United States of America.

Exxaro e hlomilwe bjalo ka karolo ya matlafatšo ya kgwebišano fao go ilwego gwa aroganywa dithoto tša Kumba Resources tša minerale wa tšhipi le go bapatša gape dišere tša Kumba ka fase ga leina la Exxaro ka Nofemere 2006. Dikhaphani tše pedi tšeo di ilego tša hlongwa nakong ya kgwebišano ke:

- Exxaro, yeo e šeditšego malahla, mohlaba wa dimenerale le metheo ya tšhipi le dimenerale tša intasteri; gammogo le
- Kumba Iron Ore, yeo e tšweletšago dimenerale tša tšhipi.

Exxaro e laola meepo ye tshela profenseng ya Limpopo le ya Mpumalanga mo Afrika Borwa. Meepo yeo ye tshela e tšweletša palomoka ya mohlagase wa 39 Mtpa, wa mušimeetse le wa malahla. Bontši bja mohlagase wa malahla o abelwa Eskom. Ditšweletšwa tša go dirwa ka malahla le tše dingwe di abelwa diintasteri tša feroaloi (ferroalloys industry). Meepo yeo ye tshela ke:

- Moepo wa Malahla wa Grooteeluk, Lephalale, profenseng ya Limpopo;
- Moepo wa Malahla wa Leeuwpán, Delmas, profenseng ya Mpumalanga;
- Moepo wa Malahla wa Matla, Kriel, profenseng ya Mpumalanga;
- Mediro ya tša Malahla tša North Block, Belfast, profenseng ya Mpumalanga;
- Moepo wa Malahla wa Tshikondeni, Musina, profenseng ya Limpopo (ka se sebaka o sa tswaletšwe ebile o tsošološwa leswa); gammogo le
- Moepo wa Malahla wa Arnot, Emalahleni, profenseng ya Mpumalanga (ka se sebaka o sa tswaletšwe ebile o tsošološwa leswa le go ba ka fase ga tlhokomelo).

Exxaro e šišinya go rafa lefelo la Turfvlakte la malahla leo le hwetšagalago polaseng ya Turfvlakte 463 LQ, kgauswi le Lephalale profenseng ya Limpopo. Mafelo ao a malahla le mekoti ya go se iše ya moepo wo o šišinywago di hwetšagala ka gare ga lefelo leo Moepo wa Malahla wa Grooteeluk e nago le Ditokelo tša Go Rafa.

Lenaneo la Tumelelo

Gore go kgonege go hwetša Tumelelo ya tša Tikologo projekeng ye e šišintšwego, Exxaro e letetšwe gore e phethagatše Tekolo ya Kamego ya Tikologo (EIA) go ya le ka Melawana ya Taolo GN R.324 go fihla go GN R.327 ya Molao wa Bosetšhaba wa tša Tikologo, 1998 (Molao 107 wa 1998) (wo o fetošitšwego).

Golder Associates Africa (Pty) Ltd (Golder), bahlankedi ba go ikema ba tekolo ya tša tikologo, ba phethagatša EIA le go ngwala Lenaneo la Taolo ya tša Tikologo (EMPr).

Pego ye e bea šedi morerong wa go laetša dintlhakgolo, tše di amanago le mediro ya moepo wa go se iše gammogo le didirišwa tše di amegago, tšeo di tlogo akaretšwa legatong la tekolo ya kamego.

Tlhalošo ya Projeke

Exxaro e šišinya go katološa mellwane ya bjale ya mediro ya moepo ka go katološetša mediro ya moepo wo o sa išego go fihlela polaseng ya Turfvlakte 463 LQ (Seswantšho 3). Polase e hwetšagala ka gare ga lefelo leo Moepo wa Malahla wa Grooteeluk e nago le Ditokelo tša Go Rafa, LP 46 MRC. Mediro ya moepo wa go se iše e tlo aroganywa ka diripa tše pedi, elego Mokoti 1 le Mokoti 2.

Moepo wa Grootegeluk o akanya dikgetho tše pedi malebana le Mokoti 1 le Mokoti 2. Kgetho ye moepo o ka e thabelago ke ya Mokoti 1 gomme e tšweletše 1.5 mtpa ya ditšweletšwa tše di sa hlotlwago (ROM) gomme go latele Mokoti 2 tekanyo ya mengwaga ye lesomepedi (12).

Kgetho ye nngwe ke ya go thoma Mokoting wa 2 gomme ka morago go latele Mokoti 1 gore go tšweletšwe 3 mtpa ya ditšweletšwa tše di sa hlotlwago tša malahla (ROM) tekanyo ya mengwaga ye šupa (7).

Ditšweletšwa tše di hwetšagalago magareng ga Mokoti 1 le Mokoti 2 gammogo le malahla di tla išwa Moepong wa Malahla wa Grootegeluk gore o šogane le tšona.

Didirišwa tše di šišintšwego di tlo phethagatšwa go thekga mediro ya moepo go akaretšwa ditsela, didirišwa tša taolo ya meetse, didirišwa tša taolo ya dilahlwa, seteišene le lefelo la boemo bja difatanaga.

Maemo a Motheo a tša Tikologo

Karolo 4.0 ya pegu ye e hlaloša tikologo ya diphedi le ekonomi ya setšhaba tšeo di ka amago ke mediro ya moepo wo o sa išego wo o šišinywago.

Pegu ye e fana ka kakaretšo-kopana ya tikologo ye e ka amegago. Phatišišo ya dintlha ka botlalo, ye e tla šetšago dintlha tša tikologo mabapi le mediro ye e šišinywago, e tla abja nakong ya legato la tekolo ya kamego le go akaretšwa Pegong ya EIA. Dintlha tša tikologo tšeo di akaretšwago Pegong ye gammogo le ye e sa tlogo ke tše di latelago:

Seemo sa lefase (Geology)

Seemo sa tikologo lefelong leo se akaretša maswika a iknease (igneous) le sedimentari (sedimentary) a Sehlopha Segolo sa Karoo. Projeke ya Turfvlakte e hwetšagala borwa bja karolo ya lebatso la fase ya Limpopo, ye e lego lefelo le lenyane magareng ga noka ya Limpopo ka bodikela le karolo ya Laphalala-Polokwane ka bohlabela.

Lefelo la projeke le hwetšagala Waterberg Coal Field gomme le akaretša dikarolo tše kgolo tša Sehlopha Segolo sa Karoo, leo le thomago karolong ya Sehlopha sa Stormberg, sa Beaufort, sa Ecca le sa Dwyka.

Boemo bja boso

Lefelo le le šišintšwego la projeke le hwetšagala seleteng sa Waterberg sa Afrika Borwa, seo se welago karolong ya seka-molalatšatši fao go fišago kudu. Phišo ya godimo gantši e lemogwa dikgweding tša selemo e lego Disemere, Janaware le Febereware, mola e yago fase dikgweding tša marega e lego June, Julae le Agostose.

Boleng bja Moya

Lefelo la projeke ya Turfvlakte le hwetšagala lefelong la tikologo ya Waterberg-Bojanala Priority Area (WBPA). Selete se se tsebega ka sethokgwa sa tlhago, fao go kgaotšago lefelo la go lema, seemo sa fase sa temo le mafelo a tlhago ao a šireleditšwego.

Moepo wa Malahla wa Grootegeluk le diteišene tša kgauswi tša ESKOM, Medupi le Matimba, ke tše dingwe tša dihlolongwa tše bohlokwa tša naga yeo. Methopo ye megolo ya tšhilafatšo ya moya lefelong le ke meepo ya malahla, tšweletšo ya mohlagase, go fiša ditšweletšwa tša makhura ka badudi, muši wa difatanaga le marole a ditsela tša go hloka sekontiri.

Mafelo ao a ka amegago a kgawuswi le Moepo wa Malahla wa Grootegeluk le le le šišintšwego la Thabametsi le mediro ya tša moepo ya Turfvlakte, a akaretša dipolase tše di phatlaleletšego, mafelo a marobalo, ditoropo le mafelo a tlhago.

Sebopego sa Naga (Topography)

Sebopego sa naga se tsebega ka mabala a meboti ye e lego magareng ga 0 le 3%. Bogolo bja lebato la projeke bo magareng ga 900 go ya go 922 m ka godimo ga lewatele. Lefelo leo lona ga le name le tlala ka diponego tša tlhago ka ntle le meboti ya go fetafetana ye e hlolwago ke Nelsonskop (922 m) ka leboa le go ya godimo go fihlela 3,600 m ka borwa bja Waterberg. Meetse a itaetša a elela thoko ya leboa-bohlabela go ya nokeng ya Mogol fao go nago le megobe yeo e tletšego mohlaba bjalo ka “Sandloopspruit”.

Tirišo ya Mmu le Naga le Bogolo bja Yona

Lefelo la projeke ya Turfvlakte le akaretša mehuta ya naga ya Ae252 le Ah85, ye e tšwelelago dingwalong tša mehuta ya naga le mmepe wa 2326 wa Ellisras.

Diphedi tša Tikologo

Lefelo la projeke le hwetšagala Limpopo Sweet Bushveld (ref. SVcb19) dimela tša mohuta wa savanna.

Dimela tša savanna ke tšona di akaretšago bogolo bja dimela Afrika Borwa, di akaretša bogolo bja go lekana 35% ya naga. Dimela tša savannas di tsebega ka bjang bjo bontši, fao go tletšego mehlare ya dikgong ye e phatlaletšego. Ponagalo le sebopego sa savanna e tsebega ka mollo wa tlhaga, ditlha tša ngwaga tša go fapana, bjang bjo bontši bjo bo fulago ke dijamerogo.

Limpopo Sweet Bushveld e akaretša thoko ya leboa go tloga mathomong a noka ya Crocodile le Marico go fihlela Limpopo Valley le ka Botswana. E tsebega ka meboti le mebotwana fao go tletšego dikgong.

Palo ye itšego ya mafelo a tlhago ao a tsebagaditšwego, gammogo le ao e sego a semmušo a a hwetšagala dikarolong tša naga kgauswi le lefelo la phatišišo. Ona a akareša Marakele National Park, D’Nyala Nature Reserve, Welgevonden Private Nature Reserve, Hans Strijdom Nature Reserve le ya kgauswi e lego Tierkop Private Nature Reserve.

Waterberg Biosphere Reserve e akaretša bogolo bja 650 000 ha tša selete sa Waterberg go ya ka borwa bja lefelo la projeke ya Turfvlakte.

Meetse ao a elago

Moepo wa Malahla wa Grootegeeluk le lefelo la projeke la Turfvlakte di hwetšagala A42J lefelo la taolo ya meetse la Limpopo Water Management Area (WMA). Mothopo mogolo wa meetse lefelong le ke Sandloopspruit yeo e elelago leboa-bohlabela e tšhelelago noka ya Mokolo ye e lego bokgole bja go lekana 40 km ka borwa bja noka ya Limpopo.

Meetse a ka fase ga mmu

Leswika la meetse (aquifer) lefelong la projeke ya Turfvlakte le tšewa bjalo ka le lenyane la lenaneo la tshepedišo ya meetse, go ya le ka sengwalwa sa Hydrogeological Map Series se se phatlaladitšwego ke DWAF (1996). Leswika la meetse ka karolwaneng ye nnyane ka bophirima bja lefelo la projeke ya Turfvlakte le hlopšha bjalo ka karolo yeo e palegilego mola karolo ye kgolo (lefelo la Mokoti A le Mokoti B) e hlopšha bjalo ka leo le palegilego eupša dikarolo tše dingwe tše di phatlaletšego di lomagantšwe. Bobedi bja dikarolo tša leswika le di tšweletša bonyane bja molete wa meetse bja go lekana 0.5 l/s, bjona bo tlwaelegile lefelong la Sehlopha Segolo sa Karoo.

Lešata

Lešata leo le šeditšwego lefelong la phatišišo le akaretša mediro ya moepo, seteišene sa mohlagase, difatanaga le badudi.

Ponego

Bophara bja lefelo la phatišišo bo tletše ka mmu wo o kopakopanego wo o tlogago o fetogile le go hlabollwa wo o amanago le karolwana ya Moepo wa Malahla wa Grootegeeluk, Seteišene sa Mohlagase sa Eskom, motse wa Marapong gammogo le dikarolo tše kgolo tša sethokgwa seo se sego sa hlabollwa ka lebaka la ge e le lešoka la diphoofole goba la go rua diphoofole.

Lefelo la projeke ya Turfvlakte le na le sethokgwa sa tlhago seo se sa hlokomelwego gabotse ka lebaka la phetošo le go tshwenywa tšeo gantši di bonalago ditseleng tšeo difatanaga tša go sepela lešokeng tša go boga diphoofole di sepelago go tšona.

Bohwa le Setšo

Lefelo la projeke le le šišinywago la Turfvlakte le hwetšagala lefelong leo le tletšego ka mabala ao a nago le mmu wa mohlaba wa sethokgwa sa savannah. Go na le mmoto wo tee ka thokwana, Nelsonskop, kgauswi le lefelo la projeke ebile go akanywa gore batho ba be ba dula fao kgale.

Pistorius (2018) o hlaloša gore lefelo la projeke ya Turfvlakte le be le se na batho ba bantši kgale. Le ge go le bjalo, batho ba thomile go dula fao nakong ya kgale, gomme seo sa fetša se dirile gore go be le batho nako ge e gatela pele, eupša e se ba bantši.

Thuto ya mašaledi a diphedi tša kgale (Palaeontology)

Sehlopha Segolo sa Karoo se tsebja kudu ka go tlala ga mašaledi a diphedi tša kgale. Gomme e bitšwa Undifferentiated Strata of the Karoo Supergroup, eupša e sepedišana le Vryheid Formation (Pe, Pv), Sehlopha sa Ecce le Grootegeeluk Formation yeo e humilego ka mašaledi a dimela bjalo ka semela sa flora, *Glossopteris* yeo e bonalago gabotse ka lebaka la dikutu, matlakala, modula le go tšweletša peu.

Molokoloko wa difatanaga

Lefelo la projeke la Turfvlakte le tsenwa ka go diriša mojako wo o lego gona wa Moepo wa Grootegeeluk, wona o tsenwa ka go diriša mmila wa D2001 mahlakanong a mmila wa go ya Marapong. Mmila wa D2001, wo o lebagoe Moepong wa Malahla wa Grootegeeluk le Marapong, o laeditšwe gabotse ka maswao a tsela.

Ekonomi ya Setšhaba

Lefelo la projeke la Turfvlakte le wela ka tlase ga Masepala wa Selete wa Waterberg le Masepala wa Selegae wa Lephalale profenseng ya Limpopo. Masepala wa Selegae wa Lephalale o bapala karolo ye kgolo morerong wa go gola le go hlabologa ga lefelo le.

Palomoka ya setšhaba tikologong ya masepala wa selegae e be e le 115 767 ka 2001 gomme ya oketšega kudu go ya go 136 626 ka 2016.

Ekonomi ya Selete sa Waterberg e ithekgile kudu ka tša moepo, temo le boeti. Intasteri ya moepo e bapala karolo ye kgolo go tlabollong ya tša ekonomi lefelong le la Selete sa Waterberg le profenseng ya Limpopo ka bophara. Masepala wa Selegae wa Lephalale o na le palo ya 44% ya mešomo, ebile 42% e tšego karolo go tša ekonomi mola 12% e sa šome.

LIST OF ACRONYMS AND ABBREVIATIONS

Abbreviation	Description
BIL	Background Information Letter
DEA	Department of Environmental Affairs
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
FSR	Final Scoping Report
GN	General Notice
ha	Hectares
I&APs	Interested and affected parties
km	Kilometre
m	Metres
MR	Mining Right
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
SG	Surveyor General
WML	Waste Management Licence
WUL	Water Use Licence

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1.0 INTRODUCTION AND BACKGROUND

Exxaro Resources Limited (Exxaro) is a South Africa-based diversified resources company with business interests in South Africa, Europe and the United States of America.

Exxaro was formed as a result of an empowerment transaction that involved the unbundling of Kumba Resources' iron ore assets and the relisting of Kumba as Exxaro in November 2006. The two companies that were formed through the transaction are:

- Exxaro, which focusses on coal, mineral sands and base metals and industrial minerals; and
- Kumba Iron Ore, which focusses on iron ore.

Exxaro manages six coal mines in the Limpopo and Mpumalanga provinces of South Africa. The six mines jointly produce 39 Mtpa of power station, steam and coking coal. Most of the power station coal is supplied to Eskom. Semi-coke and related products are produced for the ferroalloys industry. The six managed coal mines are:

- Grootegeeluk Coal Mine, Lephalale, Limpopo Province;
- Leeuwan Coal Mine, Delmas, Mpumalanga Province;
- Matla Coal Mine, Kriel, Mpumalanga Province;
- North Block Coal Operations, Belfast, Mpumalanga Province;
- Tshikondeni Coal Mine, Musina, Limpopo Province (currently in closure phase); and
- Arnot Coal Mine, Emalahleni, Mpumalanga Province (currently under decommissioning, rehabilitation, care and maintenance).

Exxaro is proposing to mine the Turfvlakte coal reserves located on the farm Turfvlakte 463 LQ, near Lephalale in the Limpopo Province. The coal reserves and proposed open pits are located within the existing Grootegeeluk Coal Mine mining right area.

2.0 PROPONENT AND PRACTITIONER DETAILS

2.1 Details of the proponent

For purposes of this Environmental Impact Assessment (EIA), the following person may be contacted at Exxaro Grootegeeluk Coal Mine:

Table 1: Proponent's contact details

Contact Person	Filomaine Swanepoel
Address	Farm Enkelbult 462 LQ within the jurisdiction of Lephalale Local Municipality of Waterberg District, Limpopo Province
Telephone	014 763 9288
Fax	014 763 9453
E-mail	Filomaine.Swanepoel@exxaro.com

2.2 Details of Environmental Assessment Practitioner

Exxaro has appointed Golder Associates Africa (Pty) Ltd (Golder) as an independent Environmental Assessment Practitioner (EAP) to undertake EIA that is required to support the application for environmental authorisation.

Golder Associates Africa is a member of the world-wide Golder Associates group of companies, offering a variety of specialised engineering and environmental services. Employee owned since its formation in 1960, the Golder Associates group employs more than 6 500 people who operate from more than 165 offices located throughout Africa, Asia, Australasia, Europe, North America and South America. Golder Associates Africa (GAA) has offices in Midrand, Pretoria, Florida, Cape Town, Maputo and Accra. Golder Associates Africa has more than 300 skilled employees and can source additional professional skills and inputs from other Golder offices around the world.

Golder has no vested interest in the proposed project and hereby declares its independence as required by the EIA Regulations.

For purposes of this EIA, the following persons may be contacted at Golder:

Table 2: Details of Golder Associates

Name	Golder Associates Africa (Pty) Ltd
Address	Building 1, Magwa Crescent West, Maxwell Office Park, Waterfall City, Midrand P.O.Box 6001, Halfway House, 1685, South Africa Telephone: (011) 254 4800 Fax: (086)582 1561
Environmental Assessment Practitioner (EAP)	Marié Schlechter (Senior Environmental Specialist) Ms Schlechter has worked in the mining industry and environmental consultancy for over eighteen (18) years, gaining experience in the environmental management discipline. Marié has experience in conducting and managing environmental impact assessment projects, implementation, maintenance and internal auditing of environmental management systems as well as compliance audits. Full CV is provided APPENDIX B. Email: mschlechter@golder.co.za
Public Participation Specialist	Antionette Pietersen (Public Participation Specialist) Email: Apietersen@golder.co.za

2.3 Description of the property

Table 3: Details of area applied for

Aspect	Description
Farm Names	Enkelbult 462 LQ (Portion 0 and 1) Turfvlakte 463 LQ
Application area	439 ha
Magisterial District	Waterberg District Municipality

Aspect	Description
Distance and direction from nearest town	Grootegeluk Coal Mine is located approximately 15 km (by road) to the north-northwest of Lephalale
21-digit Surveyor General Codes	Enkelbult 462 LQ (Portion 0) - T0LQ00000000046200000 Enkelbult 462 LQ (Portion 1) - T0LQ00000000046200001 Turfvlakte 463 LQ - T0LQ00000000046300000

2.4 Locality Map

2.4.1 Magisterial District and relevant Local Authority

The Turfvlakte project area, as part of the Exxaro Grootegeluk Coal Mine, falls within the jurisdiction of the Lephalale Magisterial District (Figure 1). The project area is located in the Lephalale Local Municipality, which falls within the boundaries of the Waterberg District Municipality, in the Limpopo Province.

The Turfvlakte project area falls within the A42J Quaternary Catchment (Figure 5)

2.4.2 Landowners and use of immediately adjacent land

The proposed project area is bordered by the remainder of the Grootegeluk Coal Mine to the immediate north, northeast, northwest and western sides, the Eskom Medupi Power Station to the south and privately-owned land to the east and southeast (Figure 2). The Matimba Power Station is located approximately 3 000 m to the east and the Marapong community is located approximately 5 000 m to the northeast.

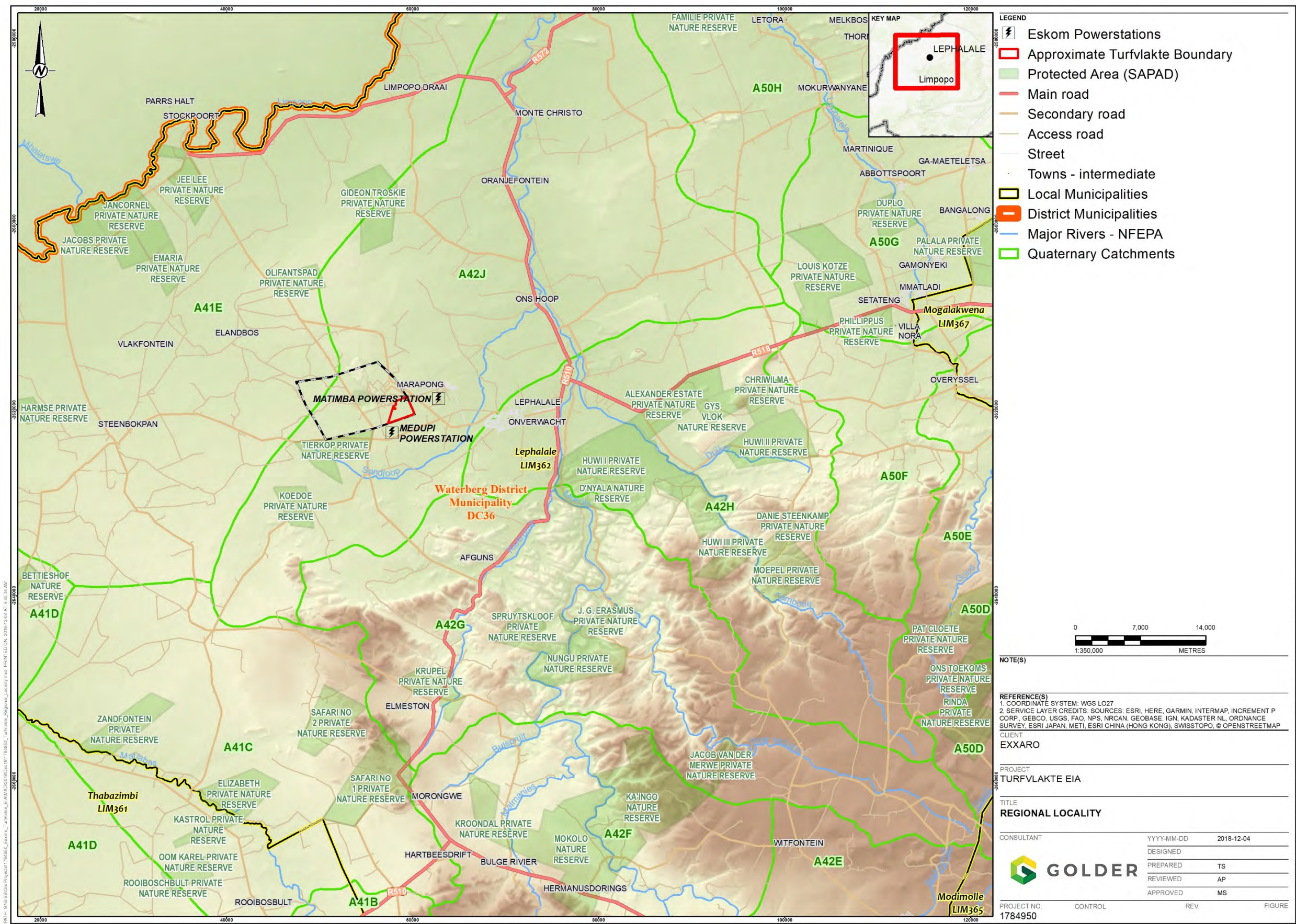


Figure 1: Regional Locality of the Grootegeluk Coal Mine

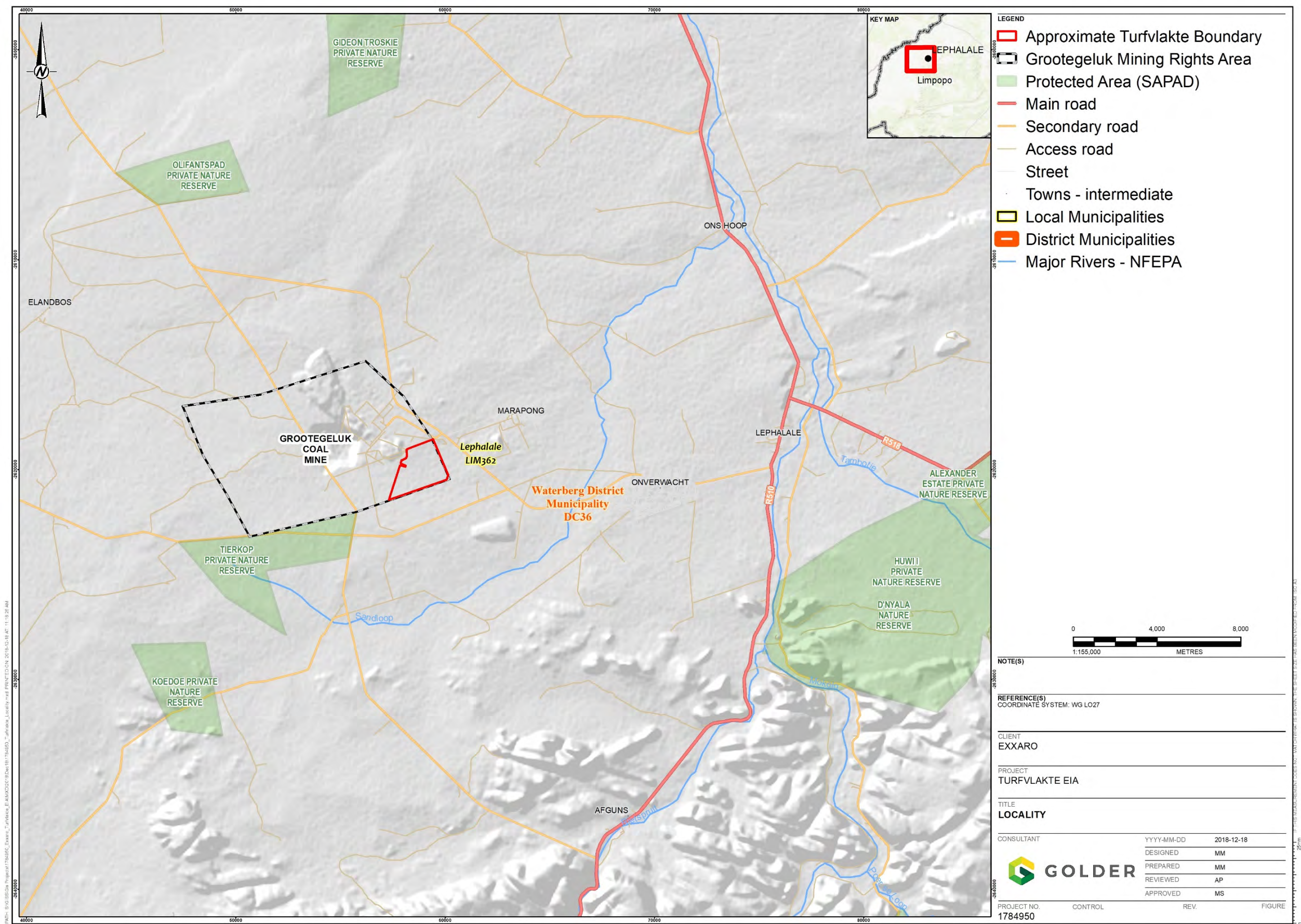


Figure 2: Locality of the Turfvlakte Project Area

The surface right owners of the various farm portions in the vicinity of the project area are listed in Table 4 and illustrated in Figure 3.

Table 4: List of landowners

Farm Name and Portion	Surface Right Owner
McCabesvley 311 LQ	Exxaro Resources Limited
Goedehoop 457 LQ	Exxaro Resources Limited
Vooruit 449 LQ	Exxaro Resources Limited
Leeuwdrift 312 LQ	Exxaro Resources Limited
Daarby 458 LQ	Exxaro Resources Limited
Appelvlakte 448 LQ	Exxaro Resources Limited
Grootegeeluk 459 LQ	Exxaro Resources Limited
Enkelbult 462 LQ	Exxaro Resources Limited
Nelsonskop 464 LQ (Portion 1 and Remainder)	Exxaro Resources Limited
Hieromtrent 460 LQ	Exxaro Resources Limited
Turfvlakte 463 LQ	Exxaro Resources Limited
Grootestryd 465 LQ (Portion 3)	Exxaro Resources Limited
Grootestryd 465 LQ (Portion 5)	Lephalale Local Municipality
Grootestryd 465 LQ (Portion Remainder)	Eskom Holdings Limited
Eenzaamheid 687 LQ	Eskom Holdings Limited
Naauw Ontkomen 509 LQ	Eskom Holdings Limited
Hanglip 508 LQ (Portion Remainder)	Eskom Holdings Limited
Hanglip 508 LQ (Portions 1, 2 and 3)	Waterkloof Familie Trust

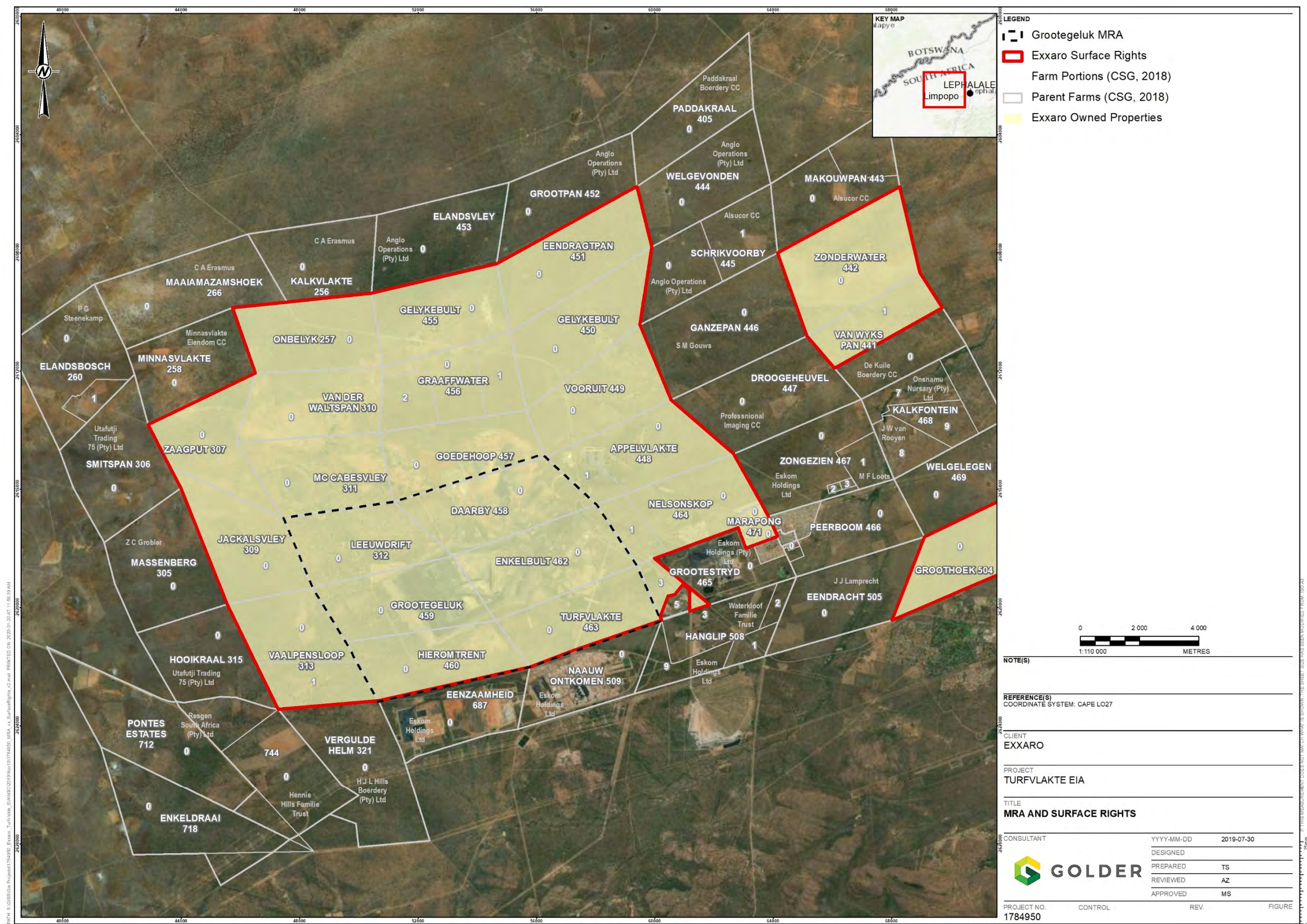


Figure 3: Surface right owners

2.5 Description of the locality and scope of the proposed overall activity

2.5.1 Location

The Turfvlakte Project is situated approximately 30 km north-west of Lephalale, located in the Waterberg region (which forms part of the Bushveld region) of the Limpopo Province of South Africa.

More specifically, the Turfvlakte project is located on the farm Turfvlakte 463 LQ directly south of the existing Grootegeluk Coal Mine operations and within the existing Mining Right of Grootegeluk Coal Mine. The location of the proposed development is shown in Figure 2.

The site layout of the project is presented in Figure 4 below. It indicates the position of the pits, haul roads, topsoil stockpile and laydown area.

Directly south of the project area is the Grootegeluk Coal Mine property border that separates Exxaro-owned land from Eskom-owned land. A provincial road close to this boundary traverses the Eskom property in an east-west direction.

2.5.2 Mining Operations

Exxaro is proposing to expand their existing mining operations by extending the opencast mining operation to the farm Turfvlakte 463 LQ (Figure 4). The farm is located within the existing Grootegeluk Coal Mine's Mining Right, LP 46 MRC. The opencast operations will consist of two pits, namely Pit 1 and Pit 2. Pit 1 will be 158 ha in size and will be 88 m deep, while Pit 2 will be 64 ha and 109 m deep.

Sufficient coal reserves have been proven to support opencast mining. Due to faulting in the area, Benches 9A and B and Bench 11 will be at quite shallow depths and high-quality coal can be mined at a favourable stripping ratio (Aurecon, 2018).

Grootegeluk Coal Mine is considering two options for the mining of Pit 1 and Pit 2. The preferred option is to mine Pit 1 and then Pit 2 to produce 1.5 million tonnes per annum run of mine (ROM) coal over a period of twelve (12) years.

The alternative option is to mine Pit 2 first and then Pit 1, to produce 3 million tonnes per annum ROM coal over a period of seven (7) years.

The interburden and coal mined from Pit 1 and Pit 2 will be transported to and handled at the existing Grootegeluk Coal Mine plants.

The mining operations will be undertaken 24 hrs, six days a week.

2.5.3 Other operations

The proposed infrastructure to be established at surface in support of the coal mining operation includes haul roads connecting the proposed pits to the existing Grootegeluk Coal Mine operations, laydown area for the mine equipment and offices, water management infrastructure (sumps and pipelines), waste management area (waste skips), and a sub-station.

2.5.3.1 Materials and Waste Management

The following types of mining related materials and wastes will be handled because of the proposed mining activities:

2.5.3.1.1 Topsoil

The topsoil from the open pit areas will be stripped prior to mining and will be stored on a dedicated topsoil stockpile located in the north western section of the project area. The topsoil stockpile will be 21 ha in size.

2.5.3.1.2 Overburden

The overburden (material that lies above the coal, such as the hards and softs) generated during the creation of the box cuts (first cut into the overburden to access the coal and interburden) will be stockpiled on the existing Grootegeluk Coal Mine Dump 6.

2.5.3.1.3 Interburden

The interburden (material that separates the coal seams within strata) will be transported with the coal to the existing Grootegeluk Coal Mine plants for further beneficiation.

2.5.3.1.4 Plant Discard

Discharge from the beneficiation process will report to a common discard conveyor, which will also include the fines discard, from where it will be conveyed to backfill the existing Grootegeluk Coal Mine pit.

2.5.3.1.5 Hydrocarbon and hazardous waste

Small amounts of hydrocarbon waste, that includes solid and liquid waste of a petrochemical nature (fuel, grease, oil, etc.) as well as other hazardous waste, will be stored in designated skips or drums for recycling or disposal at a licenced hazardous waste facility in accordance with existing hazardous waste management procedures implemented at Grootegeluk Coal Mine.

2.5.3.1.6 General waste

General waste that includes paper, plastic, glass, etc. will be stored in designated containers for disposal in accordance with the Grootegeluk Coal Mine waste management procedures.

2.5.3.2 Haul Roads

The proposed haul roads will be constructed to tie into the existing Grootegeluk Coal Mine haul roads. The haul roads will connect the Turfvlakte Pit 1, Pit 2, the infrastructure laydown area, topsoil stockpile with the Grootegeluk Coal Mine Dump 6 and the rest of the Grootegeluk Coal Mine operational areas.

The haul roads have been designed to accommodate large off-highway trucks and will be:

- Dual carriageway;
- Gravel surfaces; and
- 38.2 m wide, allowing for 11 m lane widths and 5.4 m wide earth berms on the side and in the centre of the road.

2.5.3.3 Access Roads

Access to the Turfvlakte mining area will be via the existing Grootegeluk Coal Mine access gate. The proposed new access roads will be constructed to tie into the existing Grootegeluk Coal Mine access roads. The access roads will provide access to all the infrastructure areas.

The access roads have been designed to accommodate light vehicles and will be:

- Dual directional roads;
- Gravel surfaces; and
- 10 m wide.

2.5.3.4 Infrastructure Laydown Area

The infrastructure laydown area will be 18 ha and will serve as an area for safe parking, offices and equipment storage.

2.5.3.5 Storm Water Management

The storm water management infrastructure will be designed as per the requirements of Regulation 704 under the National Water Act to ensure separation of clean and dirty water catchments.

Cut-off berms and earth canals will be located upstream of the infrastructure areas to divert the clean water run-off around the dirty infrastructure areas. These canals will integrate into the existing Grootegeluk Coal Mine storm water management system.

The contaminated run-off will be collected in concrete-lined channels that will connect with the existing Grootegeluk Coal Mine storm water management system.

2.5.3.6 Utilities

2.5.3.6.1 Potable Water

A potable water tank, with a capacity of 25 m³, will be constructed to supply potable water for the mining operations. The potable water will be pumped from the existing Grootegeluk Coal Mine potable water system.

2.5.3.6.2 Fire Water

A fire water tank, with a capacity of 25 m³, will be constructed to supply fire water for the mining operations. The fire water will be pumped from the existing Grootegeluk Coal Mine fire water system.

2.5.3.6.3 Sanitation

Sewage from the Turfvlakte operations will be transferred to the existing Grootegeluk Coal Mine for treatment at the existing sewage treatment facilities.

2.5.3.6.4 Electricity Supply

A substation will be constructed inside the infrastructure laydown area to supply electricity to the mining operations. The substation will be fed from the future Grootegeluk Coal Mine GG1/GG2 33 kV switching station as well as directly from the main Eskom 132/33 kV substation.

2.5.4 Listed and Specific Activities

Exxaro has applied for environmental authorisation for the proposed Turfvlakte project. The listed activities that require environmental authorisation in terms of the EIA Regulations GN R.324, 325, 326 and 327 that commenced on 7 April 2017 are identified in Table 5.

Table 5: Listed activities requiring environmental authorisation

Regulation	Activity Number	Description
GN R.327, 7 April 2017	9	<p><i>"The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water -</i></p> <p><i>(i) with an internal diameter of 0.36 metres or more; or</i></p> <p><i>(ii) with a peak throughput of 120 litres per second or more;</i></p> <p><i>Excluding where-</i></p> <p><i>(a) Such infrastructure is for bulk transportation of storm water or storm water drainage inside a road reserve or railway line reserve; or</i></p> <p><i>(b) Where such development will occur within an urban area."</i></p>

Regulation	Activity Number	Description
		<p>Storm water from the Turfvlakte operational areas will be transferred via pipelines to the existing Grootegeeluk Coal Mine storm water management system.</p> <p>Potable, raw and fire water will be pumped from the existing Grootegeeluk Coal Mine to the Turfvlakte operations via pipelines.</p> <p>A pipeline will be required to transport water from the open pits to the existing Grootegeeluk Coal Mine Operations.</p>
GN R.325, 7 April 2017	6	<p><i>"The development of facilities or infrastructure for any purpose or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding -</i></p> <p><i>(i) activities which are identified and included in Listing Notice 1 of 2014;</i></p> <p><i>(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 applies;</i></p> <p><i>(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or</i></p> <p><i>(iv) where the development is directly related to aquaculture or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day."</i></p> <p>The mining operations will require a water use licence as per NWA sections:</p> <ul style="list-style-type: none"> ■ Section 21(c) and Section 21(i): <ul style="list-style-type: none"> ■ Removal of pans within mining area; and ■ Proximity of mine infrastructure to wetlands/pans within the area. ■ Section 21(g): <ul style="list-style-type: none"> ■ Dust suppression. ■ Section 21(j): <ul style="list-style-type: none"> ■ Dewatering of pit areas to continue mining. <p>The above-mentioned water use licence application (WULA) will be applied for in terms of section 40 of the NWA. The compilation of the WULA will be undertaken in accordance with the published in Regulations GN R.267 as published in Government Gazette No 40713 dated 24 March 2017.</p>
	15	<p><i>"The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for –</i></p> <p><i>(i) the undertaking of a linear activity; or</i></p>

Regulation	Activity Number	Description
		<p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.”</p> <p>An area of 269 hectares of indigenous vegetation will be cleared during the construction phase of the project.</p>
	17	<p>“Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including –</p> <p>(a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or</p> <p>(b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;</p> <p>but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.”</p> <p>The proposed Turfvlakte mining operations is located within the existing Grootegeeluk Coal Mine’s Mining Right, LP 46 MRC.</p>
	27	<p>“The development of a road-</p> <p>(i) with a reserve wider than 30 metres; or</p> <p>(ii) catering for more than one land of traffic in both directions; but excluding a road-</p> <p>(a) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010, in which case activity 24 in Listing Notice 1 of 2014 applies;</p> <p>(b) which is 1 kilometre or shorter; or</p> <p>(c) where the entire road falls within an urban area.”</p> <p>Haulage roads will be constructed to connect the Turfvlakte Pit 1, Pit 2, the infrastructure laydown area and the topsoil stockpile. The haul roads will be up to 38.2 m wide. All the roads will be inside the existing Grootegeeluk Mining Right area and some will tie into the existing Grootegeeluk Coal Mine access gate and roads.</p>

2.5.5 Specific activities to be undertaken

The specific activities associated with the proposed project will be:

- Stripping and stockpiling of topsoil in front of the advancing opencast mining front, with bulldozers and front-end loaders;

- Drilling and charging of blast holes, followed by blasting, where necessary. Vibration levels and fly rock occurrence will be recorded during each blast and used to plan subsequent blasts;
- Excavation, loading, hauling and transport of overburden, interburden and coal. The interburden and coal will be transported to the existing Grootegeluk Coal Mine plants while the overburden from the initial box-cuts will be placed on the Grootegeluk Coal Mine Dump 6;
- Roll-over mining will be practiced after the construction of the initial box-cuts;
- Constructing and operating a storm water management infrastructure, that connects to the existing Grootegeluk Coal Mine storm water management system, comprising diversion berms, collection channels, pipelines and sumps;
- Constructing and operating utilities such as a fire water tank, raw water dams, sanitation facilities and electricity supply infrastructure; and
- Constructing and operating the supporting infrastructure such as offices, waste management facilities, access and haul roads, pipelines and fencing. See Figure 4 for a layout plan for the supporting infrastructure on Turfvlakte 463 LQ.

3.0 POLICY AND LEGISLATIVE CONTEXT

This section provides a brief overview of the legal requirements that must be met by this project.

3.1 Mineral and Petroleum Resources Development Act

Exxaro's mining operations at Grootegeluk Coal Mine are covered by an existing Environmental Management Programme report (EMPr) and associated Addenda lodged with the Department of Mineral Resources (DMR).

In terms of the Section 41 of the MPRDA and Regulations 53 and 54, the holder of a mining right must make financial provision, in a manner acceptable to the DMR, for the rehabilitation of negative environmental impacts, both for a planned closure at the end of the life of the mine, and for an unplanned closure during the life of the mine.

3.2 Natural Environmental Management Act

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended and the EIA Regulations, an application for environmental authorisation for certain listed activities must be submitted to the provincial environmental authority, the national authority (Department of Environmental Affairs, DEA), depending on the types of activities being applied for or, when mining and mineral processing activities are involved, the Department of Mineral Resources (DMR).

The current EIA regulations, GN R.324, GN R.325, GN R.326 and GN R.327, promulgated in terms of Sections 24(5), 24M and 44 of the NEMA and subsequent amendments, commenced on 7 April 2017. GN R.327 lists those activities for which a Basic Assessment is required, GN R.325 lists the activities requiring a full EIA (Scoping and Impact Assessment phases) and GN R.324 lists certain activities and competent authorities in specific identified geographical areas. GN R.326 defines the EIA processes that must be undertaken to apply for Environmental Authorisation.

The activities requiring environmental authorisation in terms of the NEMA are included in Table 5.

Copies of this Scoping Report have been sent to the Limpopo Department of Economic Development, Environment, and Tourism (LEDET) for comment. The provincial department is a key I&AP and will be kept informed throughout the EIA process. The EIA will meet the requirements stipulated in GN R.326 and the DEA's guidelines on public participation, published as GN 657 in May 2006.

3.3 National Water Act

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) is the primary legislation regulating both the use of water and the pollution of water resources. It is applied and enforced by the Department of Water and Sanitation (DWS).

Section 19 of the National Water Act regulates pollution, which is defined as “the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it:

Less fit for any beneficial purpose for which it may reasonably be expected to be used; or

Harmful or potentially harmful to -

- The welfare, health or safety of human beings;
- Any aquatic or non-aquatic organisms;
- The resource quality; or
- Property.”

The persons held responsible for taking measures to prevent pollution from occurring, recurring or continuing include persons who own, control, occupy or use the land. This obligation or duty of care is initiated where there is any activity or process performed on the land (either presently or in the past) or any other situation which could lead or has led to the pollution of water.

The following measures are prescribed in the Section 19(2) of the NWA to prevent pollution:

- Cease, modify or control any act or process causing the pollution;
- Comply with any prescribed standard or management practice;
- Contain or prevent the movement of pollutants;
- Eliminate any source of the pollution;
- Remedy the effects of pollution; and
- Remedy the effects of any disturbance to the bed or banks of a watercourse.

The NWA states in Section 22 (1) that a person may only use water:

- Without a licence –
 - if that water use is permissible under Schedule 1;
 - if that water use is permissible as a continuation of an existing lawful use; or
 - if that water use is permissible in terms of a general authorisation issued under section 39;
- If the water use is authorised by a licence under this Act; or
- If the responsible authority has dispensed with a licence requirement under subsection (3).

Water use is defined in Section 21 of the NWA. Exxaro’s proposed mining operations on Turfvlakte may involve the following water uses:

- a) Taking water from a water resource;
- b) Storing water;

- c) Impeding or diverting the flow of water in a watercourse;
- d) Disposing of waste in a manner which may detrimentally impact on a water resource;
- e) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- f) Altering the bed, banks, course or characteristics of a watercourse; and
- g) 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.

Regulation 704 of 4 June 1999 defines the manner in which rainwater falling or flowing onto a mining area or an industrial site must be managed and requires inter alia the following:

- a) Separation of clean (unpolluted) water from dirty water;
- b) Collection and confinement of the water arising within any dirty area into a dirty water system;
- c) Design, construction, maintenance and operation of the clean water and dirty water management systems so that it is not likely for either system to spill into the other more than once in 50 years;
- d) Design, construction, maintenance and operation of any dam that forms part of a dirty water system to have a minimum freeboard of 0.8 m above full supply level, unless otherwise specified in terms of Chapter 12 of the Act; and
- e) Design, construction, and maintenance of all water systems in such a manner as to guarantee the serviceability of such conveyances for flows up to and including those arising as a result of the maximum flood with an average period of recurrence of once in 50 years.

3.4 National Environmental Management: Waste Act

The National Environmental Management: Waste Act, 2008 (Act 59 of 2008)(NEMWA) commenced on 1 July 2009. In terms of this Act, all listed waste management activities must be licensed and in terms of Section 44 of the Act, the licensing procedure must be integrated with the environmental impact assessment process.

Government Notice 921, which commenced on 29 November 2013, lists the waste management activities that require licensing in terms of the NEMWA. Licence applications for activities involving hazardous waste must be submitted to the national authority, the Department of Environmental Affairs (DEA) and those for general waste to the provincial authority, in this case the LDEDET.

One of the major amendments effected by the National Environmental Management Amendment Act 2014 is the insertion of section 24S, as a result of which the NEMWA is now also applicable to mining residue deposits and residue stockpiles, as follows:

“Management of residue stockpiles and residue deposits

24S. *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.”*

Mining residues were classified as hazardous wastes by default in terms section 18, Schedule 3 of the National Environmental Management: Waste Amendment Act, 2014 (Act No. 26 of 2014) (NEMWAA), which commenced on 2 June 2014.

In terms of Regulations GN R.632 and GN R.633, which commenced on 24 July 2015, mining residues must be characterised and classified, and the design and management of residue stockpiles and deposits must be based on an assessment of the potential impacts and risks.

3.5 National Environmental Management: Air Quality Act

The main objectives of the National Environmental Management: Air Quality Act 2004 (Act no. 39 of 2004) (NEM: AQA) are to protect the environment by providing reasonable legislative and other measures to:

- Prevent air pollution and ecological degradation;
- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development in alignment with Sections 24a and 24b of the Constitution of the Republic of South Africa.

The Act has devolved the responsibility for air quality management from the national sphere of government to local spheres of government (district and local municipal authorities), who are tasked with baseline characterisation, management and operation of ambient monitoring networks, licensing of listed activities, and development of emissions reduction strategies.

The South African National Ambient Air Quality Standards (NAAQS) for common pollutants prescribe the allowable ambient concentrations of pollutants which are not to be exceeded during a specified time period in a defined area (Table 6). In the event that the standards are exceeded, the ambient air quality is defined as poor and potential adverse health impact are likely to occur.

Table 6: South African Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Averaging Period	Limit Value ($\mu\text{g}/\text{m}^3$)	Limit Value (ppb)	Frequency of Exceedance	Compliance Date
Sulphur dioxide (SO_2) ^(a)	10 minutes	500	191	526	Immediate
	1 hour	350	134	88	Immediate
	24 hours	125	48	4	Immediate
	1 year	50	19	0	Immediate
Nitrogen dioxide (NO_2) ^(b)	1 hour	200	106	88	Immediate
	1 year	40	21	0	Immediate
Particulate matter <10 micrograms in diameter (PM_{10}) ^(c)	24 hours	75	-	4	Immediate
	1 year	40	-	0	Immediate
Particulate matter <2.5 micrograms in diameter ($\text{PM}_{2.5}$) ^(d)	24 hours	65	-	4	Immediate
	24 hours	40	-	4	01/01/2016 – 31/12/2029
	24 hours	25	-	4	01/01/2030

Pollutant	Averaging Period	Limit Value ($\mu\text{g}/\text{m}^3$)	Limit Value (ppb)	Frequency of Exceedance	Compliance Date
	1 year	25	-	0	Immediate
	1 year	20	-	0	01/01/2016 – 31/12/2029
	1 year	15	-	0	01/01/2030
Ozone (O_3) ^(e)	8 hours	120	61	11	Immediate
Lead (Pb) ^(f)	1 year	0.5	-	0	Immediate
Carbon monoxide (CO) ^(g)	1 hour	30,000	26,000	88	Immediate
	8 hours (1 hour averages)	10,000	8,700	11	Immediate
Benzene (C_6H_6) ^(h)	1 year	5	1.6	0	01/01/2015

a. The reference method for the analysis of SO_2 shall be ISO 6767

b. The reference method for the analysis of NO_2 shall be ISO 7996

c. The reference method for the determination of the particulate matter fraction of suspended particulate matter shall be EN 12341

d. The reference method for the analysis of $\text{PM}_{2.5}$ shall be EN14907

e. The reference method for the analysis of ozone shall be the UV photometric method as described in ISO 13964

f. The reference method for the analysis of lead shall be ISO 9855

g. The reference method for analysis of CO shall be ISO 4224

h. The reference methods for benzene sampling and analysis shall be either EPA compendium method TO-14 A or method TO-17

3.5.1 National Dust Control Regulations

The National Dust Control Regulations (GN R.827), which were promulgated on 1 November 2013, define acceptable dust fall rates for residential and non-residential areas as listed in Table 7.

Table 7: Acceptable dust fall rates

Defined areas	Dust fall rate ($\text{mg}/\text{m}^2/\text{day}$ over a 30 day average)	Permitted frequency of exceedance
Residential areas	Dust fall < 600	Two per annum (not in sequential months)
Non-residential areas	600 < Dust fall < 1200	Two per annum (not in sequential months)

Although Exxaro will not require an atmospheric emission licence for its proposed Turfvlakte project, it will have to operate within the NAAQS and the National Dust Control Regulations.

3.5.2 Priority Areas

Sections 18 to 20 of NEM: AQA deal with the establishment of Priority Areas in so-called “hot-spot” areas of South Africa where ambient air quality standards are often exceeded or may often be exceeded. The establishment of a Priority Area is intended to achieve the following:

- It effectively allows for the concentration of limited air quality management capacity (human, technical and financial) for dealing with acknowledged problem areas in order to obtain measurable air quality improvements in the short, medium and long term;

- It prescribes a cooperative governance regime by effectively handing-up air quality management authority to the tier of government that can provide leadership and coordination; and
- It allows for “cutting edge” air quality management methodologies that take into account all contributors to the air pollution problem, i.e. air-shed air quality management.

The Turfvlakte project area, as part of the Grootegeeluk Mine area, is located within the Waterberg-Bojanala Priority Area (WBPA) (Figure 14). The WBPA was declared a priority area by the Minister of Water and Environmental Affairs on 15 June 2012 (Government Gazette No. 35435). The declaration was in response to the predicted NAAQS exceedances in the area and trans-boundary emissions sources and air pollution impacts spanning the Waterberg District Municipality and Bojanala Platinum District Municipality (Allan & Coetzee, 2018).

3.6 Other Applicable Legislation

- National Heritage Resources Act, Act 25 of 1999;
- Conservation of Agricultural Resources Act, Act 43 of 1983;
- National Veld and Forest Fire Bill, 10 July 1998;
- Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, Act 36 of 1947;
- National Environmental Management: Biodiversity Act, Act 10 of 2004;
- Environment Conservation Act, Act 73 of 1989;
- Conservation of Agricultural Resources Act, Act 43 of 1983;
- National Forest Act, Act 84 of 1998; and
- Limpopo Environmental Management Act, Act 7 of 2003.

3.7 Need and Desirability of Proposed Activities

Internationally, coal is the most widely used primary fuel. It is estimated that about 36 percent of the total fuel consumption for the world's electricity production is from coal (Department of Energy , 2018). In South Africa, about 77 percent of the country's primary energy needs are provided by coal.

In addition to supplying the local economy, approximately 28 percent of South Africa's production is exported. The coal is exported mainly through the Richards Bay Coal Terminal, making South Africa the fourth-largest coal exporting country in the world (Department of Energy , 2018).

Exxaro has undertaken an exercise to mitigate contractual risks associated with coal volume supply from the Grootegeeluk Coal Mine to its clients. The Turfvlakte resource has been identified as a suitable supplementary coal resource for the export market.

The positive aspects of the proposed mining operations on Turfvlakte include the benefits of additional income generation in the area.

3.8 Period for which environmental authorisation is required

The planned life of the mine, based on the proven coal reserves in Pit 1 and Pit 2, is estimated at twelve years (12) for the preferred option and seven (7) years for the alternative option (section 2.5.2). To accommodate the time needed for construction, mine development, production ramp up, closure and rehabilitation, the authorisation is required for a period of twenty (20) years.

3.9 Process followed to reach preferred site

Mining can take place only within the area for which a mining right is obtained and no alternative site for mining is possible. Several alternative sites and layouts for the supporting infrastructure are possible and may be explored, taking into consideration economic viability, practicality and environmental characteristics.

3.9.1 Project Alternatives

In terms of Regulation 50 (d) of the MPRDA Regulations R. 527 under the Mineral and Petroleum Resources Development Act, Act 28 of 2002, an environmental impact assessment report must include *inter alia* the following:

“(d) A comparative assessment of the identified land use and development alternatives and their potential environmental, social and cultural impacts.”

Alternatives considered for the proposed project are as follows:

3.9.1.1 Opencast vs Underground Mining

Due to faulting in the Grootegeluk area, Benches 9A and B and Bench 11 protrude quite shallow and therefore high-quality coal can be mined at a favourable stripping ratio by means of opencast mining. In addition, underground mining of the Turfvlakte reserve, which is a comparatively small reserve to the Grootegeluk reserve, would be un-economical and thus the opencast option is preferred.

3.9.1.2 Technology and mining approach

- Removal of topsoil, overburden, interburden and coal can be done by means of draglines, bucket wheel excavators or bowl scrapers;
- In some opencast operations, the ore is crushed in the pit and transported to a processing plant by means of conveyor belts, trucks or trains;
- Blast designs can vary widely, but are always tailored to the particular pit design and materials handling system; and
- Sometimes opencast mines are not backfilled. Instead, the void is allowed to fill with water, while the overburden and waste rock dumps and the tailings dams are re-vegetated.

The description provided in section 2.5 reflects the most suitable opencast mining approach for this particular orebody.

3.9.1.3 Location of infrastructure

The preferred location and layout of the supporting infrastructure for the Turfvlakte project, as shown in Figure 4, was chosen with particular economic, environmental and logistical considerations in mind, as set out in section 2.5 of this report.

3.9.1.4 Mine Plan

Grootegeluk Coal Mine is considering two options for mining Pit 1 and Pit 2. The preferred option is to mine Pit 1 first and then Pit 2 to produce 1.5 million tonnes per annum run of mine (ROM) coal over a period of twelve (12) years.

The alternative option is to mine Pit 2 first and then Pit 1 to produce 3 million tonnes per annum run of mine (ROM) coal over a period of seven (7) years.

3.9.1.5 *Postponement of mining project*

Exxaro is proposing to mine the Turfvlakte coal reserves located on the farm Turfvlakte 463 LQ. The coal reserves and proposed mining area are located within the existing Grootegeluk mining right area.

Postponing the mining of the Turfvlakte coal reserves would not affect the mining right, since Grootegeluk Coal Mine is already in possession of a valid mining right to mine the coal reserves within the permitted area, but it could result in Exxaro being unable to serve its markets optimally.

3.9.1.6 *No Project Option*

The coal situated in the Turfvlakte area is considered to be export quality coal. If these reserves are left unmined, the economic benefits to Exxaro and its employees as well as the associated socio-economic benefits to the local communities and businesses would not materialise.

The area will remain a natural habitat, albeit cut off from the surrounding agricultural areas by the surrounding industrial areas. This will however, be temporary for, as long as there is a demand for coal, there will be a drive to mine it.

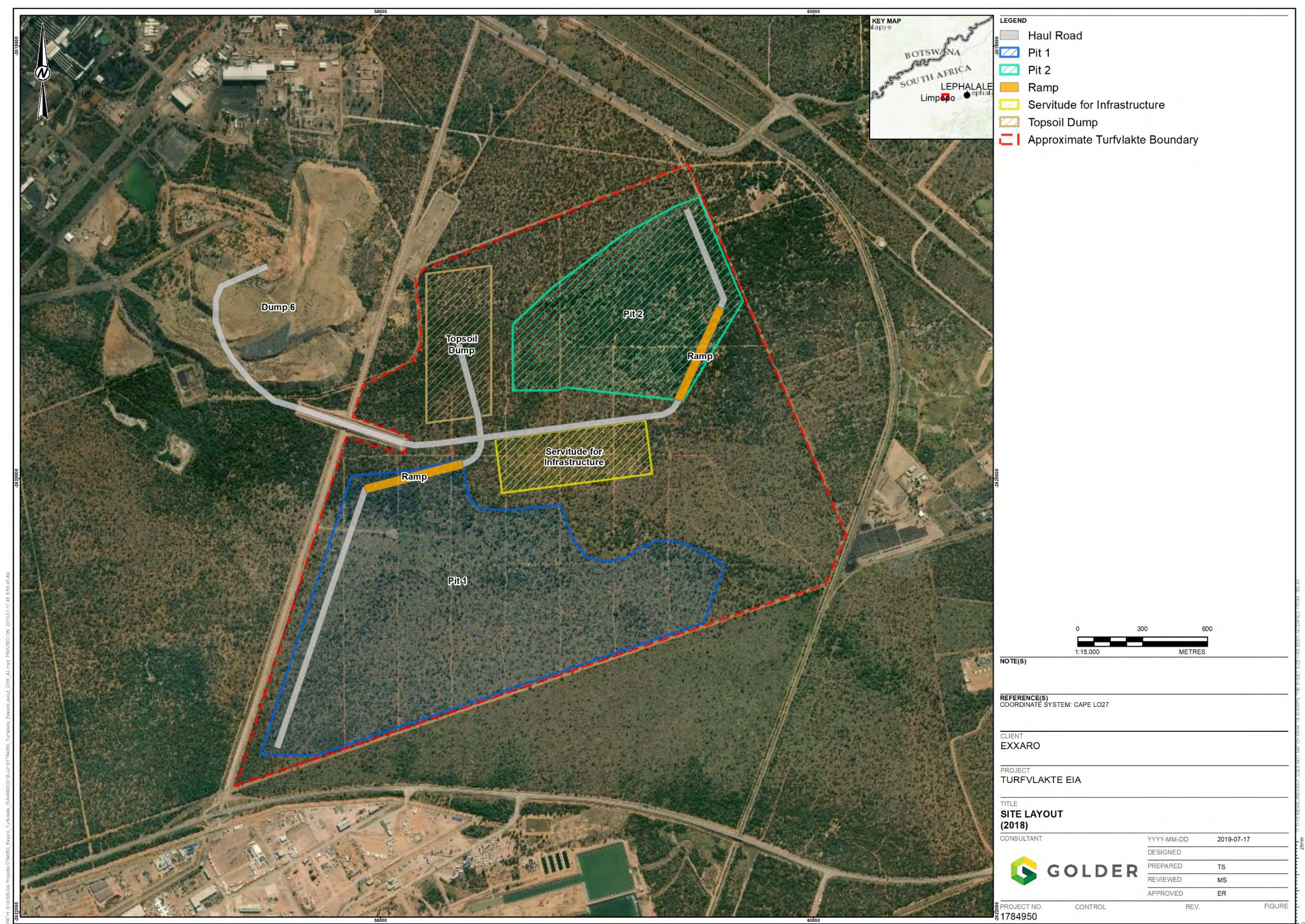


Figure 4: Infrastructure layout of the proposed Turfvlakte Project

3.9.2 Public Participation Process

This section provides an overview of the public participation process undertaken to date in this EIA.

3.9.2.1 Objectives of Public Participation

The principles that determine communication with society at large are included in the principles of the National Environmental Management Act (NEMA) (Act 107 of 1998, as amended) and are elaborated upon in General Notice 657, titled “Guideline 4: Public Participation” (Department of Environmental Affairs and Tourism, 19 May, 2006), which states that: “Public participation process means a process in which potential interested and affected parties (I&APs) are given an opportunity to comment on, or raise issues relevant to, specific matters.”

Public participation is an essential and regulatory requirement for an environmental authorisation process and must be undertaken in terms of Regulations 39 to 44 of the Environmental Impact Assessment (EIA) Regulations GN R.326 (April 2017). Public participation is a process that is intended to lead to a joint effort by stakeholders, technical specialists, the authorities and the proponent/developer who work together to produce better decisions than if they had acted independently (Greyling, 2003).

Opportunities for Comment

Documents will be available during the scoping and impact assessment phases of the EIA process to provide stakeholders with information, further opportunities to identify issues of concern and suggestions for enhanced benefits and to verify that the issues raised have been considered.

The public participation process is designed to provide sufficient and accessible information to Interested and Affected Parties (I&APs) in an objective manner and:

During the Scoping Phase to enable them to:

- Raise issues of concern and suggestions for enhanced benefits;
- Verify that their issues have been recorded;
- Assist in identifying reasonable alternatives;
- Comment on the plan of study of specialist studies to be undertaken during the impact assessment phase; and
- Contribute relevant local information and traditional knowledge to the environmental assessment.

During the impact assessment phase to assist them to:

- Contribute relevant information and local and traditional knowledge to the environmental assessment;
- Verify that their issues have been considered in the environmental investigations; and
- Comment on the findings of the environmental assessments.

During the decision-making phase:

- To advise I&APs of the outcome, i.e. the authority decision, and the appeal process.

3.9.2.2 Identification of I&APs

I&APs were initially identified through a process of networking and referral, obtaining information from Golder's existing stakeholder database, liaison with potentially affected parties and NGOs in the study area, newspaper advertisements and a registration process involving completion of a registration and comment sheet.

Through the registration sheet, I&APs were invited to indicate the names of colleagues and friends who may be interested in participating in the public participation process.

The initial stakeholder database used to announce Exxaro's proposed project for the mining of coal on the farm Turfvlakte 463 LQ near Lephalale comprised a total of 267 stakeholders (see APPENDIX C) representing various sectors of society, as listed below.

- Government (national, provincial and local);
- Directly affected landowners;
- NGOs (environmental, conservation and others);
- Agricultural organisations;
- Unions;
- Community representatives and CBOs;
- Marginalised groups (women, youth, elderly);
- Business and Commerce;
- Industry; and
- Other

Please register as an I&AP!

Stakeholders are encouraged to register as I&APs and participate in the consultation processes by completing the Registration and Comment sheet and returning it to the Public Participation Office. The Registration and Comment Sheet can also be completed on-line via Golder's website: www.golder.com/public. Contact details are provided on page ii of this report.

3.9.2.3 Register of I&APs

The NEMA Regulations (GN R.326) distinguish between I&APs and *registered* I&APs.

I&APs, as contemplated in Section 24(4)(d) of the NEMA include: "(a) any person, group of persons or organisation interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity".

In terms of the Regulations:

"An EAP managing an application must open and maintain a register which contains the names, contact details and addresses of:

- All persons who; have submitted written comments or attended meetings with the applicant or EAP;
- All persons who; have requested the applicant or EAP managing the application, in writing, for their names to be placed on the register; and
- All organs of state which have jurisdiction in respect of the activity to which the application relates.

A register for I&APs has been opened and will be updated throughout the EIA process.

As per the EIA Regulations, future consultation during the Impact Assessment phase will take place with **registered I&APs**. Stakeholders who were involved in the initial consultation and who attend the public meetings during the Scoping Phase will be added to the register.

3.9.2.4 Public participation during Scoping

This section provides a summary of the public participation process followed during the Scoping Phase of the EIA.

3.9.2.4.1 Announcement of the proposed project Draft Scoping Report

The Draft Scoping Report is available for public review for 30 days from **Monday 27 January 2020 until Tuesday 25 February 2020**.

The proposed project was announced on 24 January 2020 and stakeholders were invited to participate in the EIA and public participation process and to pass on the information to friends/colleagues/neighbours who may be interested and to register as I&APs.

The proposed project was announced as follows:

- Distribution of the Draft Scoping Report (DSR) and a letter of invitation to participate to all I&APs on the initial database, accompanied by a registration, comment and reply sheet that was mailed/emailed to the entire stakeholder database. Copies of the announcement documents are attached as APPENDIX C;
- A notification of the proposed project was also distributed via bulk SMS to all I&APs with mobile numbers on the initial stakeholder database;
- The abovementioned documents are available at the public places listed on page ii of this report and can be downloaded from the Golder website: <https://www.golder.com/global-locations/africa/south-africa-public-documents/>;
- An advertisement was published in the Mogol Post on 24 January 2020 (APPENDIX C) – a copy of the tearsheet of the advertisement will be included in the Final Scoping Report, Draft and Final EIA Reports; and
- Site notices were placed at the entrance to the proposed project site and at visible places at the boundary of the property. Photographic evidence of the site notices will be included in the Final Scoping Report, Draft and Final EIA Reports.
- I&APs were invited to attend either of the public meetings, as follows:

Date: Wednesday 12 February 2020

Time: 10:00 am – 12:00pm

Venue: Mogol Club, Lephalale, George Wells Street, Lephalale

OR

Date: Wednesday, 12 February 2020

Time: 14:00 – 16:00

Venue: Mogolo Academy, 175 Mosethla Street, Marapong, Lephalale

The minutes of the meetings will be sent to meeting attendees and upon request to those who request copies. The issues raised at the meetings will be incorporated into the Comment and Response Report that will be produced and included in the Final Scoping Report. Photographic evidence of the meetings will be included in the Final Scoping and Draft and Final EIA Reports.

Note: During previous stakeholder consultation processes Golder were advised to announce future EIA projects in the area also via the local radio station. However, a recent consultation with one of the NGOs in Lephalale revealed that the local radio station had closed down in 2019 and Golder were advised to put a site notice of the proposed project at the entrance to the Spar in Lephalale.

Final Scoping Report

The DSR will be updated after the expiry of the public review period and the Final Scoping Report will be submitted to the Department of Mineral Resources (DMR). The Final Scoping Report will be posted to Golder's website for I&APs information.

3.9.2.5 Comment and Response Report

As the announcement of the proposed project and the availability of the Draft Scoping Report are taking place simultaneously, stakeholders' issues, questions, concerns and suggestions for enhanced benefits will be collated during the public review period. All comments and issues raised in writing, telephonically or at the public meetings will be captured and incorporated in the Comment and Response Report. The Comment and Response Report will form part of the Final Scoping Report, Draft and Final EIA Reports.

4.0 ENVIRONMENTAL ATTRIBUTES AND DESCRIPTION OF THE BASELINE RECEIVING ENVIRONMENT

4.1 Geology

4.1.1 Regional Geology

Based on the 1:250 000 Geological Map Series 2326 Ellisras, Council for Geoscience, the regional geology in the area is characterised by the igneous and sedimentary rocks of the Karoo Supergroup (Golder Associates Africa, 2017) (Figure 5). The Turfvlakte Project is situated on the southern portion of the Limpopo Depression, a relatively small corridor between the Limpopo River in the west and the Palala-Pietersburg Plateau in the east (Brink & Van der Linde, 2018).

The Turfvlakte Project Area is located on the Waterberg Coal Field and includes all the major units of the Karoo Supergroup (Table 8), comprising from surface of the Stormberg Group, Beaufort Group, Eccca Group and the Dwyka group forming the basement (Figure 6).

Table 8: Stratigraphy of the Karoo Super Group

Group	Formation (SACS – 1980)	Formation (Cilliers 1951_	Representative Rock Type	Average Thickness
Stormberg	Drakensberg Basalt	Drakensberg	Lava, purplish to red, amygdaloidal	95 m
	Clarens Sandstone	Cave Sandstone	Sandstone, fine grained, white to yellow-brown to reddish	80 m
	Elliot	Red Beds	Mudstone, red to chocolate brown, clayey	90 m
	Molteno	Molteno	Sandstone, white, medium to coarse grained, scattered pebbles	15 m
Beaufort	Beaufort	Beaufort	Mudstone, purple and greenish grey, alternating at top, light grey at base	90 m
Eccca	Volkstrand Shale	Upper Eccca	Intercalated shale and bright coal	60 m
	Vryheid	Middle Eccca	Sandstone and grit, intercalated carbonaceous shale, siltstone, few thick coal seams, mainly dull	55 m
	Pietermaritzburg Shale	Lower Eccca	Shale and sandstone, grit in lower portions	150 m
Dwyka	Dwyka	Dwyka	Tillite	3 m

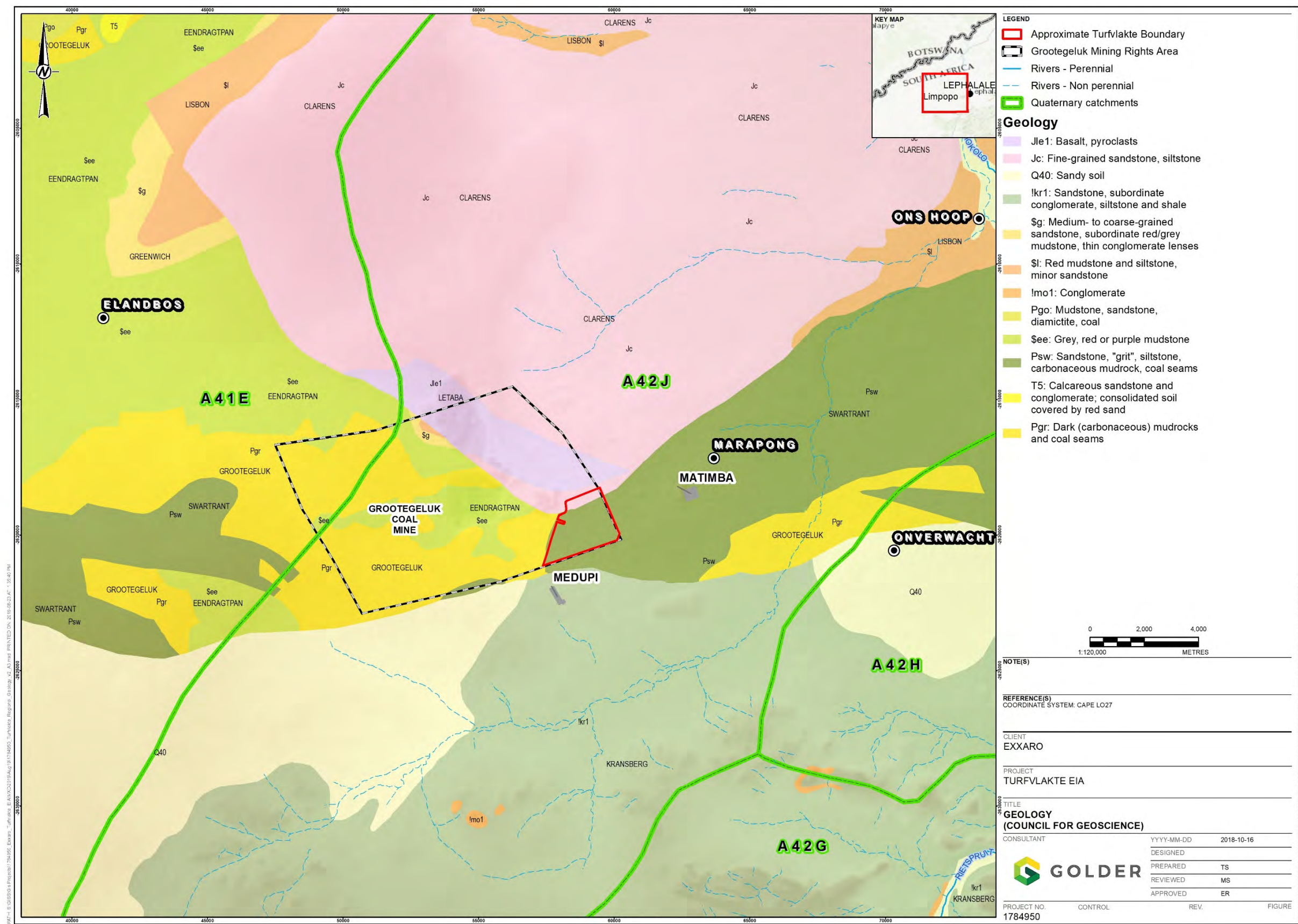


Figure 5: Regional Geology

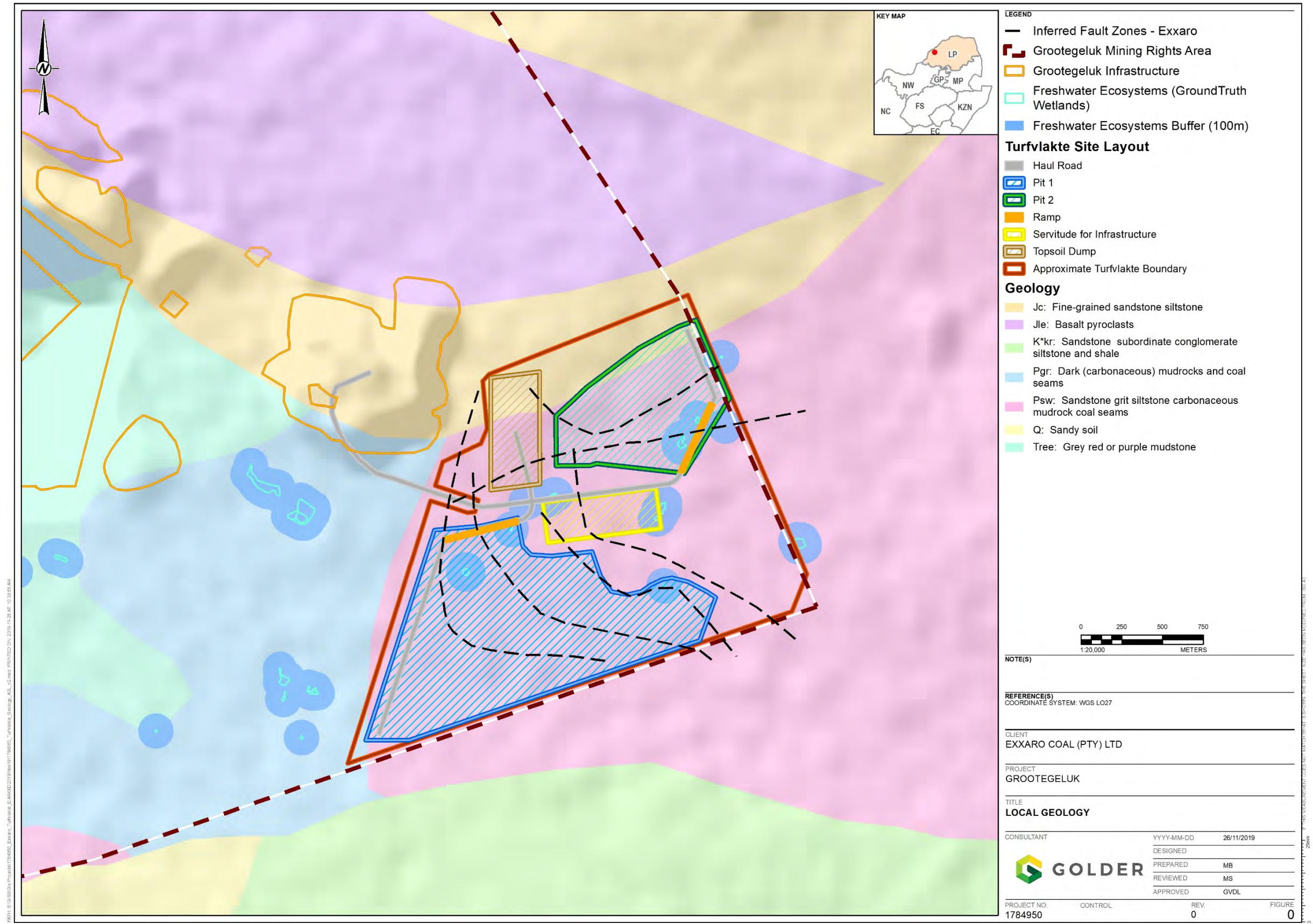


Figure 6: Geology of the Turfvlakte project area

The Waterberg Coal Field covers an area of approximately 88 km (east to west) and 40 km north-south. The coalfield also extends westward into Botswana. The Waterberg Coal Field is part of the late Palaeozoic to early Mesozoic (100-200 Ma) Erathems of the Karoo Supper Group. The coalfield is fault-bounded and forms a graben structure. The Eenzaamheid Fault forms the southern boundary, with rocks of the Waterberg Group occurring to the south and the Karoo to the north. The northern boundary is delineated by the Zoetfontein Fault with Archaean granites outcropping north of the fault (Golder Associates Africa , 2017).

The coal seams of the Waterberg Coal Field occur in the Volksrust and Vryheid Formations of the Karoo Super Group. These are also referred to as the Grootegeluk and Goedgedacht Formations, respectively.

The coalfield is further subdivided by the Daarby Fault that delineates a shallower western part of the coalfield, which is suitable for opencast mining and a deep north-eastern part, which is not suitable for opencast mining. The Zoetfontein Fault was tectonically active before and during Karoo deposition, while the Eenzaamheid and Daarby faults, as most of the other faults in the Waterberg Coalfield, are younger than the Karoo Sequence.

Sedimentation occurred in a shallow east-west striking trough and the general direction of transport was ENE-WSW. Karoo sediments are deposited on the Waterberg Group in the southern portion of the coalfield, while the basement rocks to the north of the Zoetfontein Fault are Archaean rocks. The paleo-floor in the eastern portion consists of granite and basic rocks of the Bushveld Igneous Complex. Relatively few dolerite dykes outcrop in the south-eastern portion of the coalfield and no sills have been intersected in any of the exploration boreholes (Golder Associates Africa , 2017).

4.1.2 Structural Geology

Three major geological fault zones intersect the greater study area, i.e. Zoetfontein Fault (to the north of Grootegeluk mine), Daarby Fault(north – east trending fault) and Eenzaamheid Fault to the south of Turfvlakte, as well as several minor faults and fractures which have been delineated by Exxaro as indicated on Figure 6 (Brink & Van der Linde, 2018).

Zoetfontein Fault:

The Zoetfontein Fault is a high angled east northeast – west southwest striking major fault. Significant post-Karoo displacement is evident and is known to be still seismically active; this resulted in the extensive downthrow to the north and sinistral horizontal movement. The basement complex consists of Archaean granite and gneiss, outcropping to the north of the fault zone (Brink & Van der Linde, 2018).

Daarby Fault:

The Daarby Fault is a major north-east, then north-west trending fault, assumed to be part of one set of events because both “legs” of the fault exhibit the same throw and throw direction. Both faults have consequently been combined into the one name. The Daarby Fault is a normal fault with a downthrow of 360 m to the north and the fault dips at an angle of between 50° and 60° to the north, bringing up-thrown Beaufort and Eccu Group Formations to the south into contact with the down-thrown Letaba, Clarens, Elliott and Molteno Formations in the north.

Eenzaamheid Fault:

The Eenzaamheid Fault, situated south of the Daarby fault, has a throw of 250 m to the north brining the upthrown Waterberg Group on the southern side of the fault into contact with the down-thrown Beaufort and Eccu Groups on the northern side of the fault. The dip angle of the Eenzaamheid Fault is near vertical. Evidence of a possible link between the Eenzaamheid and Daarby Faults exists from exploration boreholes on the farm Turfvlakte.

Minor faulting:

The associated step faults, associated with the Daarby and Eenzaamheid faults, are classed as minor faulting that have varying strikes, throws and throw directions. These faults have been interpreted from exploration boreholes, the geological model and mapping within the open pit excavation (Golder Associates Africa, 2017).

4.1.3 Local Geology

The Turfvlakte Project Area is dominated by the geology of three major Karoo Super Group Formations, namely the Volksrust, the Vryheid and the Clarence Formations. The local geology of the Waterberg Coal Field as found in the vicinity of the project area is presented in Figure 6 (provided by Exxaro).

The general stratigraphy of the Turfvlakte Project Area consists of weathered formation which is approximately 25 to 30m thick and is made up of topsoil, calcrete, minor ferricrete, a sandy alluvium, weathered shale, clay and non-reactive carbonaceous material. A generalized stratigraphy for the Turfvlakte project areas is shown in Figure 7.

The overburden overlays minor occurrences of Volksrust Formation coals in the western portion of the project area that disappears to the east of the project area. These coal measures are predominately material from what is defined as Benches 4 and 5 at Grootegeeluk mine. In the eastern portion of the farm, the Vryheid Formation lies directly under the overburden (provided by Exxaro). The thickness distribution of the overburden is shown in Figure 8 (provided by Exxaro).

Description		Thickness
Completely weathered, reddish brown to brown (where reworked with organic material), non-cohesive, aeolian sand with abundant quartz grains, upper most part of the profile.		29.35m
Hard to very hard, nodular, boulder or hardpan calcrete. Minor sporadic occurrences of ferricrete		
Highly weathered, cream to brown and reddish brown in places, coarse grained to gravelly, loose to moderately cemented (calcified), with abundant quartz grains and quartz pebbles throughout the horizon. Some rounded Karoo siltstone/shale fragments, alluvial sand.		
Highly weathered, yellowish brown and cream to brownish grey and light grey, fine grained, soft to slightly/moderately hard shale fragments and chips in a very fine powdery clay matrix, moulds in hand but has overall granular feel when moulded, weathered Karoo shales/siltstone		
Highly to completely weathered, light yellow brown and cream to brownish grey, fine grained and powdery, minor very soft to clayey shale fragments, easily moulded when compressed in hand and stains hands when wet, weathered Karoo shales/siltstones.		
Volksrust formation: Intercalated shale and bright coal layers. Only present in western portion of project area.		14.50m
Vryheid formation: Sandstone and grit, intercalated carbonaceous shale, siltstone, few thick coal seams, mainly dull		30.73m

Figure 7: Generalised Stratigraphy of Turfvlakte Project Area (provided by Exxaro) (Brink & Van der Linde, 2018)

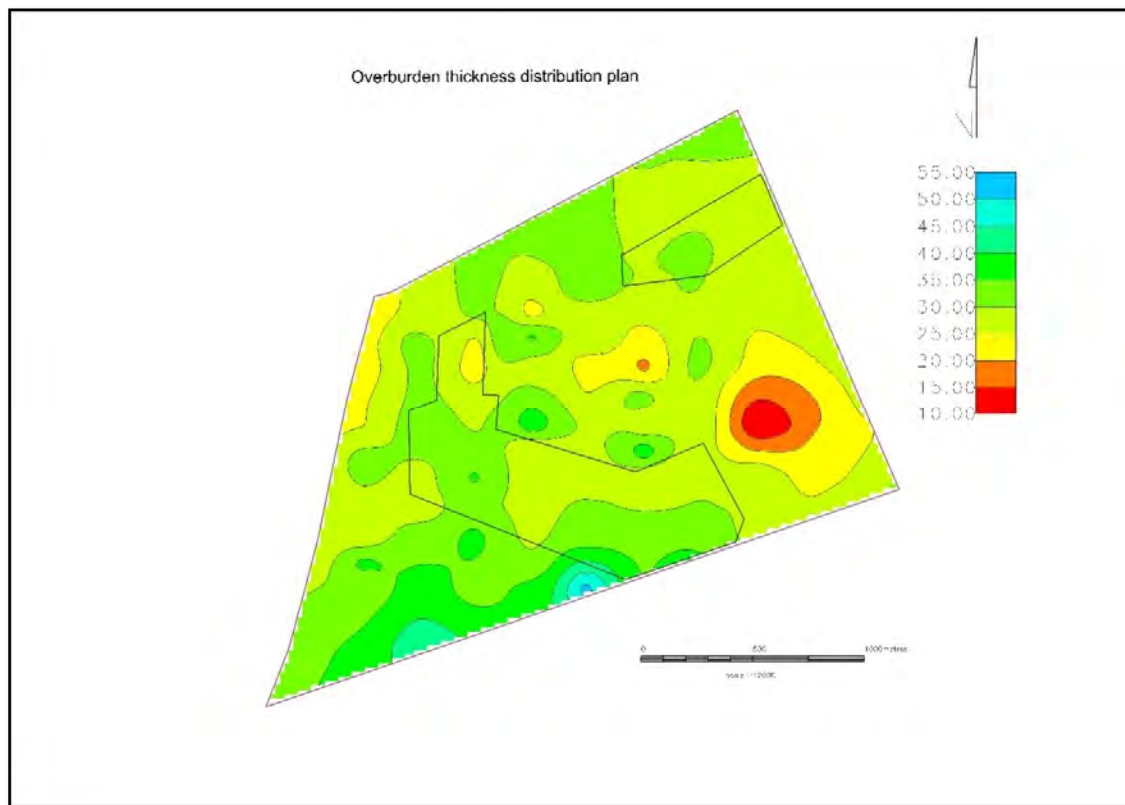


Figure 8: Overburden Thickness Distribution (provided by Exxaro) (Brink & Van der Linde, 2018)

The full Waterberg coal succession does not occur on the project area. A number of factors contribute to this. These include but are not limited to (provided by Exxaro):

- Differential weathering of the coal measures of the Volksrust and Vryheid Formations.
- The project area is situated in a narrow corridor that is bounded by two regional faults namely the Daarby and Eenzaamheid Faults. These faults appear to have a number of smaller, sympathetic faults associated with them. These fault zones make the project area more structurally complex and may contribute to the disappearance of portions of the coal measures in the area. These faults have been inferred by Exxaro from exploration boreholes and the geological model Figure 6 (Brink & Van der Linde, 2018).

4.2 Climate

The proposed Turfvlakte project area is located in the Waterberg region of South Africa which falls within the subtropical high-pressure belt. The mean circulation of the atmosphere over the subcontinent, except for near the surface, is anti-cyclonic throughout the year. The synoptic patterns affecting the typical weather experienced at the mine owe their origins to the subtropical, tropical and temperate features of the general atmospheric circulation over South Africa. The highest temperatures are typically experienced during the summer months of December, January and February, and the lowest during the winter months of June, July and August (Boyd & Dama-Fakir, 2018).

4.2.1 Temperature

Average temperatures in the region range from a minimum of approximately 5°C in June and July, to a maximum of approximately 33°C in January and December (Table 9).

Table 9: Average temperatures in the Lephalale area (<https://en.climate-data.org/location/26819/>)

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	26	25.2	23.8	21.1	17.4	14	14.1	17	21.3	23.5	24.7	25.6
Min. Temperature (°C)	19.5	18.9	16.9	13.4	8.2	4.4	4.5	7.6	12.4	15.6	17.8	18.9

4.2.2 Rainfall

Data from three rainfall stations in close proximity to the project area, with reasonably long and reliable records, were analysed and are presented in Table 10.

Table 10: Metadata for the rain stations

Station Name	Station No	Distance	Latitude	Longitude	Record	Patched Data	Reliability	MAP	Altitude
		km	Degrees	Degrees	Years	%	%	mm	mamsl
Grootfontein	0674429 W	18.796	23.39	27.45	44	57.9	42.1	440	853
Ellisras (POL)	0674400 W	17.102	23.41	27.44	33	66.2	33.8	463	837
Grootegeeluk	0674100 W	0.000	23.40	27.34	24	76.9	23.0	449	908

From the data analysed, it was observed that the same trend is present in both wet and dry seasons, as illustrated in Figure 9. The wet season is from October to March and the dry season from April to September, with the maximum average rainfall recorded in December and the minimum average rainfall recorded in July (Boyd & Dama-Fakir, 2018).

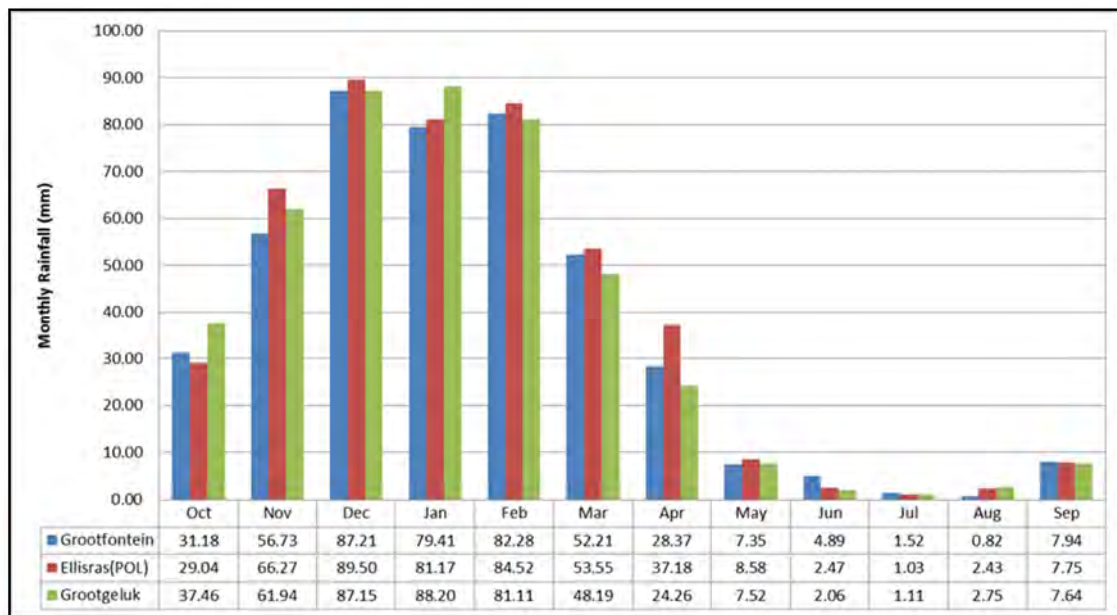


Figure 9: Average monthly rainfall for the stations analysed (Boyd & Dama-Fakir, 2018)

4.2.3 Evaporation

The nearest Symons (S)-Pan Evaporation station to the Turfvlakte farm (A4E007) has a Mean Annual Evaporation (MAE) of 1 844 mm/year. Mean monthly evaporation values are presented in Figure 10. It is important to note that the mean annual evaporation is almost 4 times higher than the rainfall.

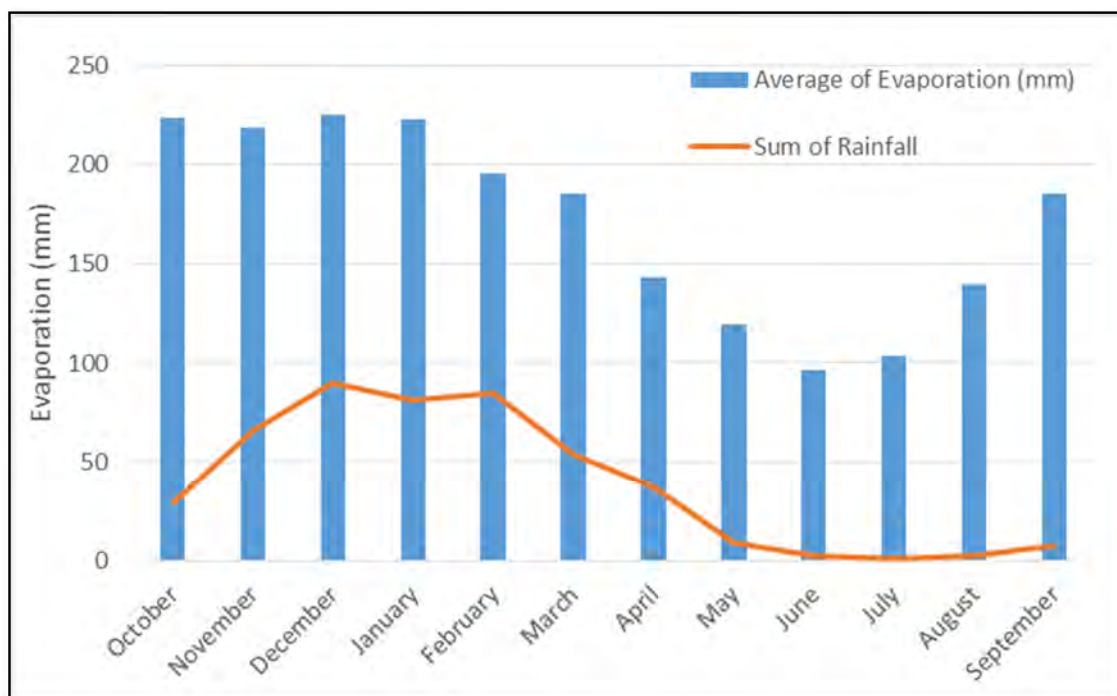


Figure 10: Average monthly evaporation measurements for the Lephalale area (Boyd & Dama-Fakir, 2018)

4.2.4 Wind Speed and Direction

Winds at the Turfvlakte project area are expected to originate from the north-east to east-north-easterly sector (Figure 11). Wind speeds are moderate, averaging 3.2 m/s with a low percentage (10%) of calm conditions (<1 m/s).

The seasonal and diurnal wind roses are provided in Figure 11.

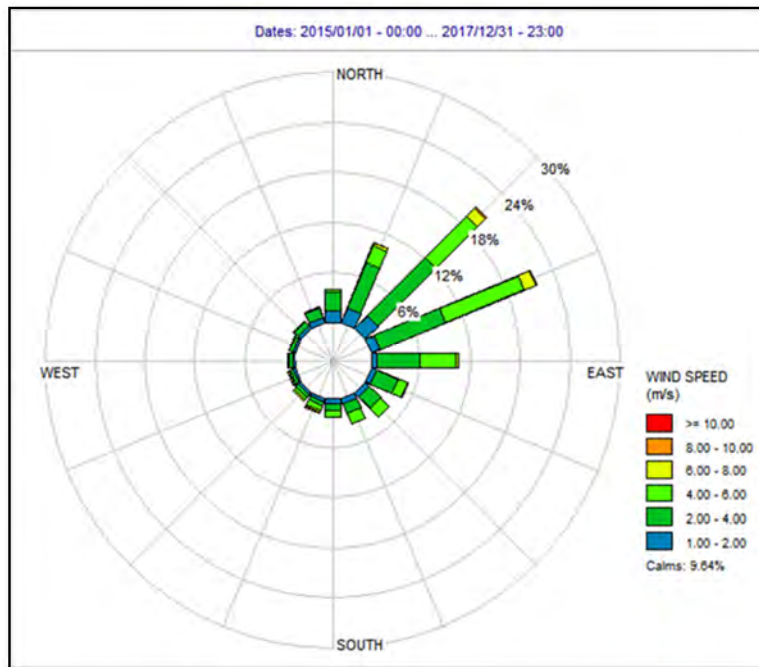


Figure 11: Period (2015 - 2017) modelled wind rose for the Turfvlakte project area (Allan & Coetzee, 2018)

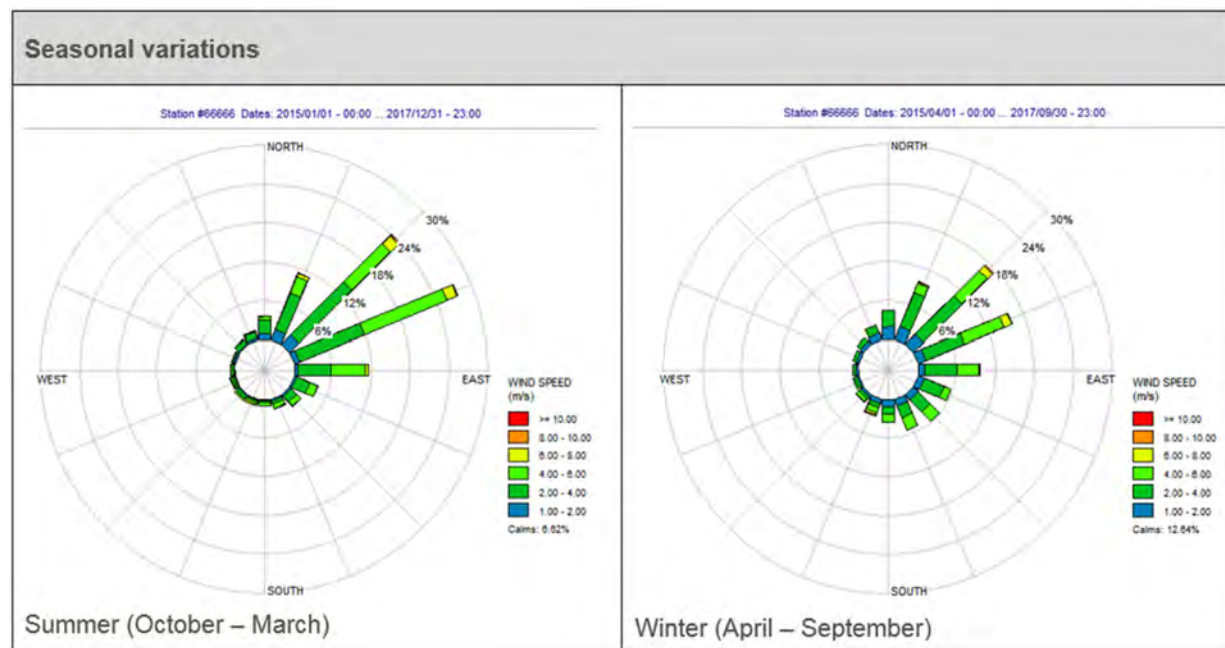


Figure 12: Seasonal variations in wind speed and direction (Allan & Coetzee, 2018)

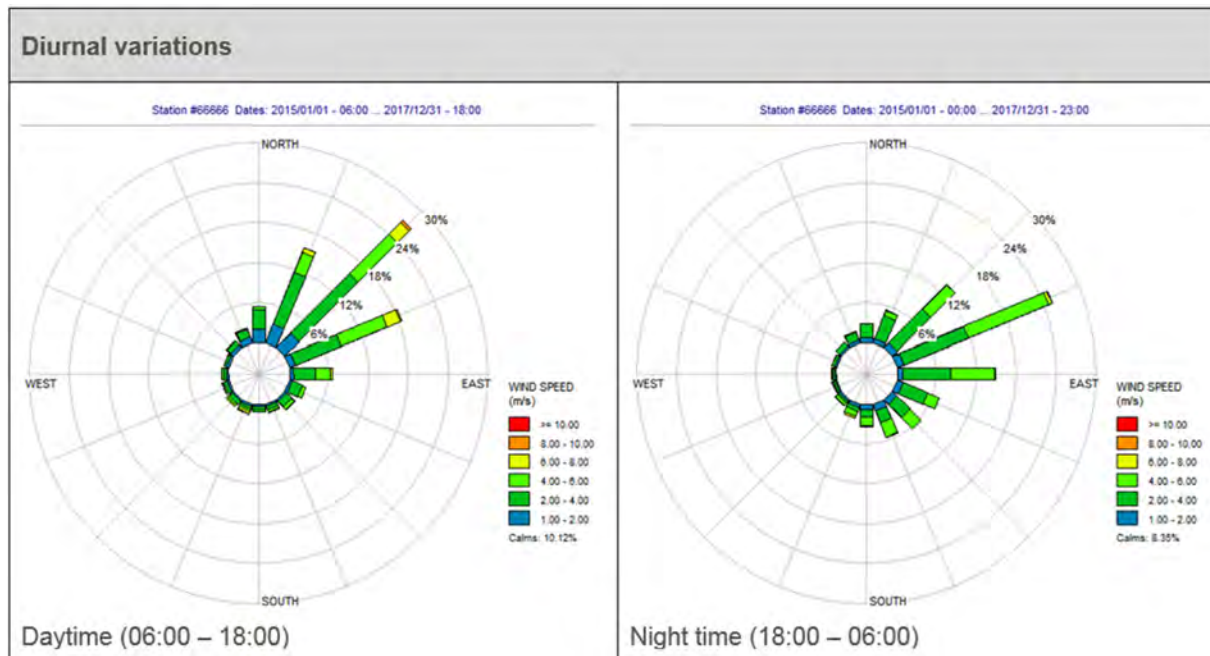


Figure 13: Diurnal variations in wind speed and direction (Allan & Coetzee, 2018)

4.2.5 Extreme Weather Events

The area is mainly frost free and hail seldom occurs.

4.3 Air Quality

4.3.1 Priority Area

The Turfvlakte project area is located within the Waterberg-Bojanala Priority Area (WBPA) (Figure 14).

4.3.2 Land Use and Sensitive Receptors

The region is characterised by natural bushveld, interspersed with plots of cultivated land, small scale farming and protected natural reserves, as illustrated in Figure 15. The Grootegeluk Coal Mine, and the neighbouring Eskom power stations, Medupi and Matimba, are prominent features in the local landscape.

Potential sensitive receptors in the vicinity of the current Grootegeluk Coal Mine and the proposed Thabametsi and Turfvlakte mining operations, include dispersed farm houses, lodges, towns and natural reserves. The Manketti Lodge is the sensitive receptor in closest proximity, 400 m north-east of the proposed Turfvlakte Pit 2, of the proposed project area. The towns of Marapong, 4 km east of the Grootegeluk Coal Mine, and Onverwacht, 10 km east of Grootegeluk Coal Mine, host a number of schools and hospitals. The combined habitation of the two neighbouring towns are approximately 26 000 people. Table 11 lists a selection of representative receptor sites surrounding the Grootegeluk Coal Mine and proposed Thabametsi and Turfvlakte mining operations. The location of the receptor sites is illustrated in Figure 15.

Table 11: Selected representative receptor locations

Number	ID	Name	X	Y	South	East
0	MAN	Manketti Lodge	559704	7382428	-23.66782	27.58550

Number	ID	Name	X	Y	South	East
1	VIL	Village	561063	7383287	-23.66001	27.59879
2	DIT	Ditheku Primary (Marapong)	562976	7384216	-23.65154	27.61751
3	MAR	Marapong Private Hospital	563100	7383440	-23.65854	27.61876
4	NEL	Nelson Skop Primary (Marapong)	563854	7383540	-23.65761	27.62615
5	SED	Sedibeng School for the Deaf (Onverwacht)	567943	7379416	-23.69469	27.66643
6	FAR	Farm house NE	561418	7389535	-23.60355	27.60201
7	GOE	Goedenhoop 4570	552506	7387090	-23.62596	27.51475
8	GRA	Graaffwater 4562	552136	7388001	-23.61774	27.51108
9	ELA	Elandsbosch 2601	540835	7388273	-23.61561	27.40030
10	MAS	Massenberg 3050	542716	7384120	-23.65307	27.41886
11	HOO	Hooikraal 3150	545894	7378122	-23.70716	27.45021
12	BUF	Buffelsjagt 3170	547057	7375644	-23.72951	27.46169
13	TIE	Tierkop NR/ Vergulde Helm 3210	550506	7377127	-23.71601	27.49548
14	KRO	Kromdraai 6900	554915	7374607	-23.73863	27.53883
15	WEL	Wellington 5190	561926	7373877	-23.74496	27.60764
16	HAN	Hanglip 5083	561482	7380495	-23.68521	27.60301

4.3.3 Sources of Air Pollution

With the Grootegeluk Coal Mine, Matimba and Medupi Power Stations, and Marapong and Lephalale residential areas in areas surrounding the Turfvlakte project are, the following key sources of air pollution were identified:

- Coal mining;
- Power generation;
- Domestic fuel burning;
- Vehicle emissions; and
- The entrainment of dust on unpaved roads.

4.3.3.1 Coal Mining

Coal mining operations are prominent emission sources in the WBPA, with the most relevant operation the Grootegeluk Coal Mine. Activities at the mining operations that result in the entrainment/suspension of particulate matter, include but are not limited to:

- Vehicles used on unpaved and paved roads;
- Blasting;
- Overburden stripping;
- Ore and overburden materials handling;
- Crushing and screening of ore; and
- Wind entrainment from stockpiles, waste rock dumps and tailings storage facilities.

When fresh coal is loaded onto a stockpile, the potential for dust emission is at a maximum. Fine coal particles are easily disaggregated and released to the atmosphere upon exposure to air currents, either from coal transfer itself or from high winds. As the coal pile ages, the potential for dust emissions is greatly reduced as moisture causes aggregation and cementation of fines to the surface of larger particles (USEPA (2006) as cited by (Allan & Coetzee, 2018).

Carbon oxides, hydrocarbons, sulphuric gases and hydrogen are potentially emitted from coal stockpiles. The potential sources of these gases include degassing, low temperature oxidation and, in extreme cases, spontaneous combustion.

Coal beds contain reservoirs of gases, mainly carbon dioxide (CO₂) and methane (CH₄). These gases are stored on the internal surface of organic matter or within the molecular structure of the coal. From the moment that coal is exposed to air, it is subject to low temperature oxidation (weathering) by atmospheric oxygen. This process can be sustained if the heat produced by the exothermic oxidation cannot be sufficiently dissipated by heat transfer within the stockpile. Temperatures are therefore generally higher and atmospheric pressures lower than those occurring in the coal beds. These conditions are ideal for degassing. In addition to the CO₂ and CH₄ emitted in the degassing process, dimethylsulphide (DMS) is produced from lignite (IEA Clean Coal Centre (2013) as cited by (Allan & Coetzee, 2018).

Spontaneous combustion is caused when coal oxidizes and airflow is insufficient to dissipate the heat. During combustion, the reaction between coal and the air produces oxides of carbon, including CO₂, oxides of sulphur (SO_x), and various oxides of nitrogen (NO_x). Because of the hydrogenous and nitrogenous components of coal, hydrides and nitrides of carbon and sulphur are also produced during the combustion process. These include hydrogen cyanide (HCN), sulphur nitrate (SNO₃) and other toxic substances including: arsenic, lead, mercury, nickel, vanadium, beryllium, cadmium, barium, chromium, copper, molybdenum, zinc, selenium and radium (World Coal Institute (2008) as cited by (Allan & Coetzee, 2018).

Fugitive dust and fine particulates generated at the current Grootegeluk Coal Mine and proposed Turfvlakte and Thabametsi mining operations are anticipated to have the largest impact on ambient air quality.

4.3.3.2 Power Generation

The coal reserves in the region have led to establishment of the following power generating infrastructure:

- Matimba coal fired power station, approximately 5 km east-south-east of the Grootegeluk Coal Mine;
- Medupi coal fired power station, approximately 5 km south of the Grootegeluk Coal Mine; and

- Power stations in Botswana, located approximately 100 km from Lephalale.

The air pollutants released as a result of the high temperature combustion process at coal-fired power stations primarily include particulates (PM₁₀ and PM_{2.5}), SO₂, NO_x, nitric oxide (NO), NO₂, CO, CO₂, nitrous oxide (N₂O), and trace amounts of mercury.

The non-combustible portion of the fuel remains as solid waste. The coarser, heavier waste is called bottom ash and is extracted from the burner, and the lighter, finer portion is fly ash, usually emitted as particulates through the stack and resulting in the formation of particulate matter which is liberated to the atmosphere via a stack (post scrubbing at most power stations) (Allan & Coetzee, 2018).

4.3.3.3 Domestic Fuel Burning

Households within nearby towns and communities are likely to use coal, wood and paraffin for space heating and/or cooking purposes. Emissions from these communities are therefore anticipated to impact the region, especially during the winter period due to the increased demand for space heating.

Domestic fuel burning of coal emits a large amount of gaseous and particulate pollutants including sulphur dioxide, heavy metals, total and respirable particulates, inorganic ash, carbon monoxide, polycyclic aromatic hydrocarbons (PAHs), and benzo(a)pyrene. Pollutants arising due to the combustion of wood include respirable particulates, NO₂, CO, PAHs, particulate benzo(a)pyrene and formaldehyde. The main pollutants emitted from the combustion of paraffin are NO₂, particulates, CO and PAHs.

4.3.3.4 Vehicle Emissions

Air pollution generated from vehicle emissions may be grouped into primary and secondary pollutants. Primary pollutants are those emitted directly to the atmosphere as exhaust emissions whereas, secondary pollutants are formed in the atmosphere as a result of atmospheric chemical reactions, such as hydrolysis, oxidation, or photochemical reactions. The primary pollutants emitted typically include CO₂, CO, hydrocarbons (including benzene, 1,2-butadiene, aldehydes and PAHs), SO₂, NO_x and particulates. Secondary pollutants formed in the atmosphere typically include NO₂, photochemical oxidants such as O₃, hydrocarbons, sulphur acid, sulphates, nitric acid, sulphates, nitric acid and nitrate aerosols (USEPA (1995) as cited by (Allan & Coetzee, 2018).

The quantity of pollutants emitted by a vehicle depends on specific vehicle related factors such as vehicle weight, speed and age; fuel-related factors such as fuel type (petroleum or diesel), fuel formulation (oxygen, sulphur, benzene and lead replacement agents) and environmental factors such as altitude, humidity and temperature (Samaras and Sorensen (1999) as cited by (Allan & Coetzee, 2018).

Pollutants emitted from heavy off-highway vehicles include:

- CO - produced as a result of incomplete combustion;
- NO_x – produced from the oxidation of nitrogen at high temperature and pressure in the combustion chamber;
- SO₂ - produced from the combustion of sulphur in diesel; and
- PM - produced from the incomplete combustion of the diesel, additives in fuels and lubricants, and worn material that accumulate in the engine lubricant.

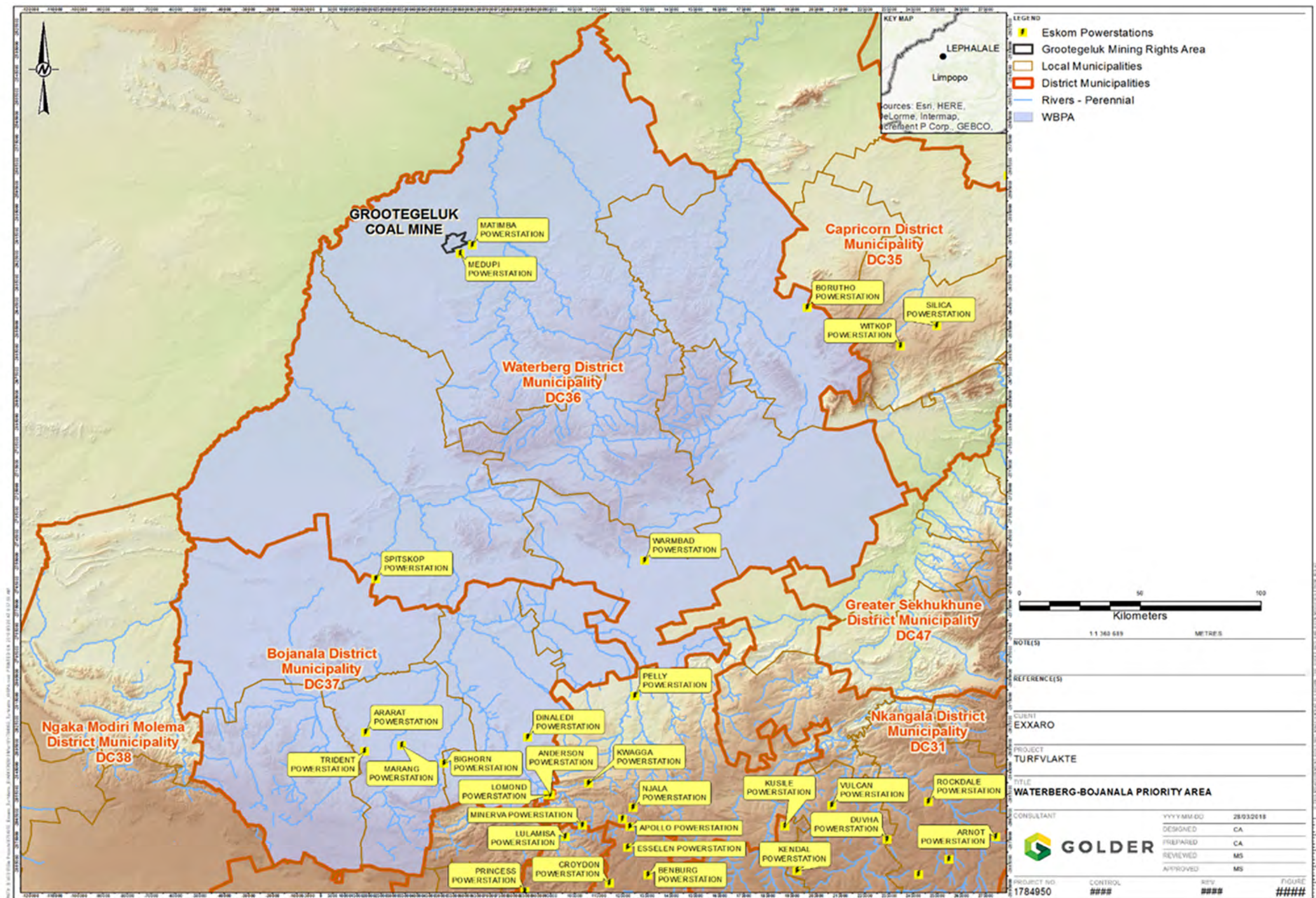
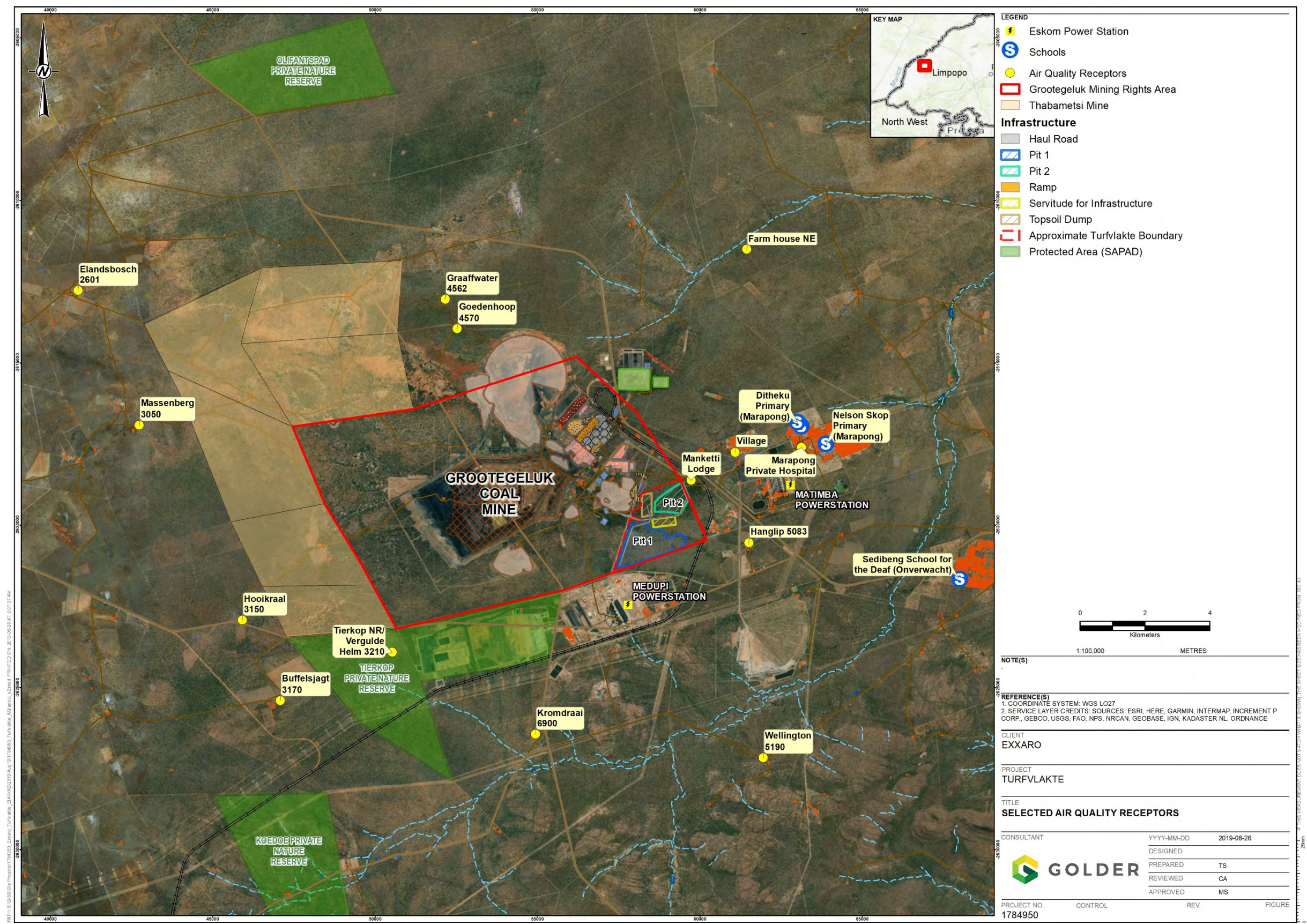


Figure 14: Waterberg-Bojanala Priority Area (WBPA)



4.3.3.5 Vehicle Entrainment of Dust on Unpaved Roads

Vehicle entrained dust emissions from paved and unpaved roads represent a potentially significant source of fugitive dust in the region. Particulate emissions from paved roads occur when loose, spilt material on the road surface becomes suspended as vehicles travel across the roads surface and or when fine particulates are blown from the transported load. At industrial and construction sites the surface loading is continually replenished by spillage of material from unpaved roads and vehicles (USEPA (1995) as cited by (Allan & Coetzee, 2018)).

The surface of an unpaved road is unprotected from both the weight of a vehicle as well as the wind turbulence generated by the vehicle. The wheels of vehicles pulverise the surface and thus loosen material from the road, generating fine dust particles. This loosened material can then be lifted from the road surface a by turbulent air currents created as the vehicle is moving. The effect of this turbulent wake is maintained sometime after the vehicle has passed. The quantity of dust emissions from an unpaved road therefore varies linearly with the volume of traffic.

4.3.4 Ambient Air Quality Monitoring

4.3.4.1 Dust Fallout

A dust fallout monitoring network, consisting of 12 single dust fallout buckets has been established at points along the fence-line and boundary of the Grootegeluk Coal Mine (Figure 16).



Figure 16: Grootegeluk Coal Mine dust fallout monitoring locations (Exxaro Grootegeluk, (2018) as cited by (Allan & Coetzee, 2018))

The dust fallout data for the period January to December 2018 is illustrated in Figure 17. One exceedance of the non-residential limit was recorded in the period. The exceedance was recorded in November at monitoring

point GGD 04, located to the west of the Grootegeluk Coal Mine pit. Spoiled samples were recorded at GGD04 during the monitoring period, primarily as a result of animal/human interruptions.

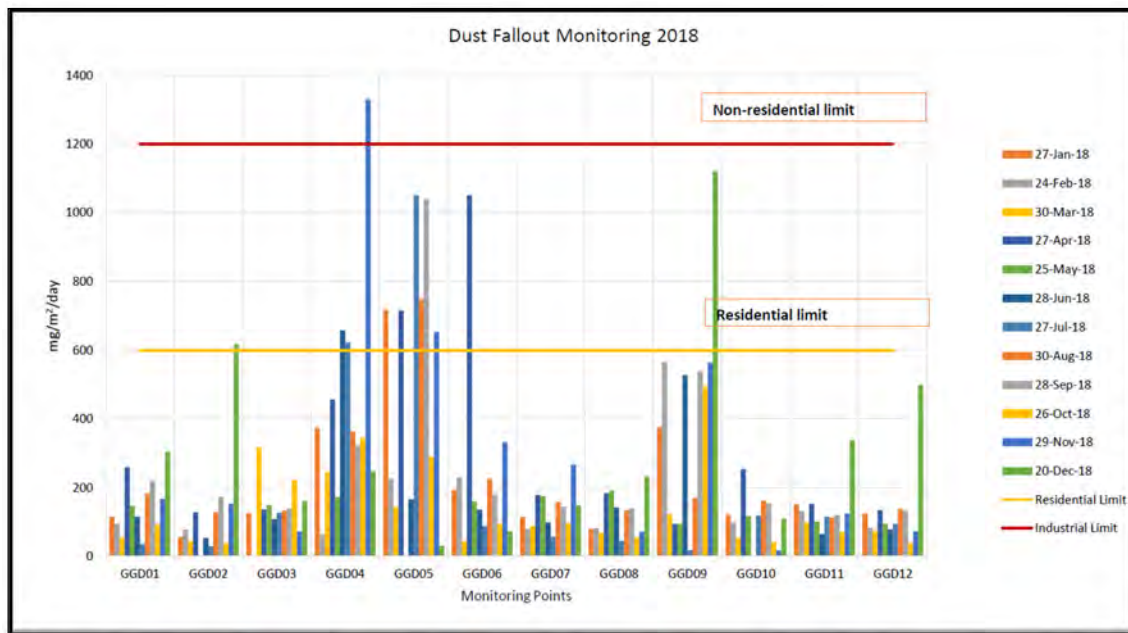


Figure 17: Dust fallout monitoring results for January to December 2018

4.3.4.2 Fine Particulates

Fine particulate monitoring is undertaken at the Medupi coal fired power station (~5 km east-south-east of the Grootegeluk Coal Mine). This data is published to the South African Air Quality Information System (SAAQIS) and is available for public use. The daily average validated fine particulate data for 01 January 2017 – 31 December 2017 was extracted from the SAAQIS site to determine the baseline ambient fine particulate loads in the region.

PM_{2.5} results indicated two peaks in March and September 2017 (Figure 18). These peaks were considered outliers and distorted the graphical output to the extent that the 'typical' concentrations were no longer visible. Data for the period 1 April 2017 - 31 August 2017 (excluding these outliers) was therefore assumed to be representative of typical ambient conditions (Figure 19). Concentrations measured during this time fluctuated frequently from 5 µg/m³ to 30 µg/m³ with average concentrations of approximately 15 µg/m³ (roughly 40% of the NAAQS) (Allan & Coetzee, 2018).

PM₁₀ results indicated peaks in September 2017 at Medupi (Figure 20). Again, these peaks were considered outliers and distorted the graphical output to the extent that the 'typical' concentrations were no longer visible. Data from 1 January – 31 August were therefore selected for the Medupi power station (Figure 21). Concentrations measured at Medupi fluctuated frequently from 5 µg/m³ to 70 µg/m³ with average concentrations of approximately 30 µg/m³ (roughly 40% of the NAAQS) (Allan & Coetzee, 2018).

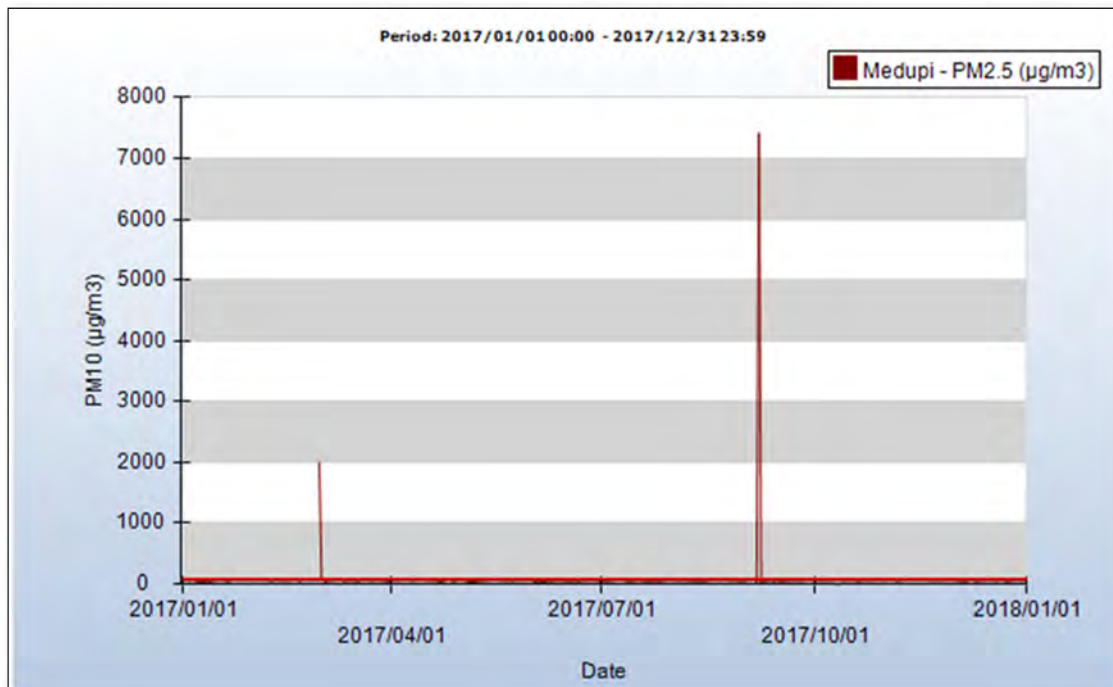


Figure 18: Daily average PM_{2.5} data for 1 January 2017 - 31 December 2017, measured at the Medupi Power Station (www.saaqis.org.za)

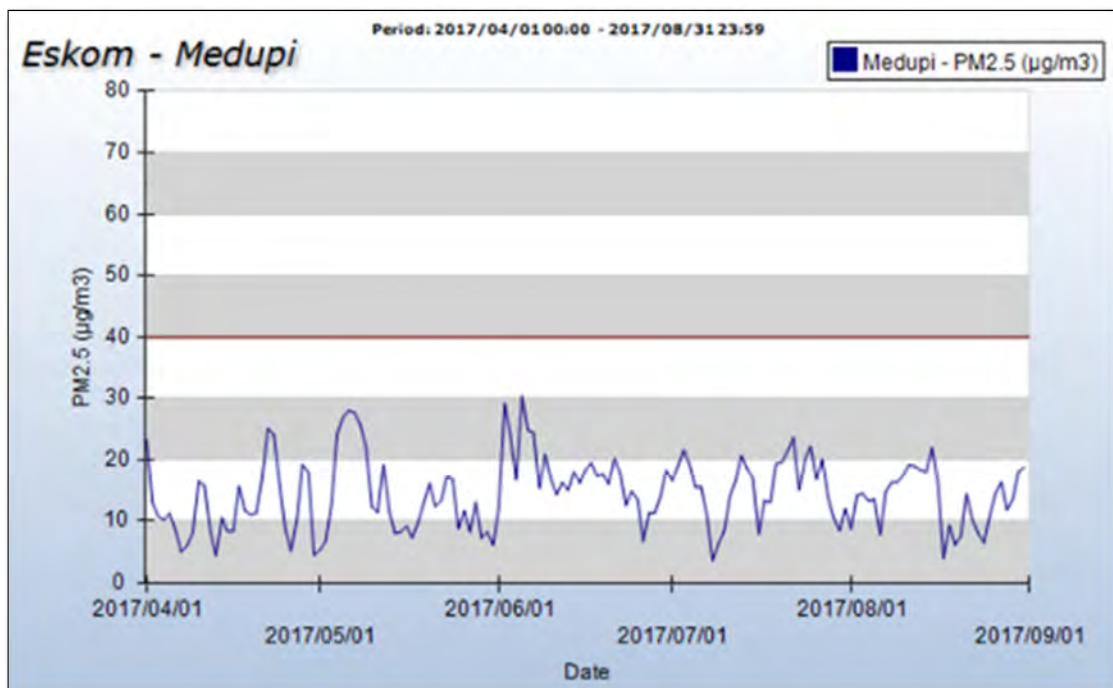


Figure 19: Daily average PM_{2.5} data for 1 April 2017 - 31 August 2017, measured at the Medupi Power Station (www.saaqis.org.za)

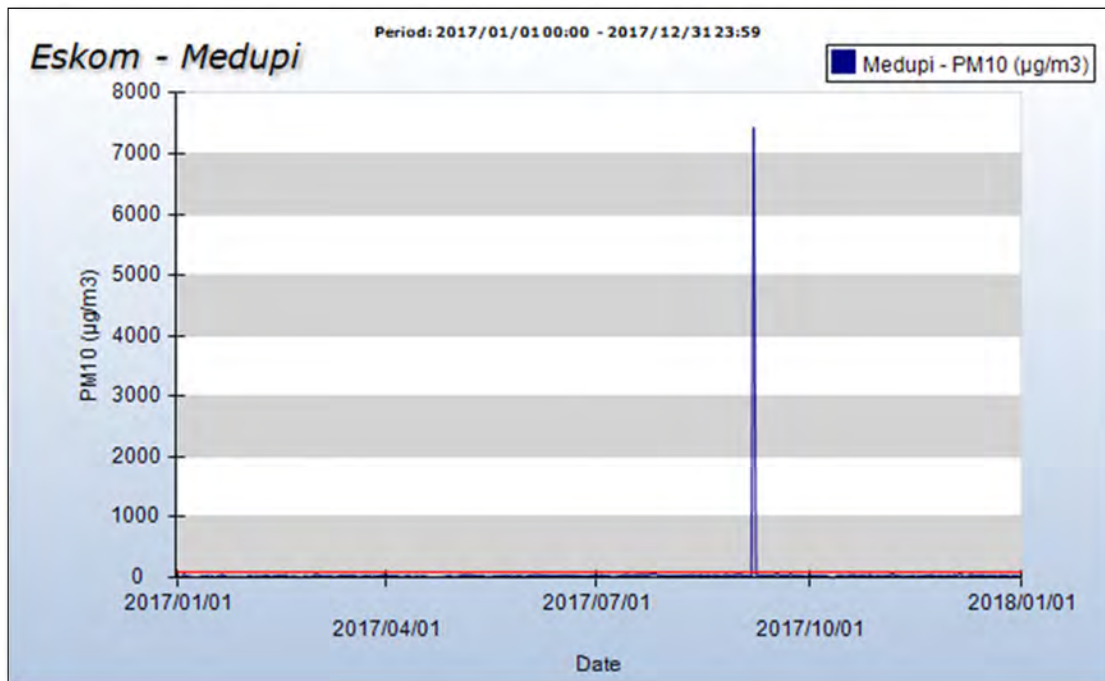


Figure 20: Daily average PM₁₀ data for 1 January 2017 - 31 December 2017, measured at the Medupi Power Station (www.saaqis.org.za)

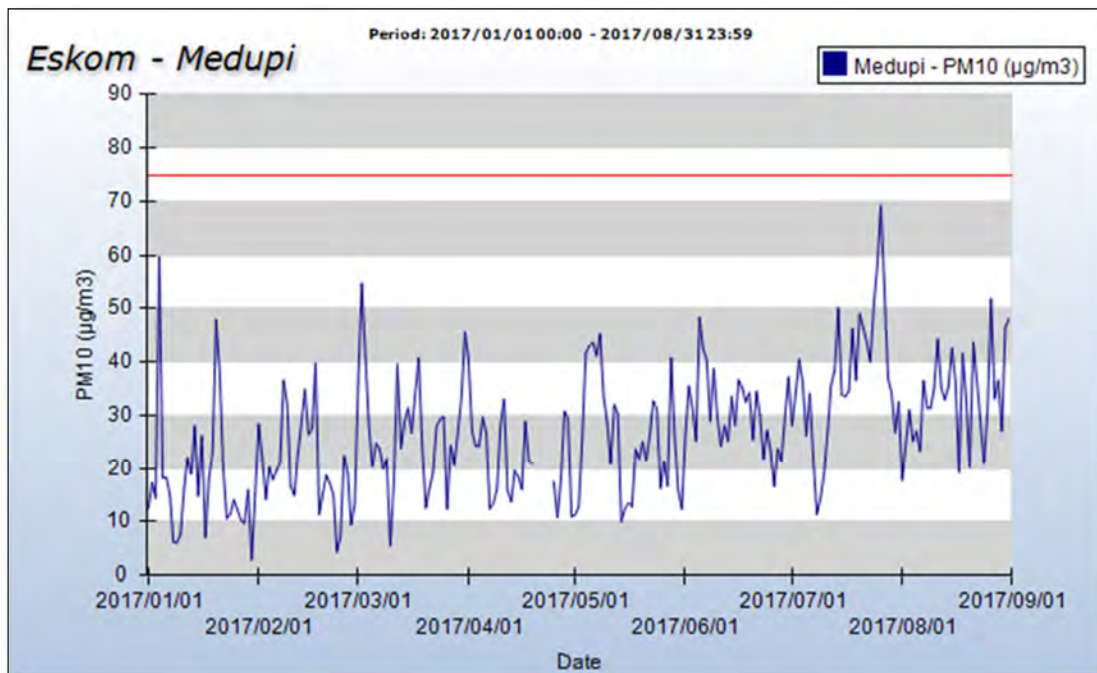


Figure 21: Daily average PM₁₀ data for 1 January 2017 - 1 September 2017, measured at the Medupi Power Station (www.saaqis.org.za)

4.4 Topography

The general topography of the area is described as “Plains”, with slopes that vary between 0 and 3%. Elevation around the mine varies from 900 to 922 m above sea level. The area is generally featureless except for elevation differences caused by Nelsonskop (922 m) in the north and the Waterberg range (3,600 m) in the south. Drainage appears to be in an east-north-easterly direction towards the Mogol River and consists mainly of dry sandy gullies such as the “Sandloopspruit” (Figure 22).

The Mogol River is approximately 810 m above sea level, while the mine is approximately 900 m above sea level. This results in an almost negligible gradient of 90:21000 m or 0.0043 %. General topographical drainage appears to be in an east-north-easterly direction towards the Mogol River. No natural drainage channels occur on the mine area, except for Sandloopspruit which is located approximately 1 km north of the mine’s slimes dams. Due to the flat topography, highly permeable sands and the absence of any surface water drainage courses, the mine has no direct impact on the surface hydrology of the Mogol Catchment (Schlechter & Roux, 2014).

The surface effects concerning the adjacent Grootegeluk mining operation are:

- The open pit area exposed for mining activities is approximately 852 ha;
- Several discard dumps covering a total of about 1000 ha with heights varying between 40 and 60 meters;
- Office and workshop buildings, together with other infrastructure in the mining area occupy a further 10 ha;
- The slimes dams north of the beneficiation plant cover about 100 ha at a height of approximately 25 m; and
- A number of borrow pits were made in the area to obtain construction materials, inter alia for road building.

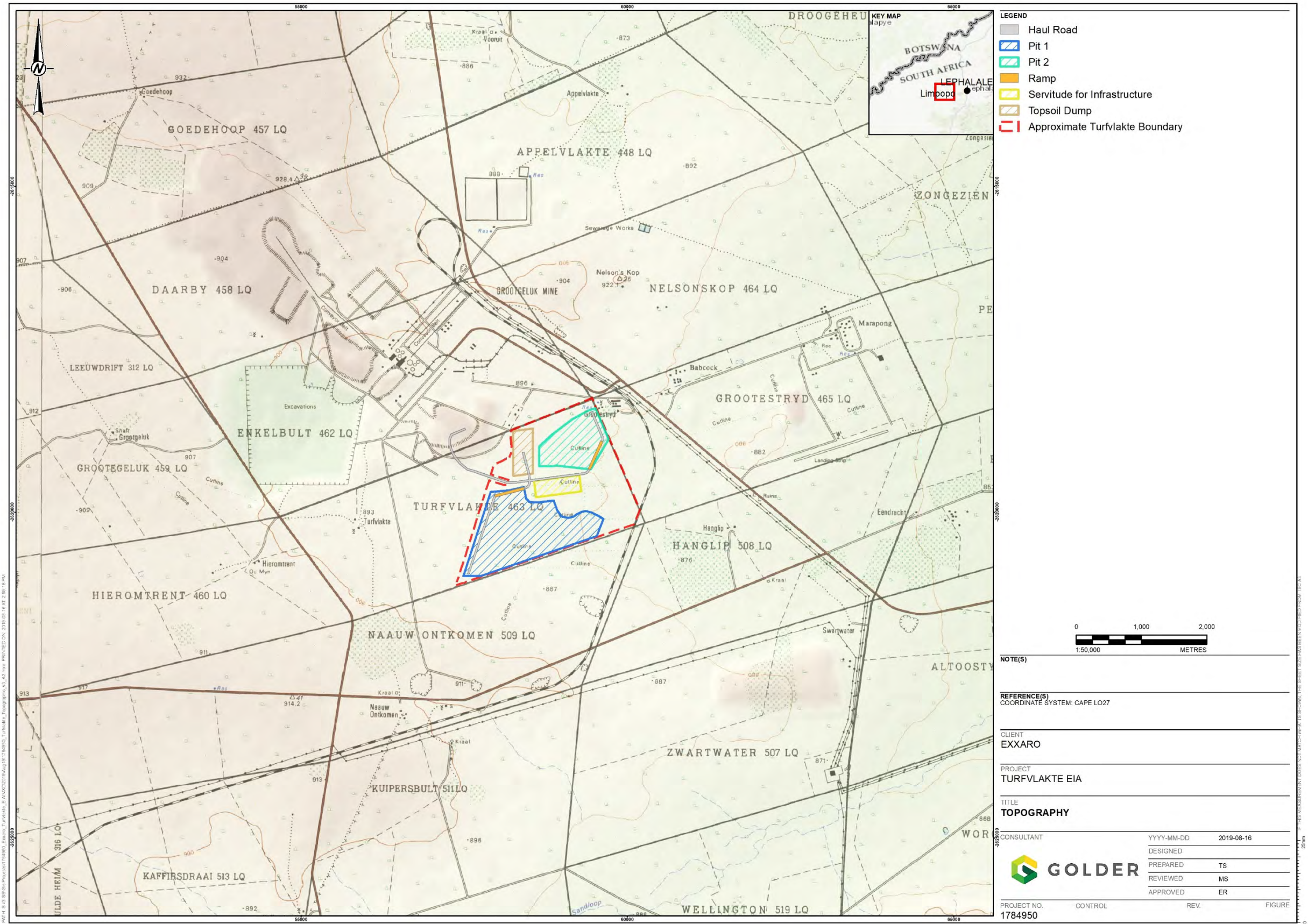


Figure 22: Topography of the regional area

4.5 Soil Land Use and Land Capability

4.5.1 Regional soils, land capability and land use

The Turfvlakte project area comprises of land types Ae252 and Ah85, as derived from the land type memoirs and associated maps of 2326 Ellisras (Peterson and Haarhoff, 1976-2006). A reconnaissance land type survey on a scale of 1:250 000 was conducted in the early 1970s to compile inventories of the natural resources of South Africa in terms of soil, climate and terrain (Maake, Snyman, & Herselman, 2018).

The Ae252 land type consists of approximately 84% of the study area, whereas land type Ah85 occupies approximately 16%.

The Ae252 land type comprises 79% of the Hutton soil form and 11% of the Mispah soil form.

The Ah85 comprises of 46% of Hutton, 43% Clovelly, 5% Fernwood, 4% Avalon and 2% of the Mispah soil forms respectively.

4.5.2 Land Capability

The land capability classification was undertaken at a national scale, utilising the land type data on a scale of 1:250 000 (Schoeman et.al. (2000) as cited by (Maake, Snyman, & Herselman, 2018).

The land capability for the Turfvlakte project area, as defined in the National Land Capability for South Africa, is classified as Class V (100% of the area). Class V is described as non-arable land only suitable for limited pastoral or forestry use, if sufficient rainfall is received, and generally not suitable for cultivation.

4.6 Ecology

The Turfvlakte project area is located in the Limpopo Sweet Bushveld (ref. SVcb19) vegetation type of the savanna biome (Mucina & Rutherford, 2006) (Figure 23). The attributes of the savanna biome and the Limpopo Sweet Bushveld are described as follows:

4.6.1 Savanna Biome

The savanna biome is the largest biome in South Africa, covering approximately 35% of the country's land surface. Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, yet distinct woody plant component. Primary determinants of savanna composition, structure and functioning are fire, a distinct seasonal climate, substrate type, and browsing and grazing by large herbivores (Scholes & Walker, 1993).

Compositionally, Africa's savannas are distinguished as either fine-leaved savannas or broad-leaved savannas. The distribution of these forms is based primarily on soil fertility; fine-leaved savannas occur on nutrient rich soils and are dominated by microphyllous woody species of the *Mimosaceae* family (most commonly *Acacias*¹). These savannas have a productive and diverse herbaceous layer that is dominated by grasses, and can support large populations of mammalian herbivores (Scholes & Walker, 1993).

Conversely, broad-leaved savannas usually occur on nutrient poor soils and are dominated by macrophyllous woody species from the *Combretaceae* family (common genera: *Combretum* & *Terminalia*). Compared to fine-leaved savannas, broad-leaved savannas are less productive and support a lower herbivore biomass (Scholes & Walker, 1993).

¹ Members of the African *Acacia* genus have been parsed into the genera *Vachellia* and *Senegalia* (Kull and Rangan, 2012). The *Acacia* name however, has been retained by many scholars as a colloquial and collective term for Africa's iconic thorn trees.

4.6.2 Limpopo Sweet Bushveld

Limpopo Sweet Bushveld extends northwards from the lower reaches of the Crocodile and Marico Rivers to the Limpopo Valley and into Botswana. This vegetation type is dominated by elements of Low & Robelo's (1996) Sweet Bushveld and Acocks (1953) Arid Sweet Bushveld (Mucina & Rutherford, 2006).

4.6.2.1 Vegetation and Landscape features

Limpopo Sweet Bushveld is characterised by undulating or irregular plains dominated by open woodland. A number of tributaries of the Limpopo River traverse this vegetation type (Mucina & Rutherford, 2006).

4.6.2.2 Important Plant Taxa

Based on Mucina & Rutherford's (2006) vegetation classification, important plant taxa are those species that have a high abundance, a frequent occurrence (not being particularly abundant) or are prominent in the landscape within a particular vegetation type. They note the following species as important taxa in the Limpopo Sweet Bushveld vegetation type:

■ Trees:

- *Senegalia burkei* – Black Monkey Thorn;
- *S. mellifera* subsp. *Detinens* – Black Thorn;
- *Vachellia robusta* – Brack Thorn;
- *V. erioloba* – Camel Thorn;
- *V. nilotica* – Scented-pod Acacia;
- *V. tortilis* subsp. *Heteracantha* – Umbrella Thorn;
- *V. fleckii* – Blade Thorn;
- *Albizia anthelmintica* – Worm Cure Albizia;
- *Boscia albitrunca* – Shepard's Tree;
- *Combretum apiculatum* – Red Bushwillow;
- *C. hereroense* – Russet Bushwillow;
- *Commiphora pyracanthoides* – Corkwood;
- *C. Africana* – African Myrrh;
- *Dichrostachys cinerea* – Sicklebush;
- *Peltophorum africanum* – African Weeping Wattle; and
- *Terminalia sericea* – Silver Cluster Leaf.

■ Shrubs:

- *Ehretia rigida*;
- *Catophractes alexandri*;
- *Euclea undulata*;
- *Rhigozum obovatum*;
- *Cadaba aphylla*;

- *Grewia flava*;
- *Leucosphaera bainesii*; and
- *Diospyros lycioides* subsp. *Lycioides*.

■ **Graminoides:**

- *Digitaria eriantha*;
- *Enneapogon cenchroides*;
- *Eragrostis lehmanniana*;
- *E. pallens*;
- *E. rigidior*;
- *Panicum maximum*;
- *P. coloratum*;
- *Schmidtia pappophoroides*;
- *Aristida congesta*;
- *Cymbopogon verticillata*;
- *Ischaemum afrum*;
- *Stipagrostis uniplumis*; and
- *Urochloa mossambicensis*.

■ **Herbs:**

- *Acanthosicyos naudinianus*;
- *Commelina benghalensis*;
- *Harpagophytum procumbens* subsp. *Transvaalense*;
- *Hemizygia elliotii*; and
- *Hermestaedtia odorata*.

- Endemic Taxon: The succulent herb *Piранthus атrosanguineus* is endemic to this region.

4.6.3 Formal Vegetation Considerations

4.6.3.1 Limpopo Conservation Plan

The Limpopo Sweet Bushveld extends over approximately 1 200 513 ha, of which, about 6.9% has been transformed and 0.6% is protected. Limpopo Sweet Bushveld is considered Least Threatened by both the national and provincial biodiversity assessment despite the poor level of formal protection (Limpopo Conservation Plan V2, 2013).

According to the Limpopo Conservation Plan's mapping of critical biodiversity areas (CBA), the study area is located on land designated as 'Ecological Support Area 1' (Figure 24). This designation characterises both natural and degraded land that supports CBAs by maintaining ecological processes. The advocated management objective of such land is to limit biodiversity loss by maintaining ecosystem functioning and connectivity, and listed incompatible land uses include, *inter alia*, mining and industry (Limpopo Conservation Plan V2, 2013).

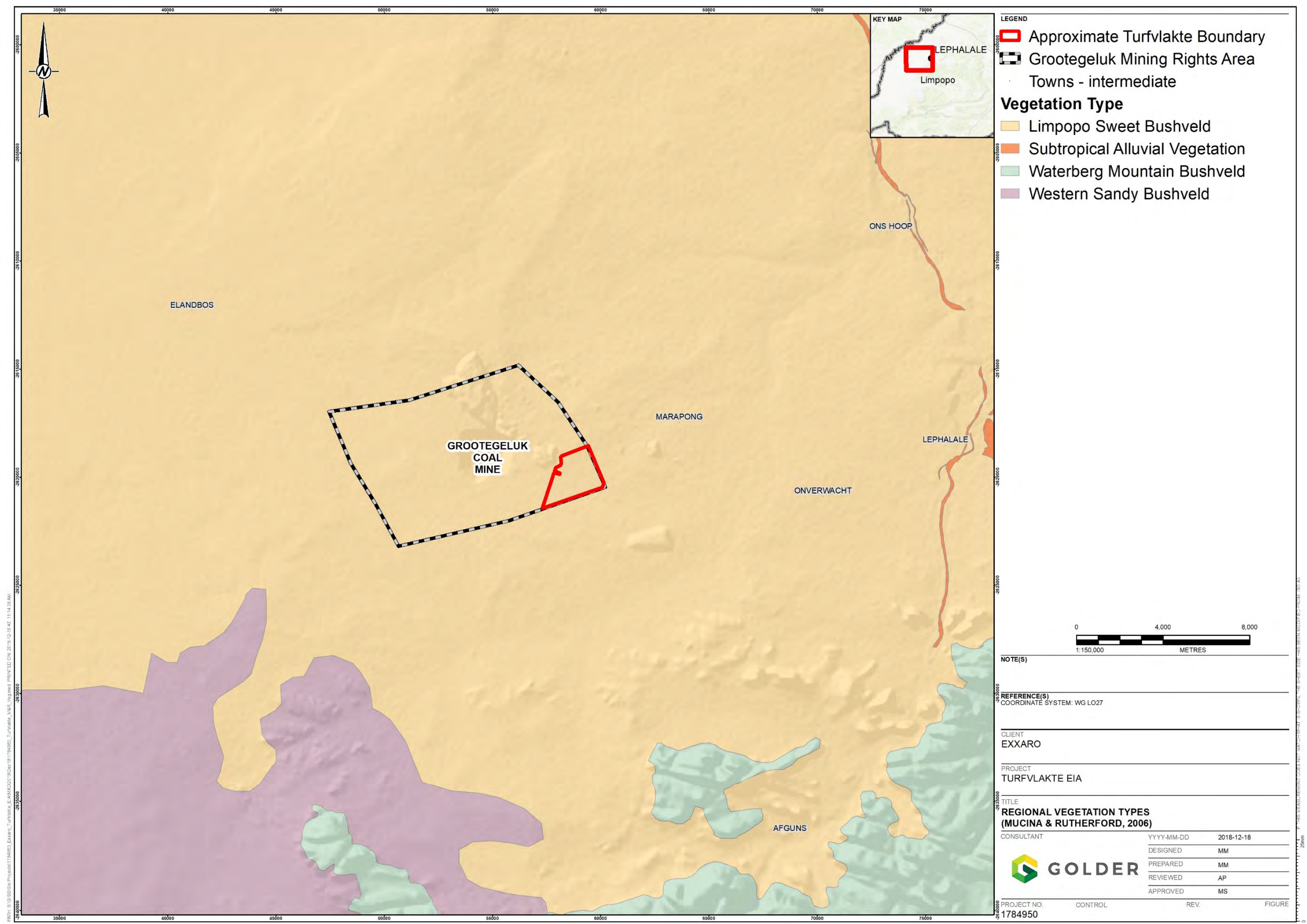


Figure 23: Study area in relation to Mucina & Rutherford's (2006) regional vegetation types

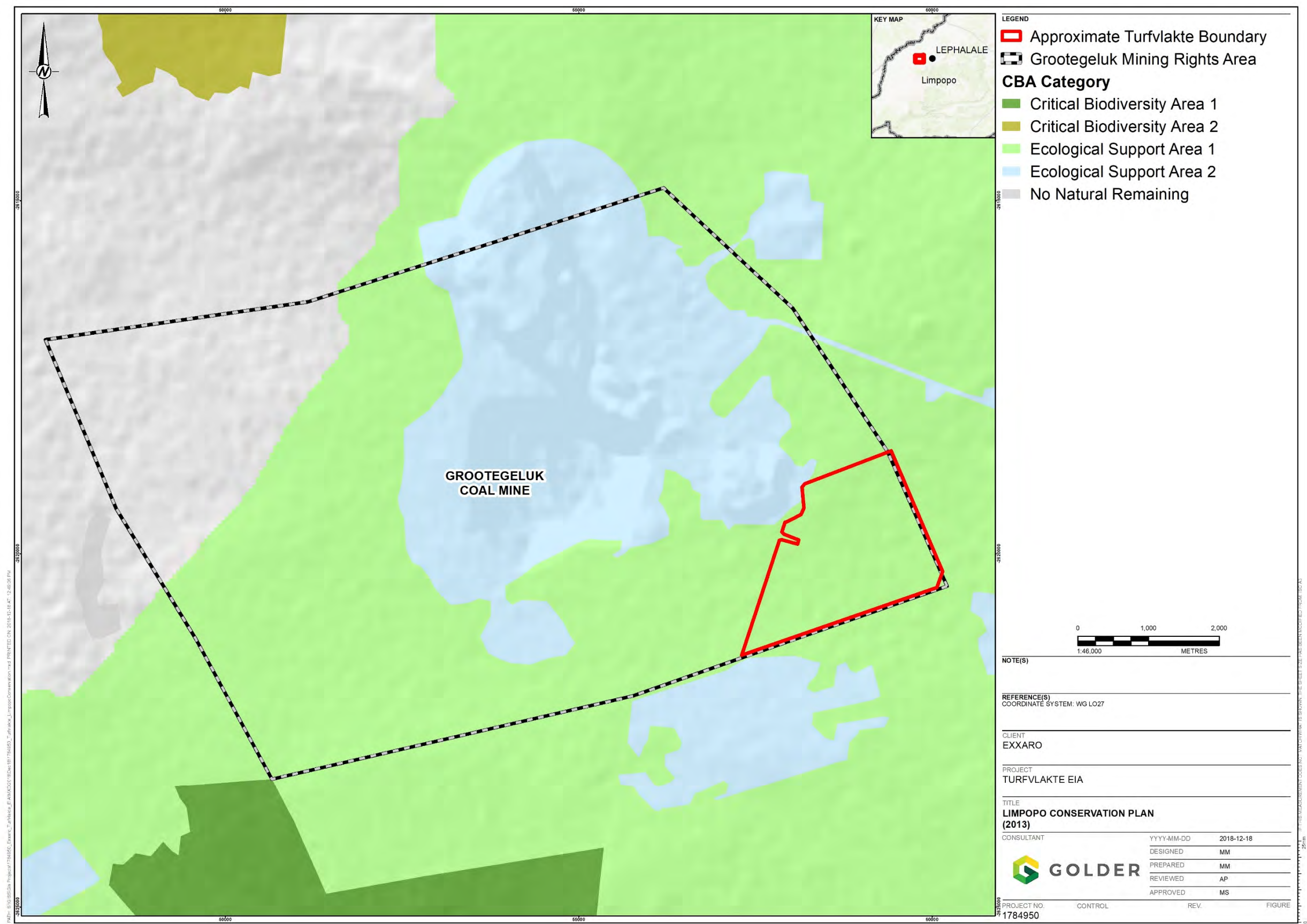


Figure 24: Limpopo Conservation Plan (2013)

4.6.3.2 Protected Areas

Nature Reserve and Conservation Areas

A number of statutorily declared nature reserves, as well as informal conservation areas are present in the broader region surrounding the study area. These include Marakele National Park, D’Nyala Nature Reserve, Welgevonden Private Nature Reserve, Hans Strijdom Nature Reserve and the neighbouring Tierkop Private Nature Reserve.

Important Bird Areas

The Waterberg System Important Bird Area (IBA) is approximately 1 321 450 ha in extent, comprising the whole Waterberg plateau and dominates the region to the south-east of the study area. The IBA supports populations of several globally and regionally threatened species, including *inter alia*, a significantly large colony of between 800-850 pairs of Cape Vulture (*Gyps coprotheres*) (Marnewick, Retief, Theron, Wright, & Anderson, 2015).

Waterberg Biosphere Reserve

The Waterberg Biosphere Reserve occupies approximately 650 000 ha of the Waterberg district to the south of the Turfvlakte project area. The concept of biosphere reserves is fairly recent, and has been recognised by UNESCO as a means to promote the conservation and sustainable use of land within a particular area. The Waterberg Biosphere Reserve is recognised by UNESCO (Zinn & Aken, 2018).

4.7 Surface Water

4.7.1 Water Management Area

The Grootegeluk Coal Mine and Turfvlakte project area is situated in the A42J quaternary catchment of the Limpopo Water Management Area (WMA) (Figure 25). The main surface water resource in the quaternary catchment is the Sandloopspruit, which flows east-north-east to join the Mokolo River approximately 40 kilometres south of the Limpopo River (Boyd & Dama-Fakir, 2018).

4.7.2 Local Water Resources

The Turfvlakte project area is located in an area with topography mainly consisting of plains, with slopes that vary between 0% and 3%. Drainage appears to be in an east-north-easterly direction towards the Mokolo River and consists mainly of dry sandy gullies such as the Sandloopspruit (Golder (2013) as cited by (Boyd & Dama-Fakir, 2018).

The Mokolo River is approximately 810 m above sea level, while the mine is approximately 900 m above sea level. This results in an almost negligible gradient of 90:21000 m or 0.0043%. No natural drainage channels occur on the Grootegeluk Coal Mine area, except for Sandloopspruit which is located approximately 4.2 km south west of the Grootegeluk Pit. It flows west to east to the south of the study area past the Medupi Power Station and then north-east before it’s confluence with the Mokolo River approximately 16 kilometres north of the Town of Lephalale.

Due to the flat topography, highly permeable sands and the absence of any surface water drainage courses, the Turfvlakte study area is approximately five kilometres from the Sandloopspruit with no direct route or drainage lines emanating from the site to the river. The only surface water resources in the study area are those illustrated as pans in Figure 26.

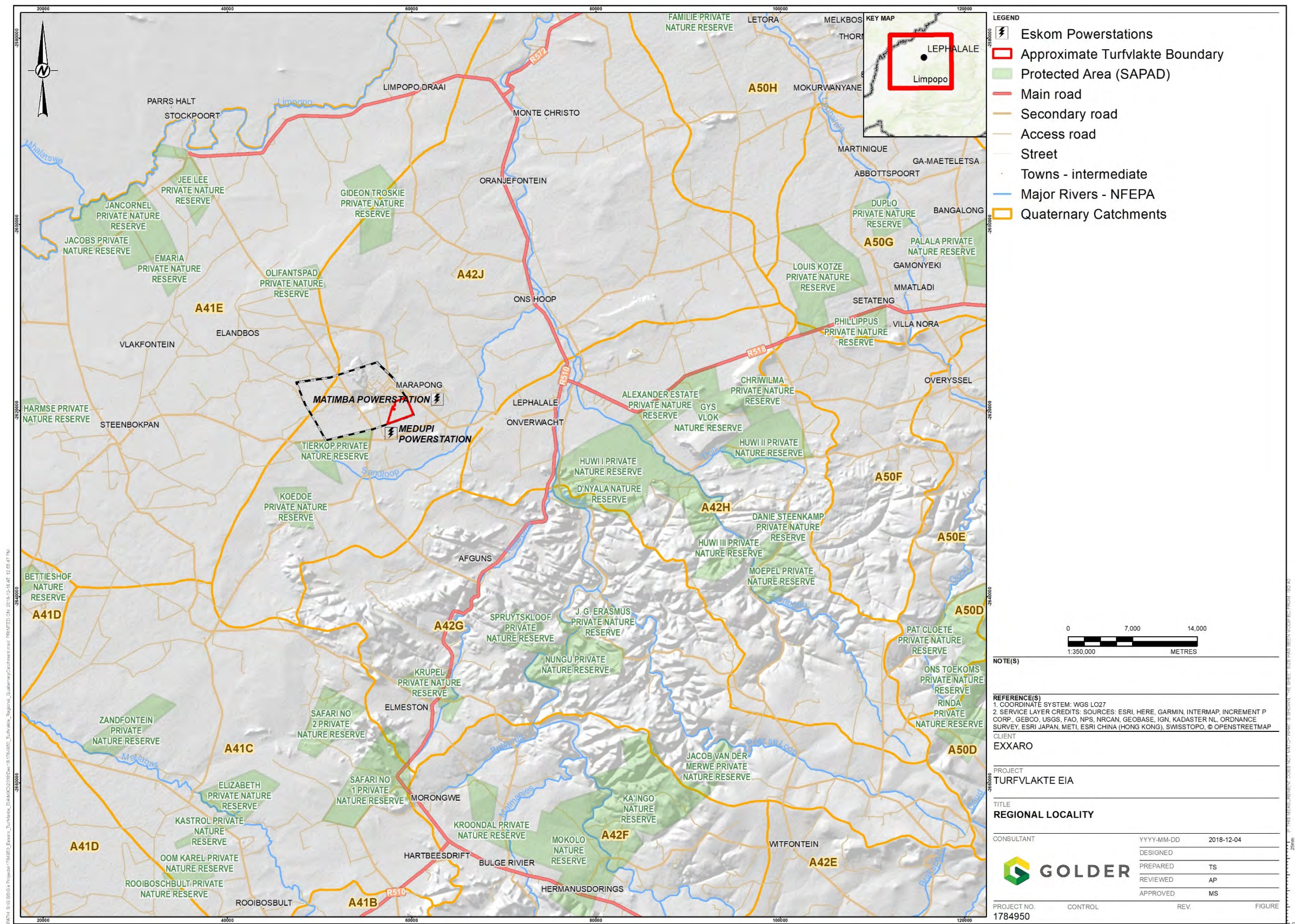


Figure 25: Regional Locality indicating the position of the project area within the Quaternary Catchment

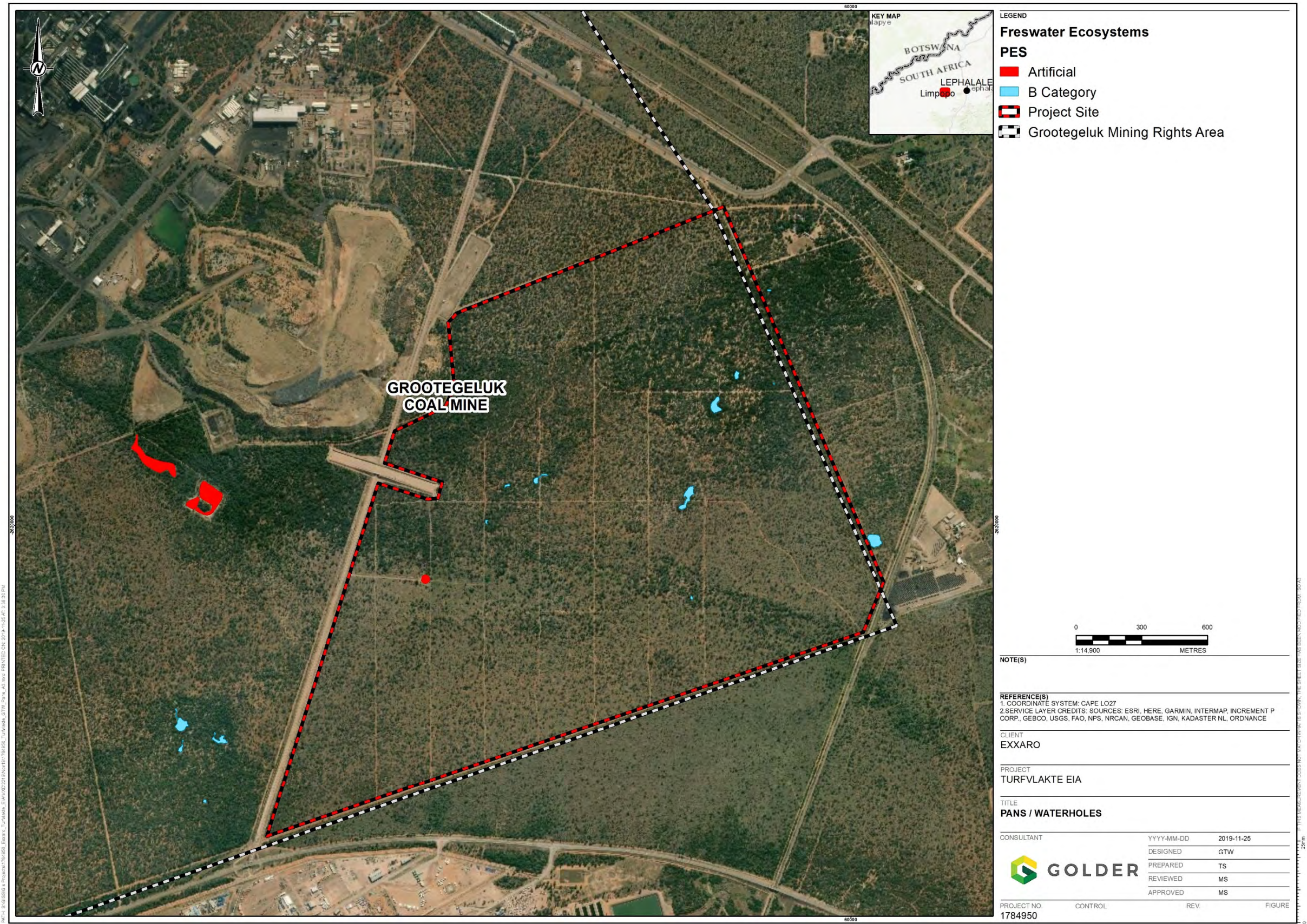


Figure 26: Pans in the Turfvlakte project and surrounding area

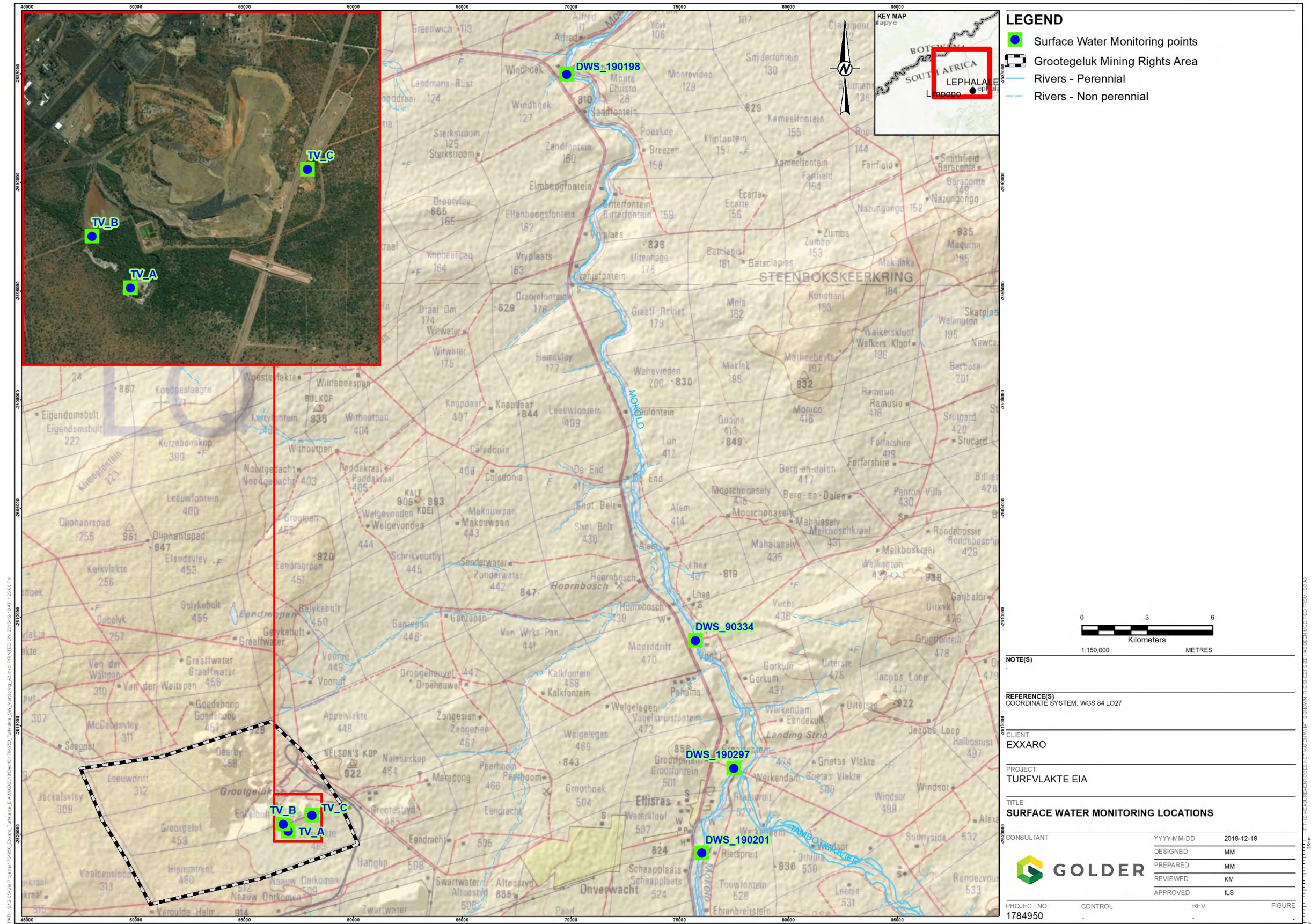


Figure 27: Surface water monitoring points

4.7.3 Water Users

The main water users in the local area are domestic water users from the Town of Lephalale and the Marapong Village, east of the Turfvlakte project area in the Southern Regions of the Lephalale Local Municipality. These areas receive water from the Mokolo Dam via the Wolfenfontein storage dam. The Grootegeluk Coal Mine, the Medupi and the Matimba also receive water from this source. Limited groundwater is currently used (Boyd & Dama-Fakir, 2018).

Non-consumptive water uses practiced in the area include discharge from domestic wastewater treatment works (WWTW), specifically the Marapong WWTW that discharge to the Sandloop (Figure 25).

4.7.4 Water Quality Monitoring Points

Due to the absence of natural surface water features at the Grootegeluk Coal Mine and the Turfvlakte project area, there are no water quality or quantity monitoring points in the immediate area. The Department of Water and Sanitation (DWS) has several monitoring points on the Mokolo River at the sites described in Table 12 and illustrated in Figure 27.

Table 12: Surface Water Monitoring Points

Site ID	Description	Longitude	Latitude
DWS_190201	Mokolo River upstream Town of Lephalale	27.74528	-23.68738
DWS_190297	Mokolo River downstream Town of Lephalale	27.75953	-23.65222
DWS_90334	Mokolo River upstream Sandloop confluence	27.74194	-23.59917
DWS_190198	Mokolo River downstream Sandloop confluence	27.68271	-23.36407

4.8 Groundwater

4.8.1 Hydrogeology

4.8.1.1 Regional Aquifer Classification and Borehole Yield

The aquifer at the Turfvlakte Project Area is classified as a minor aquifer system, as defined by Hydrogeological Map Series published by DWAF (1996). The small western part of the Turfvlakte project area aquifer is classified as a fractured aquifer zone whereas the greater part (proposed locality of Pit 1 and Pit 2) is classified as intergranular and fractured. Both aquifer zones have an average borehole yield between 0.5l/s, which are typical of the Karoo Super Group (Figure 28).

4.8.1.2 Aquifer Classification

Based on the drilling results, provided by Exxaro, two aquifer systems are distinguished at the Turfvlakte project area in the Karoo Supergroup namely:

- Top weathered aquifer system; with an average thickness of ~ 28m. The average water level is about 24 metres below ground level (mbgl) which means that the weathered zone is saturated and water-bearing; and
- Fractured secondary aquifer system; with an average thickness of ~ 15m below the weathered aquifer system and is characterised by secondary fractures resulting in preferential flow paths for the groundwater flow and possible contaminant migration.

4.8.1.3 Top Weathered Aquifer

Borehole logs received from Exxaro indicate that the top part of the rock formation is composed of a weathered aquifer system of variable thickness. The depth of weathering ranges from 14.25 to 36.05 (mbgl) with an average weathering depth of 28.3mbgl.

These weathered deposits comprise of top soil, calcrete, minor ferricrete, a sandy alluvium, weathered shale, clay and non-reactive carbonaceous material (Exxaro (2018) as cited by (Brink & Van der Linde, 2018)).

4.8.1.4 Fractured Secondary Aquifer

The major aquifer type in the greater Turfvlakte project investigation area is characterised by secondary fractures and weathering zones that essentially control groundwater flow and mass transport. The most important characteristics of fractures are the relatively high transmissivity with relatively low storage properties. In contrast, the matrix blocks between the fractures or fracture zones have very low to zero transmissivity but may have significantly higher storativity. The combination of the fracture and matrix properties result in significant flow and mass transport velocities ($>> 100$ m/d) through the fractures while sorption by the aquifer and storage of water and contaminants occur in the matrix (Roux (2009) as cited by (Brink & Van der Linde, 2018)).

Water strikes depths encountered during the Exxaro Drilling Programme (2017-2018) range from 20 to 39 mbgl with an average strike depth of 28.7 mbgl. Blow yield measured during the drilling programme ranges from 0.13 to 3.49 l/s with an average yield of 0.68l/s.

The Daarby Fault represents one of the major structures controlling the regional hydrogeology as it has been identified to be a barrier to groundwater flow (Roux (2003) as cited by (Brink & Van der Linde, 2018)). Groundwater levels on either side of the fault differ considerably, up to 100 m.

Although the Daarby Fault is characterised as a no-flow boundary in a regional context, field investigations have indicated that small amounts of seepage could take place across the fault, from the northern to the southern compartment. Steenekamp (2001) predicted the transmissivity of the fault to be approximately $0.01\text{m}^2/\text{d}$.

Basalt is usually characterised by insignificant transmissivity and storativity values. However, field investigations indicate that the Letaba Basalt (north of the Daarby Fault) is fractured and weathering occurred between successive lava flows. Aquifer tests conducted on a number of boreholes located in the basalt indicated that the T-values range between 0.7 to $380\text{ m}^2/\text{d}$, with an average of $62\text{ m}^2/\text{d}$ (Environmental Resource Management, 2011).

The lower contact between the Letaba Formation and the Clarens Formation is represented by an erosion surface with yield between 2 l/s and 12.7 l/s. ERM postulates that the highest mobility of contaminants will be associated with this layer (Environmental Resource Management, 2011).

4.8.1.5 Aquifer Thickness

The aquifer thickness depends strongly on the type of aquifer in the area, especially in the case of fractured bedrock aquifers. Because secondary, fractured rock aquifers occur in the Turfvlakte project area, aquifer thickness depends strongly on the presence, depths and orientations of the fractures or fracture systems through which flow takes place. The depths at which water yielding fractures are intersected in the Turfvlakte area vary significantly from 20 to 39 mbgl (Exxaro 2017-2018).

In the Stormberg basalt aquifer to the north of the Daarby Fault, much of the formation is weathered and fracturing occurs throughout the rock thickness. To the south of the Daarby Fault in the Eccra and Beaufort Groups sandstones and shales, very limited fracturing has occurred in general and groundwater flow is restricted to post-depositional faulting and associated fracturing (Golder Associates Africa, 2017).

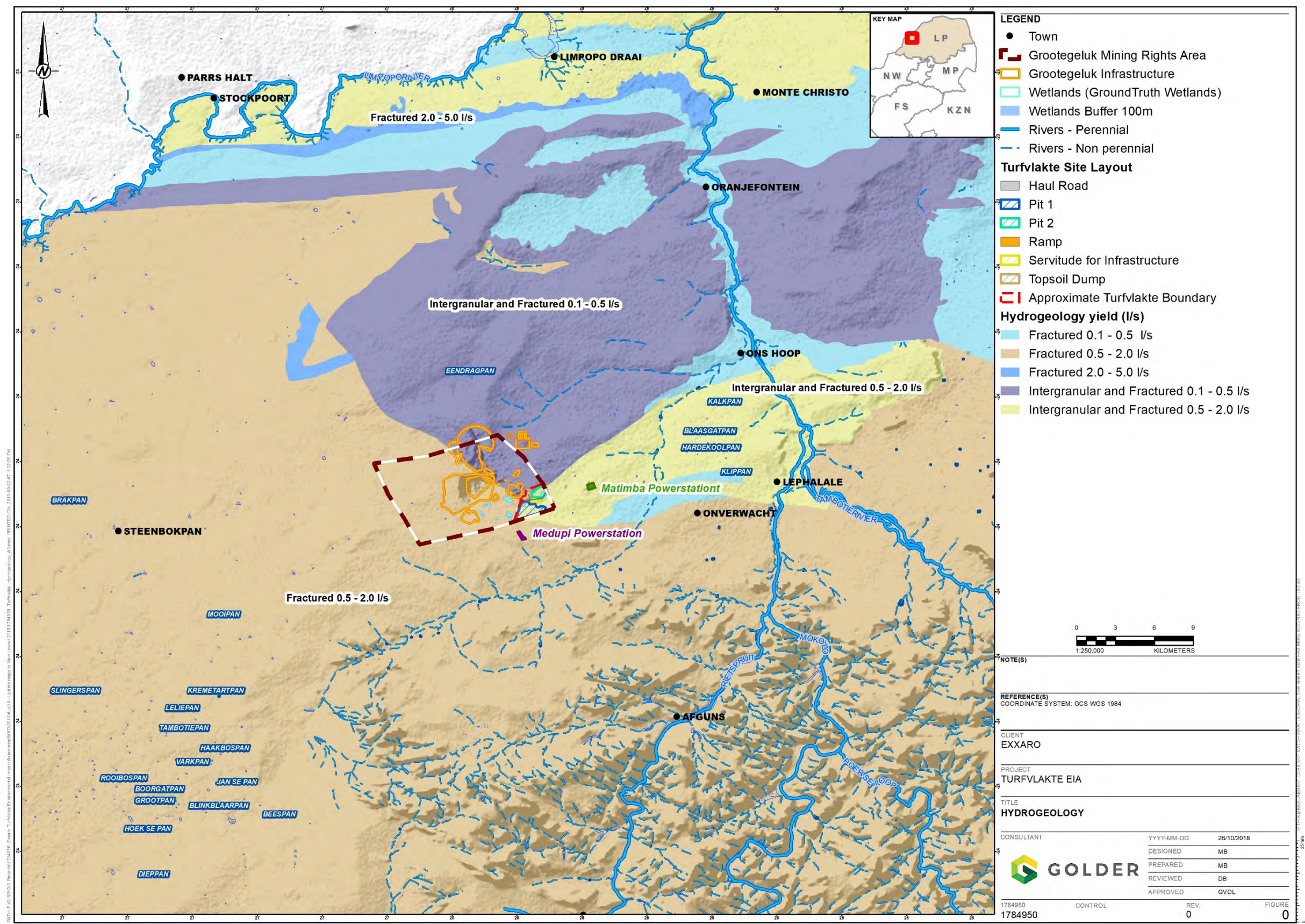


Figure 28: Hydrogeology and Average Borehole Yield

4.8.2 Groundwater Level and Flow Direction

The published Groundwater Resource Map Series – Sheet 2 (DWAF, 1995), indicates the water level to be between 20 to 40mbgl (Figure 29).

The regional groundwater flow directions were towards the Mokolo and Limpopo Rivers as they are the primary receptors in the project area.

4.8.3 Regional Aquifer Recharge

From the published hydrogeological maps (DWAF 1996) the average recharge of the greater northern part of Turfvlakte study area is shown as between 5 and 10mm per annum, whereas the southern part is shown as between 10 and 15mm per annum (Figure 30).

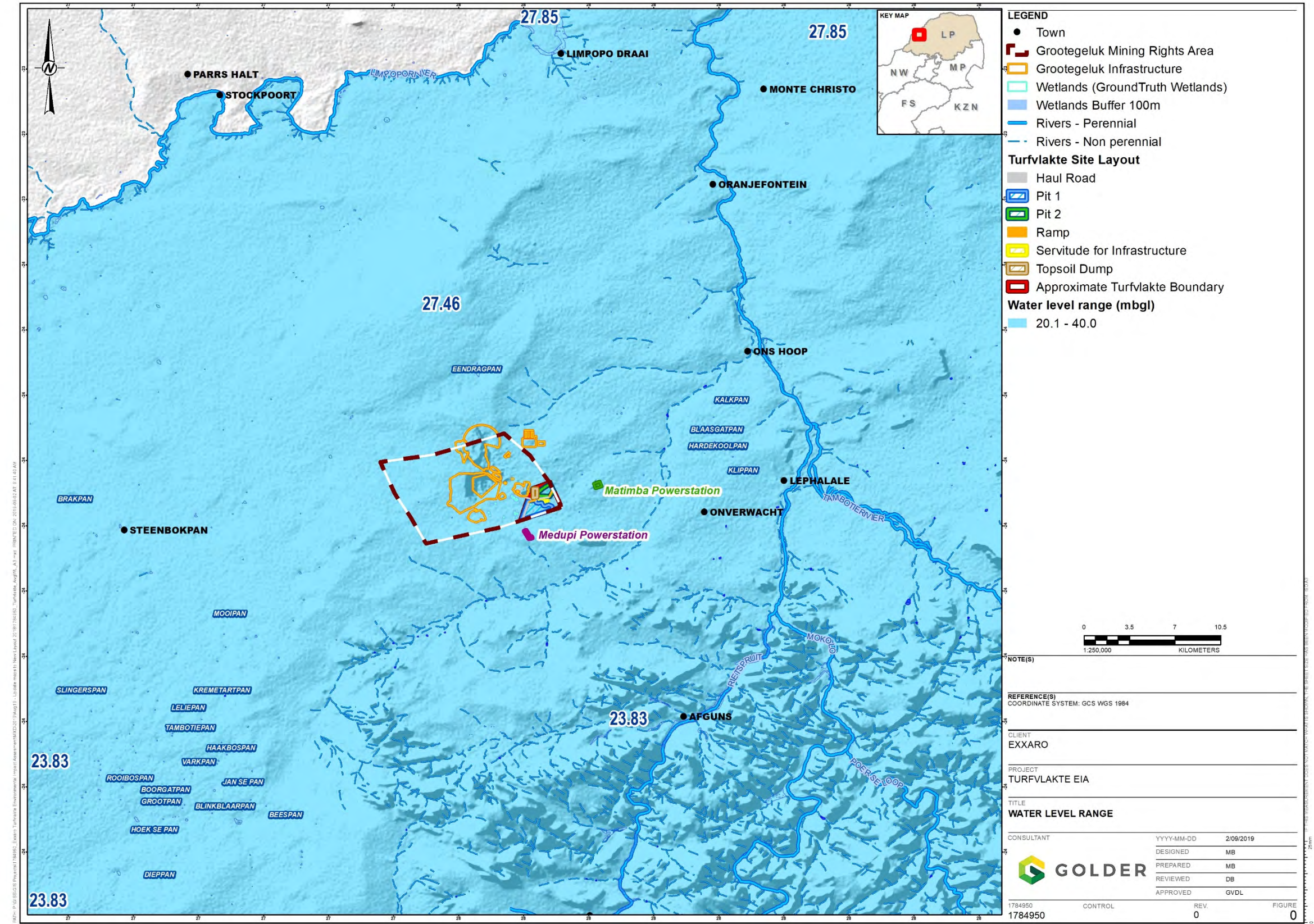


Figure 29: Average Groundwater Levels

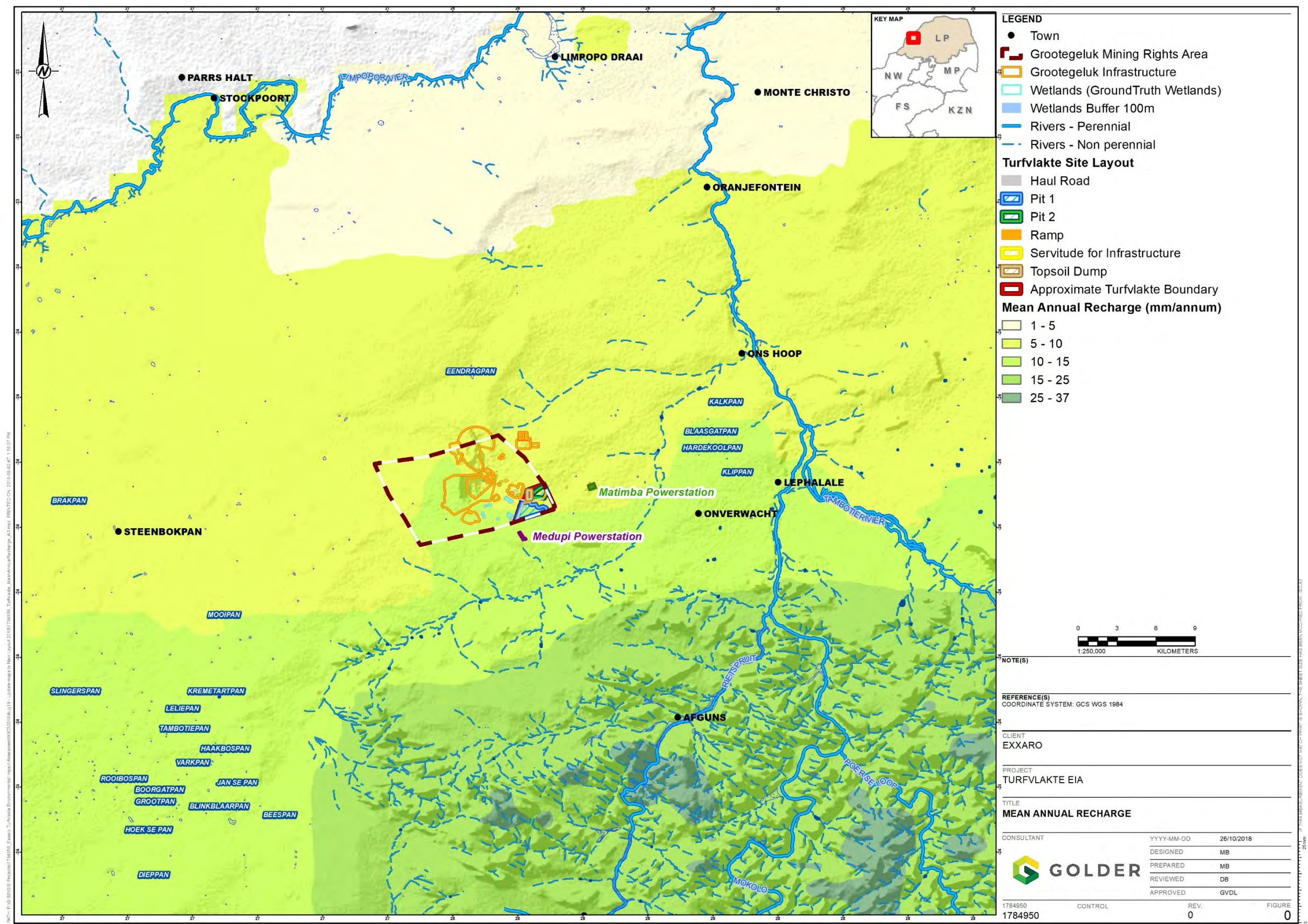


Figure 30: Groundwater Mean Annual Recharge (Vegter (1996) as cited by (Brink & Van der Linde, 2018))

4.9 Noise

Current pre-project baseline noise levels were measured by dBAcoustics (Van der Merwe, 2018) at the points illustrated in Figure 31 and listed in Table 13. The measuring points were selected to be representative of the prevailing ambient noise levels for the study area and included all the noise sources such as distant mining activities, power station noise, traffic and domestic noise.

Table 13: Baseline Noise Measuring Points

Position	Latitude	Longitude	Remarks
1	23°39.503'	27°35.703'	Northern side of Marapong. Distant Matimba power station audible.
2	23°39.706'	27°37.086'	Marapong residential area. Distant Matimba power station audible.
3	23°39.982'	27°37.447'	Marapong boundary behind Matimba power station. Power station noise audible.
4	23°39.336'	27°40.775'	Lephalale Agricultural Holdings. Distant Matimba power station audible.
5	23°39.739'	27°42.571'	Lephalale Agricultural Holdings (Horse riding school). Distant Matimba power station audible.
6	23°40.540'	27°41.250'	Residential area at Lephalale. Domestic type noise.
7	23°41.832'	27°39.871'	Residential area. Distant traffic audible.
8	23°43.663'	27°41.403'	Mabula Lodge. Distant humming sound audible.
9	23°44.285'	27°39.402'	South east of the proposed Turfvlakte. Distant plant audible.
10	23°43.703'	27°35.591'	Eskom nature reserve. Far distant Medupi plant audible.
11	23°44.508'	27°34.812'	Eskom nature reserve. Far distant Medupi plant audible.
12	23°45.872'	27°31.589'	Kumanati Lodge. Distant Medupi plant audible.
13	23°46.536'	27°28.939'	Lephalale game traders. Agricultural activities audible.
14	23°43.216'	27°24.179'	Taaibosch. Insects and birds audible.
15	23°42.446'	27°27.036'	Along Steenbokpan Road Traffic – 10 vehicles not included in results.
16	23°42.493'	27°29.772'	West of Grootegeluk mine. Distant Grootegeluk mine audible.
17	23°42.052'	27°29.481'	West of Grootegeluk mine. Distant Grootegeluk mine audible.
18	23°40.462'	27°28.492'	West of Grootegeluk mine. Distant Grootegeluk mine audible.
19	23°39.289'	27°27.915'	West of Grootegeluk mine. Distant Grootegeluk mine audible.
20	23°36.065'	27°31.313'	Along gravel road. Insects and birds.
21	23°37.078'	27°33.555'	Along gravel road. Insects and birds.

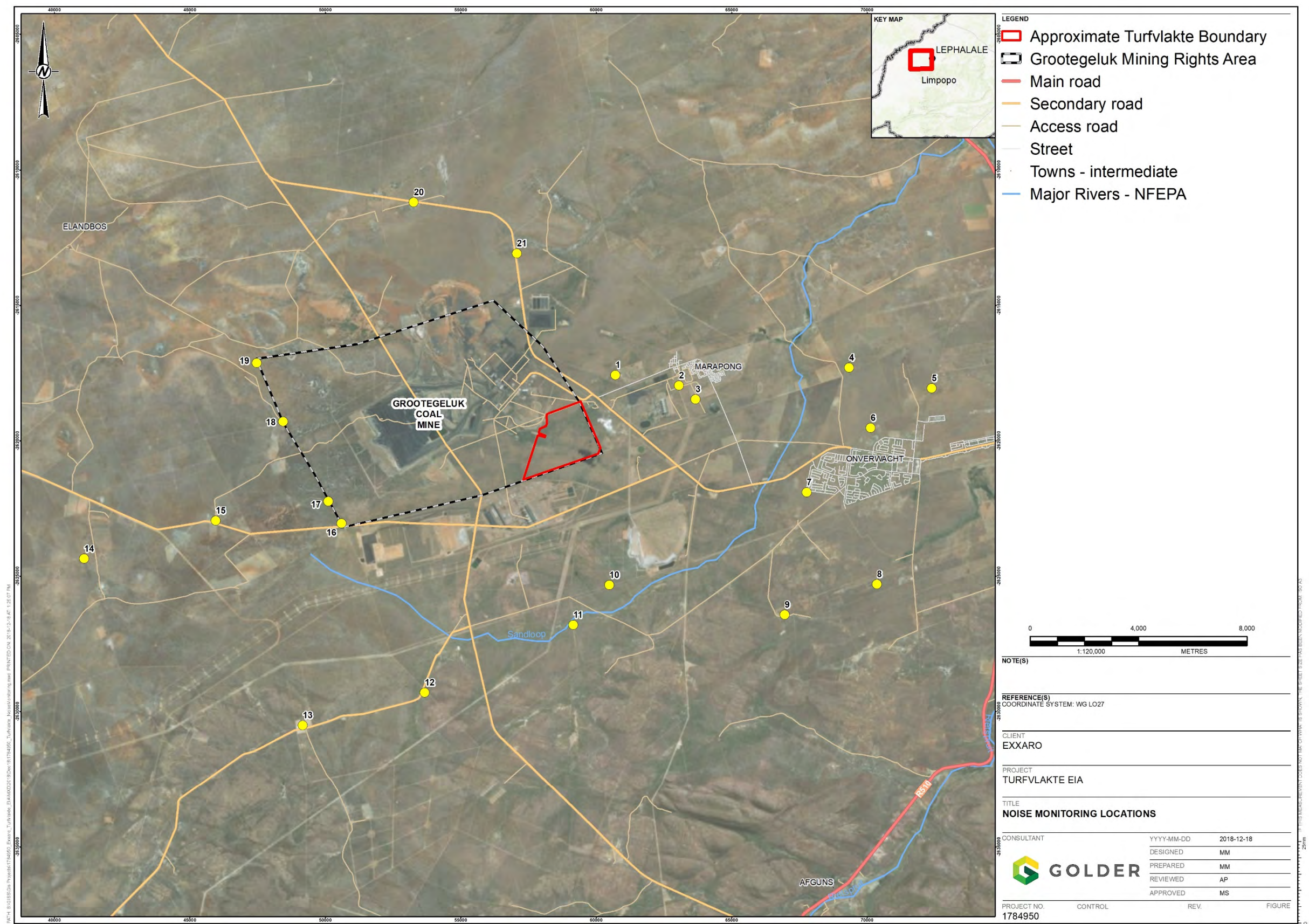


Figure 31: Baseline Noise Monitoring Points

The baseline noise monitoring provided the following insight into the study area:

- There is a continuous to intermittent flow of traffic along the tarred feeder roads to the east and south of the proposed Turfvlakte mining area;
- The tarred feeder road immediately east of the proposed mining area was used by traffic and heavy-duty trucks;
- The gravel road leading to the south of the proposed mining area was used on an intermittent basis;
- Domestic type noise, traffic and noise from the Matimba power station contribute to the prevailing ambient noise levels;
- Domestic activities, traffic noise, birds and insects contribute to the prevailing ambient noise levels in the residential areas of Lephalale; and
- Wind and weather conditions play an important role in noise propagation.

4.10 Visual Aspect

The wider study area is characterised by a mixture of completely transformed and developed land associated with the adjacent Grootegeluk Coal Mine, Eskom Power Stations, the Marapong residential area as well as large tracts of undeveloped natural bushveld, under either game or livestock management. A number of statutorily declared nature reserves and informal conservation areas are present in the broader region (Zinn, A, Bothma, J, 2018).

The Turfvlakte project area comprises natural bushveld with negligible levels of transformation and disturbance that are limited to a network of game viewing vehicle tracks (Figure 32). Several small exploration drill pads were observed on site.



Figure 32: View across the Turfvlakte project site from the elevated conveyor bridge (Note Medupi Power Station and the conveyor linking Medupi to Grootegeluk Coal Mine) (Zinn, A, Bothma, J, 2018)

The topography of the project area is generally flat, with slight undulations associated with drainage features.

Zinn and Bothma (2018) describes the vegetation in the project area as fairly open and characterised by a well-developed tree component (tree height generally ranging from 2 m to 5 m), comprising both fine-leaved and broad-leaved species, and an herbaceous layer consisting of both grasses and forbs. Patches of dense, closed vegetation were observed in the project area.

4.11 Sites of Archaeological and Cultural Significance

The Turfvlakte project area is located in an area covered by consistent level sandy plains with open savannah bush. A solitary kopje, Nelsonskop, occurs near the project area and is associated with human occupation in the past. A few scattered pans occur around the project area whilst agricultural fields are more prominent to the south of the area (Pistorius, 2018).

Pistorius (2018) states that the Turfvlakte project area was sparsely populated by humans in the past. However, occupation started at an early period resulting in the presence of humans in the area over a long time span but on a limited scale. Occupation occurred from the Stone Age, hundreds of thousands of years ago, throughout the Early Iron Age which covers the first millennium AD and the Historical Period which commenced with the arrival of the first colonial hunters, traders and farmers.

4.12 Palaeontology

The Turfvlakte project area is situated on the Grootegeluk Formation close to Lephalale.

The Karoo Supergroup is renowned for its fossil wealth. It is marked as Undifferentiated Strata of the Karoo Supergroup, but correlates with the Vryheid Formation (Pe, Pv), Eccu Group and the Grootegeluk Formation, which is rich in plant fossils such as the *Glossopteris* flora, represented by stumps, leaves, pollen and fructifications. This formation is early to mid-Permian (Palaeozoic) in age and consists of sandstone, shaley sandstone, grit, conglomerate, coal and shale. Coal seams are present in the Grootegeluk Formation within the sandstone and shale layers of the horsts and grabens. Fossils are mainly present in the grey shale which is interlayered between the coal seams (Kent (1980), Visser (1989) as cited by (Fourie, 2018))

4.13 Traffic

The Turfvlakte project site is accessed *via* the existing Grootegeluk Mine entrance which is accessible from Road D2001 at the intersection with the road to Marapong. The intersection of D2001, which provides access to both Grootegeluk Coal Mine and Marapong, is signalised.

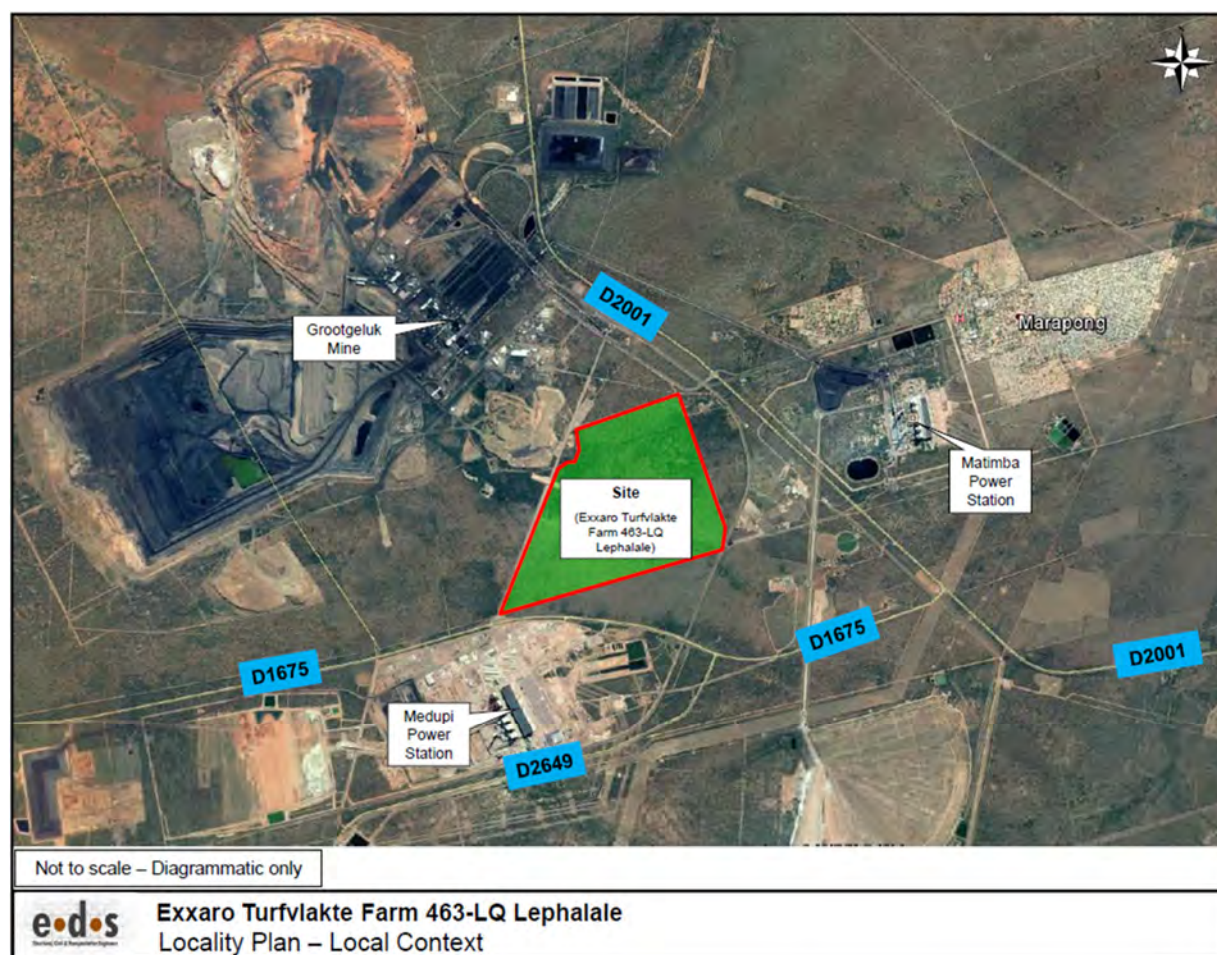


Figure 33: Major roads in the vicinity of the Turfvlakte project area (Makala, J, van der Walt, G, 2018)

4.14 Socio-economic

Some of the statistics in this section are based on the 2011 census and are therefore out of date, but they do provide a broad picture of prevailing socio-economic conditions within the vicinity of the Grootegeluk mine (Smith & de Waal, 2015)

Key socio-economic statistics for the Lephalale Local Municipality are listed in Table 14 (Lephalale LM IDP 2018-2019, 2018).

Table 14: Key socio-economic statistics for Lephalale Local Municipality

Aspect	Number	Percentage
Total Population	140 240	100%
Population growth	2011 – 2016	13.5%
Population density	8 persons/km ²	
Young (0-14)	40 358	29.2%

Aspect	Number	Percentage
Working Age	95 103	54.8%
Elderly (65+)	5 403	3.5%
Dependants	35 136	33.2%
Males	78 320	55.85%
Females	61 919	44.15%
Unemployment rate 2016	21 113	22.2%
Youth unemployment rate 2016	7 345	27%
No schooling aged 20+	3 769	6.2%
Higher education aged 20+	12 615	16.4%
Matric aged 20+	16 579	23.5%
Total number of households	43 002	100%
Number of agricultural households	6 757	22.6%
Average household size	3.2	
Female headed households	16 443	39.1%
Formal dwellings	34 610	82.3%
Flush toilet connected to sewer	17 536	41.6%
Piped water inside dwelling	17 390	41.3%
Electricity for lighting	37 602	89.4%

4.14.1 Administrative Setting

The Grootegeeluk mining complex is located in Ward 2 of the Lephalale Local Municipality, in the Waterberg Municipal District of the Limpopo Province. Limpopo is the northernmost of South Africa's nine provinces. It was named after the Limpopo River, which flows along South Africa's borders with Botswana, Zimbabwe and Mozambique. The capital of Limpopo is Polokwane.

Limpopo has the highest level of poverty of all the South African provinces with 78.9% of its population living beneath the national poverty line, which is based on the minimum food needs for daily energy requirements, plus essential non-food items.

The Waterberg District Municipality (WDM) covers an area of about 4.95 million ha and consists of the six local municipalities Bela-Bela, Lephalale, Modimolle, Mogalakwena, Mookgophong and Thabazimbi. Geographically, it is the largest District Municipality in the Limpopo province, but it has a smaller population than any of the other districts as it consists mainly of commercial farms, game farms, some small rural settlements and a few small towns. (Waterberg DM 2017-18 IDP, 2018)

The WDM is a well-known tourist destination, offering attractions such as Makapans valley and the Marekele National Park. The Medupi Power Station, which is located in the Waterberg District, is of significant importance with regard to ensuring sufficient energy capacity for the country over the long term.

Lephalale Local Municipality (LLM) is situated in the north-western part of the Waterberg District Municipality. Its north-western border forms part of the international border between South Africa and Botswana. It is the largest local municipality in the province, with a surface area of about 1.4 million ha.

4.14.2 Population Demographics

The population profile is shown in Table 15. According to the official census of 2011, the number of households in the Lephalale local municipality increased from 20 277 in 2001 to 29 880 in 2011, and household size increased from 3.5 to 3.9. This census indicated a 35.8% population increase between 2001 and 2011, with 43.2% of the population falling within the 15 - 34 year age group.

Table 15: Population Profile

	Black	Coloured	Indian	White	Other	Male %	Female %	Total
Limpopo Province	97%	0.2%	0.2%	2.5%	0.1%	50%	50%	5 391 455
Waterberg DM	91.2%	0.5%	0.4%	7.6%	0.3%	52%	48%	679 316
Lephalale LM	91%	0.1%	0.3%	7.9%	0.3%	51%	49%	115 767
Ward 3	86.6%	0.6%	0.1%	12.5%	0.5%	52%	48%	11 138

* Stats SA, 2011

The population within the LM was 115 767 in 2001 and increased significantly to 140 240 in 2016 (Lephalale LM IDP 2018-2019, 2018), which may be attributed largely to the construction of the Medupi Power Station at that time (De Mendonca & de Waal, 2018).

4.14.3 Level of Education

The education levels in the area, as determined during the 2011 census, are shown in Table 16.

Table 16: Average Education Levels

	No Schooling	Some Primary	Completed primary	Some secondary	Completed secondary	Higher
Limpopo Province	17%	12%	4%	36%	27%	8%
Waterberg DM	13%	14%	5%	37%	24%	7%
Lephalale LM	10%	13%	5%	40%	24%	8%
Ward 3	14%	19%	9%	38%	14%	6%

* Stats SA, 2011

The percentage of individuals with no formal education has shown a decreasing trend since 2001 (Municipalities of South Africa, 2012). In 2013, Statistics South Africa recorded 40% of the Limpopo population as having reached secondary education, but less than 10% had achieved post matric qualifications (Lehohla, 2015).

Challenges experienced by school-going children include poor road conditions, a lack of transport to schools, a lack of water or an inadequate supply thereof, a lack of provision for disabled learners to attend school, mismanagement of funds, overcrowding of classrooms and increased teenage pregnancies.

The Lephalale Local Municipality has 94 educational facilities in total. Generally, there is an educational facility within a 30 minute walking distance from 95% of the population, but primary schools are perceived to be more

easily accessible than secondary schools. Secondary schools do not have adequate mathematics and science teachers and the area lacks technical high schools.

4.14.4 Economic Activities

Lephalale is the fastest growing town in the Waterberg district, which has abundant natural resources with potential for entrepreneurship and economic development. The economy is dominated by mining (platinum, iron ore, coal, diamonds), tourism and agriculture. The Waterberg District Municipality is the largest platinum producing area in the Limpopo Province. The growing energy demand drives the development of coal and petroleum production in the Lephalale area.

The coal resource in the Waterberg field is estimated at 76 billion tons, which is more than 40% of the national coal reserve. Mining is the highest GDP contributor in the district at 47.4% (Waterberg DM IDP, 2014/2015) (Waterberg DM 2017-18 IDP, 2018).

The renowned Biosphere Reserve is found in the District, and the agricultural potential of the sector has not yet been reached.

The local economy is currently dominated by Exxaro's Grootegeluk Coal Mine and Eskom's Matimba power station. The contribution of mining to the Lephalale LM's GDP is major at 59.21%. Tourism, game farming, commercial hunting, red meat production and manufacturing also contribute significantly to the local economy. Lephalale is currently in the second stage of considerable public sector investment, estimated at R140 billion over six years, for the construction of Medupi power station (Lephalale Final IDP 2013-2016, 2015).

The Gross Value Added (GVA) per sector of the economy within the Lephalale Local Municipality is shown in Table 17 (Lephalale Local Municipality: Integrated Development Plan 2016-2017, 2016)

Table 17: Gross Value Added per economic sector in Lephalale at constant 2005 prices Rm

Sector	2008	2009	2010	2010 %
Agriculture, Forestry and Fishing	189	168	171	3.9
Mining and Quarrying	1415	2456	3148	71.4
Manufacturing	81	62	63	1.4
Electricity, Gas and Water	179	120	125	2.8
Construction	45	42	42	0.9
Wholesale and retail trade, catering and accommodation	218	192	196	4.4
Transport, storage and communication	191	185	193	4.4
Community, social and personal services	58	53	53	1.2
Finance, insurance, real estate and business services	257	228	230	5.2
General Government	196	184	190	4.3
Total	2829	3690	4411	100.0

Source: Quantec, 2010 Regional Economic Data base

The contribution of mining within the Lephalale Municipal area to the Waterberg DM's GDP is significant at 59.21%. Electricity contributes 11.33% to the Waterberg DM's GDP and Lephalale LM's contribution to the Waterberg electricity sector is 69.65%. The Medupi Power Station near Lephalale will have a notable influence on the future development of the area. The three economic clusters that are most relevant to Lephalale LM are firstly coal and petrochemical, secondly red meat and thirdly tourism (Lephalale Final IDP 2013-2016, 2015) (Lephalale LM IDP 2018-2019, 2018). Agriculture is the sector that employs the largest part of the workforce (38.85%) in the Waterberg DM. It is followed by community services (15.71%). Tourism and manufacturing contribute to the local economy to a lesser extent.

The regional Gross Value Added (GVA) for 2010 is shown in Table 18.

Table 18: Regional Gross Value Added (2010)

Industry	Waterberg DM	Lephalale LM
Agriculture, forestry and fishing	3%	4%
Mining and quarrying	51%	71%
Manufacturing	3%	1%
Electricity, gas and water	2%	3%
Construction	2%	1%
Wholesale and retail trade, catering and accommodation	8%	4%
Transport, storage and communication	8%	4%
Finance, insurance, real estate and business services	12%	5%
Community, social and personal services	3%	1%
General government	9%	4%

Source: Quantec, 2010

4.14.5 Employment Levels

The provincial and regional employment profile is summarised in Figure 34.

The unemployment rate measures the percentage of employable people in the country's workforce who are over the age of 16 and who have either lost their livelihoods or have unsuccessfully sought jobs previously and are still seeking employment. This category also includes, children, pensioners and disabled persons.

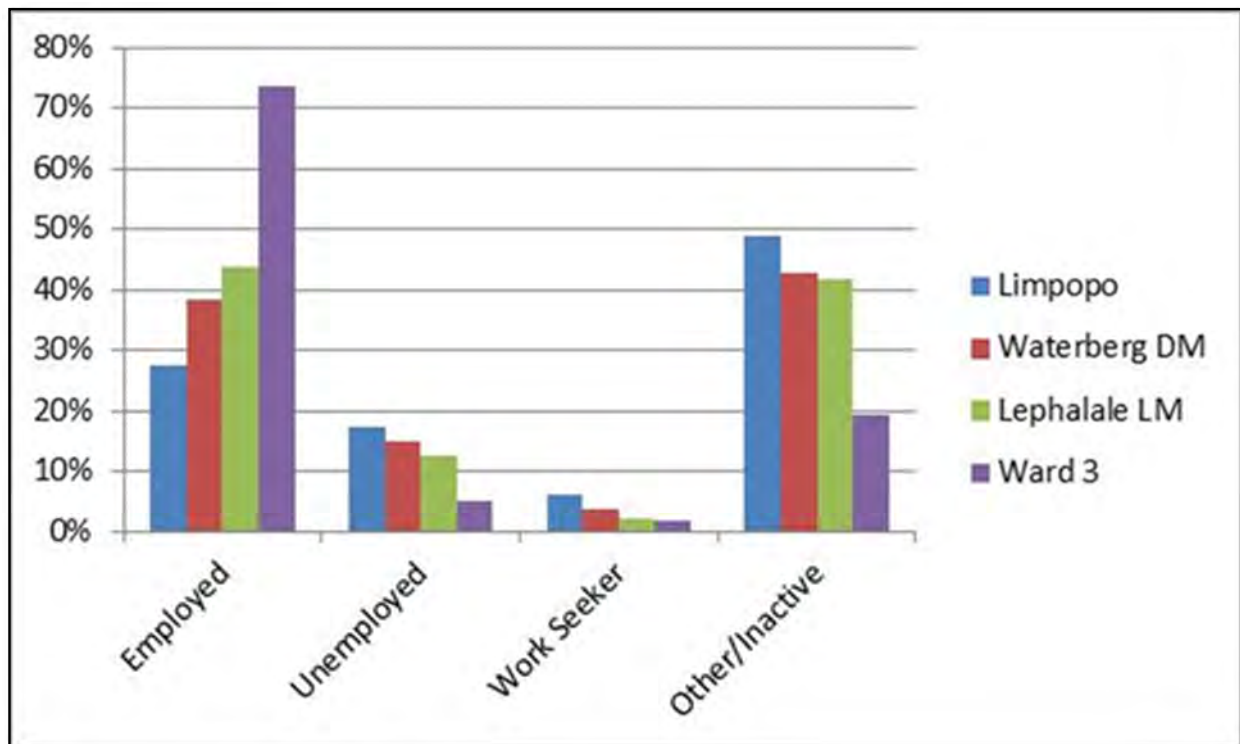


Figure 34: Employment Distribution in the Regional and Local Study Area (Stats SA 2011 census)

As illustrated in Figure 35, the Lephalale LM has a 44% employment rate, with 42% being economically inactive and 12% unemployed.

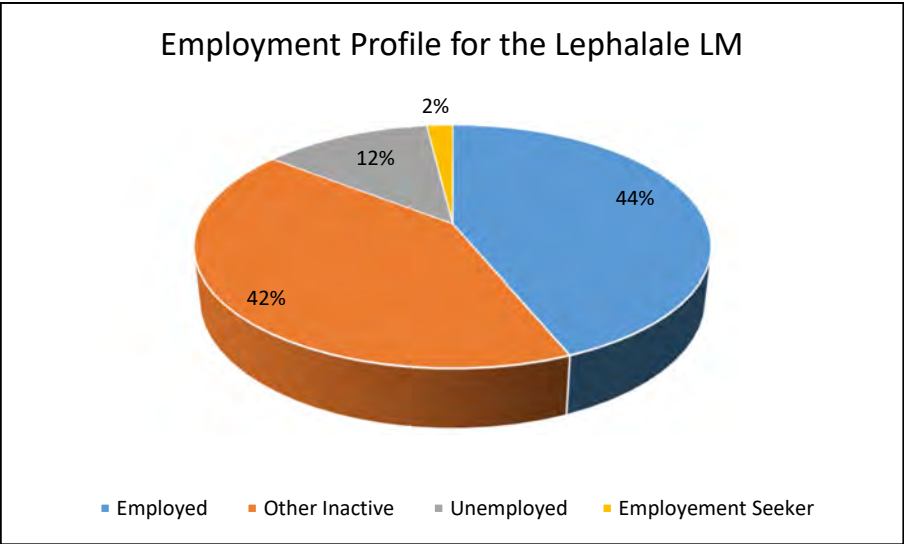


Figure 35: Employment Status (SA Census 2011)

5.0 POTENTIAL IMPACTS IDENTIFIED

The following potential impacts were identified during the scoping phase:

- 1) **Groundwater:** Abstraction of groundwater to enable open cast mining operations will result in the lowering of the groundwater table around the pits. The use of explosives and spillages of hydrocarbons could cause groundwater pollution. The project may be expected to have an impact of **moderate** significance on the groundwater regime and groundwater users during the life of the mine;
- 2) **Surface water:** Runoff from the topsoil stockpile could have a high silt load and runoff from the operational areas could be contaminated with hydrocarbons. Such dirty runoff from the project area could cause surface water pollution in the nearby pans. Without appropriate mitigation measures, the project could have a **moderate** impact on the surface water regime during the life of the mining operations;
- 3) **Ecology:** The project will result in the potential removal of protected trees and vegetation from the combined footprint area (opencast mining and infrastructure) of about 269 ha over time. Due to the destruction of their habitat, the game and current faunal population in the project area will have to be relocated until suitable habitat has been restored post rehabilitation. The long-term impact is expected to be **moderate**;
- 4) **Air Quality:** Particulate mobilisation due to drilling, blasting, loading, hauling, stockpiling, backfilling and material storage has the potential for an impact of **moderate** significance on air quality within and in the vicinity of the project area, particularly in the downwind direction. Gaseous emissions due to blasting and the diesel engines on mining vehicles are expected to have an impact of **low** significance on air quality;
- 5) **Noise:** The noise impact could range from **moderate** to **low** significance during the mining operations. The noise from the mining machinery will be audible, but is not expected to exceed the daytime and night-time levels for urban districts, beyond the 500 m blast zone boundary and at some sensitive areas along the way as the mining front moves along the length of the ore deposit;
- 6) **Blasting and Vibration:** Ground vibration, air blast, fly rock and fumes are some of the potential impacts that could result from blasting operations. Structures in close proximity to the proposed open pits, such as the D1678 road, existing conveyors, bridges, pans, buildings and Manketti Lodge may experience impacts of **moderate** to **high** significance;
- 7) **Visual:** The infrastructure associated with the proposed Turfvlakte project will have a **low** visual impact at close range only due to the project area being located amongst the existing Grootegeeluk Coal Mine and the Matimba and Medupi power stations;
- 8) **Cultural and heritage:** Unless unknown graves are unearthed during construction and mining, the expected impact on cultural and heritage resources is likely to be of **negligible** significance;
- 9) **Palaeontology:** Unless unknown fossils or palaeontological resources are unearthed during construction and mining, the expected impact on palaeontology is likely to be of **negligible** significance;
- 10) **Traffic:** The additional of traffic as a result of the proposed mining operations could result in an impact of **moderate** significance on the roads users in the vicinity of the Grootegeeluk Coal Mine.
- 11) **Socio-economics:** The Turfvlakte mining operations will utilise workforce from the existing Grootegeeluk Coal Mine. The project will provide an additional contribution to the Lephalale LM's GDP. Given the significant contribution of mining to the local GDP, the impact is expected to be of **moderate** significance.

6.0 EIA PROCESS AND METHODOLOGY

The overall process and methodology that was followed for the scoping phase of the EIA was based on best practice guidelines and the requirements of South African legislation (specifically NEMA and MPRDA).

The approach included the following key stages:

- Gap Analysis of existing information against the Project compliance criteria;
- Project Definition and Analysis of Alternatives – inclusive of data review, red flag and constraints mapping, input to alternatives analysis and preferred layout planning and project description;
- Screening (legal and process review) – review of all applicable compliance criteria;
- EIA Scoping (identification of key issues and development of plan of study for carrying out the impact assessment). This report is presented to the public for comment and to the South African Government departments dealing with mining and environmental authorisations for a decision on whether the scope proposed for the EIA is appropriate;
- Environmental and Social Baseline Studies – carrying out monitoring, data collection and fieldwork to determine the baseline conditions of the environment that could be affected by the Project; and
- Stakeholder Engagement – is undertaken throughout the Scoping process to record issues and comments received from the public. These issues and comments are integrated into the process and will be considered in the impact assessment phase of the EIA.

The following activities will be undertaken during the next phase of the EIA:

- Impact Assessment – evaluation of potential impacts and benefits of the Project utilising qualitative and quantitative evaluation as determined by the scoping phase;
- Environmental and Social Management Systems Development – establishment of a system for the management of environmental, social impacts supported by action plans;
- Preparation of an EIA report – documenting all processes and presenting the findings of the impact assessment. The EIA report will be presented to the public for comment and to the relevant South African Government departments for a decision on whether the Project may proceed and if so under what conditions; and
- Stakeholder Engagement – will continue throughout the remainder of the EIA process to record issues and comments received from interested and affected parties. All issues and comments will be integrated into the process and considered during the EIA.

The overarching principles that guide the EIA include:

- Sustainability – development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs;
- Mitigation hierarchy – The mitigation hierarchy describes a step-wise approach that illustrates the preferred approach to mitigating adverse impacts as follows (the governing principle is to achieve no net loss and preferably a net positive impact on people and the environment as a result of the Project):
 - the preferred mitigation measure is **avoidance**;
 - then **minimisation**;
 - then **rehabilitation** or **restoration**; and

- finally, **offsetting** residual, unavoidable impacts.
- Duty of care towards the environment and affected people.

The assessment of the impacts of the proposed activities will be conducted within the context provided by these principles and objectives.

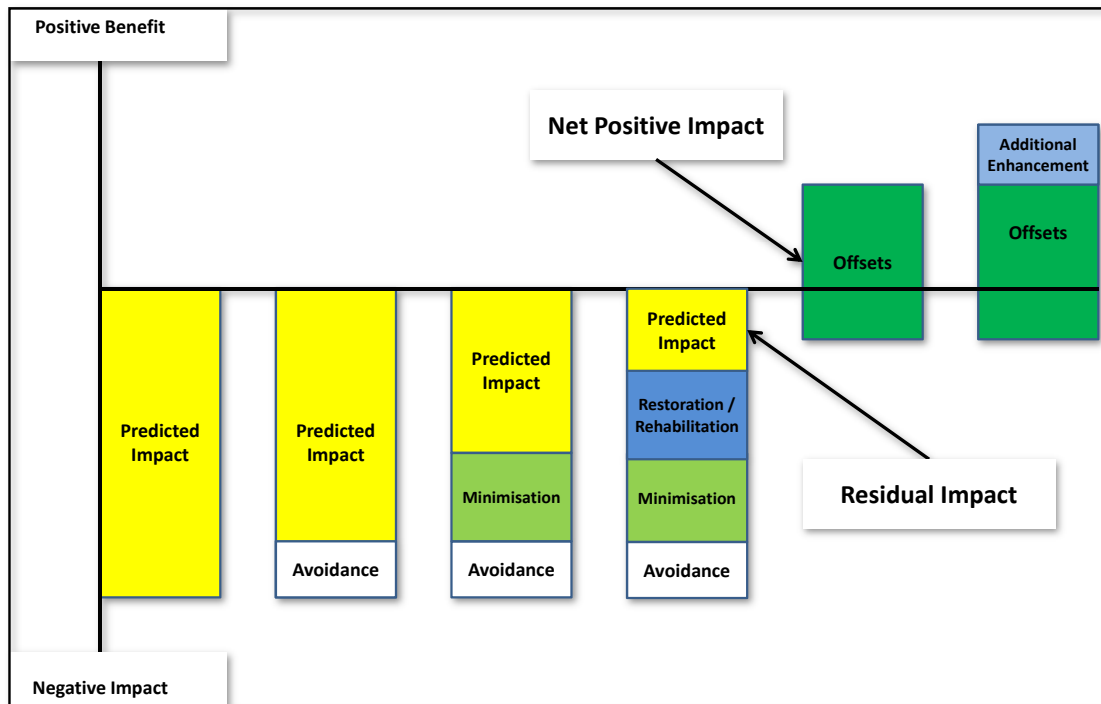


Figure 36: Mitigation Hierarchy adapted from the Biodiversity Offset Design Handbook, 2009

6.1 Scoping Methodology

The methodology specifically adopted for the scoping phase included the following:

- Stakeholder consultation as described in section 3.9.2;
- Review of existing data;
- Fieldwork by the EIA specialist team to obtain additional baseline data;
- Workshops with the specialist team to identify key impacts and issues and to outline the plan of study; and
- Compiling the Scoping report.

6.2 Positive and negative impacts of initial site layout and alternatives

All infrastructure site layouts must avoid the sterilisation of the open cast minable coal reserves. They must therefore be located adjacent to, but not on the footprint of such reserves.

The proposed infrastructure layout, as illustrated in Figure 4, has been optimised to ensure integration with the Grootegeeluk Coal Mine infrastructure and access roads.

See section 3.9 for a discussion on the alternative layouts and their positive and negative impacts.

6.3 Possible mitigation measures and level of risk

The following issues and potential mitigation measures are being considered:

- 1) **Air Quality:** The potential impact on air quality will be particulate mobilisation as a result of drilling, blasting, loading, hauling, dumping, stockpiling and crushing of the coal and associated material.

Wet suppression will be employed in the mine area and on the haul roads in order to maintain a **low** risk of exceeding national standards for PM₁₀ concentrations and rates of dust fall.

- 2) **Soil, Land Capability and Land Use:** The risk of causing a significant degradation of topsoil quality and associated loss of land capability after rehabilitation will be minimised to a **low** significance by:

- Taking care to strip and stockpile topsoil, subsoil and overburden layers selectively and to prevent mixing of especially topsoil with any of the other layers;
- Conduct roll-over mining by backfilling the opencast voids with overburden, subsoil and finally topsoil, in that order;
- Analysing the topsoil, fertilising it appropriately and re-vegetating it with locally indigenous flora to re-establish the pre-project land use, which was natural veld suitable for grazing.

- 3) **Ecology:** Successful restoration of the land capability will encourage natural re-colonisation of the rehabilitated area by mammals, birds, reptiles and insects, but it may require re-introduction of some species over time in order to reduce the risk of low-functioning or unbalanced ecosystem to a **low** level.

- 4) **Surface Water:** No natural drainage channels occur within the project area, except for the Sandloopspruit which is located approximately 4.2 km south west of the Grootegeeluk Pit. The risk of the contaminated runoff from the project area reaching the Sandloopspruit is **moderate to low**. It will be reduced to a **low** level by constructing clean water diversion berms to divert uncontaminated runoff around potential sources of contamination and collection channels to transport contaminated water to a pollution control dam, as required by Regulation 704 under the National Water Act.

- 5) **Groundwater levels, availability and quality:** The abstraction of groundwater for mine dewatering purposes will be aimed at controlling, but not eliminating, seepage into opencast pits. Safe and acceptable working conditions will be maintained by pumping out the seepage. This approach will minimise the formation of a cone of depression around the pits.

The following mitigation measures should be implemented:

- a. Placing product coal, discard coal and other potentially acid-forming materials on impermeable barriers; and
 - b. Regular monitoring of groundwater quality *via* the series of appropriately placed boreholes.
- 6) **Noise:** The risk of people being exposed to unacceptable levels of noise is **moderate to low** taking into consideration the existing noise sources such as the Grootegeeluk Coal Mine and adjacent power stations located in the immediate surrounding area.

Off-site noise levels will be mitigated by:

- Selection of mining vehicles and ore beneficiation equipment for lower sound levels;
- Regular maintenance of sound attenuation equipment;

- Locating the topsoil stockpile to act as an acoustic barrier between the opencast mine and receptors where practical; and
 - Enclosing noisy equipment, such as crushers, in buildings clad with sound-absorbing materials where necessary.
- 7) **Blasting and vibration:** Blasts will be monitored, and each blast will be designed to avoid exceedances of guidelines for air blast, fly rock and ground vibration. Vibration levels experienced depend on distance from the blast, the energy density of the blast and the characteristics of rock formations between the blast and the observer. The ground vibration levels will be controlled by monitoring each blast and taking the results into account when designing subsequent blasts.
- The risk of causing injuries or vehicle damage by fly rock will be minimised by closing off sections of public road within 500 metres of a blast immediately prior to each blast.
- 8) **Visual aspects:** The proposed mining operations and associated infrastructure will be constructed on a relatively flat terrain but in between the existing Grootegeeluk Coal Mine and the Medupi and Matimba power stations. The infrastructure will be visible from the local public roads. Judicious placement of the topsoil stockpile can screen the infrastructure from certain viewshed areas, but the stockpile would also be visually prominent and potentially intrusive, unless it is vegetated to mitigate the visual impact. The main visibility risk is inadequate dust suppression when dust plumes will be highly visible above the mine from distances of up to 7 km. Diligent application of wet suppression or chemical binders on unpaved roads would reduce this risk to a **low** level.
- 9) **Cultural and heritage:** Unless unknown graves are unearthed during construction and mining, the expected impact on cultural and heritage resources is likely to be of **negligible** significance;
- 10) **Palaeontology:** Unless unknown fossils or palaeontological resources are unearthed during construction and mining, the expected impact on palaeontology is likely to be of **negligible** significance;
- 11) **Socio-economics:** The Turfvlakte mining operations will utilise workforce from the existing Grootegeeluk Coal Mine. The project will provide an additional contribution to the Lephalale LM's GDP. Given the significant contribution of mining to the local GDP, the impact is expected to be of **moderate** significance.

6.4 Site selection matrix and final site layout plan

Alternative site layout to the one illustrated in Figure 4 were evaluated on the basis of the following criteria:

- Sterilisation of coal reserves. If infrastructure is placed on an area that contains ore that can be mined by opencast methods, Exxaro will be unable to mine the reserves underneath the footprint of the infrastructure;
- Size of area available for infrastructure. At least 269 ha is needed to accommodate the infrastructure associated with the proposed open cast mining e.g. pits, haul roads, topsoil stockpile and infrastructure laydown area;
- Avoidance, where possible of environmental features. The aim is to minimise the environmental aspects; and
- Internal conveyance considerations for the transport of equipment, personnel and product to the adjacent Grootegeeluk Coal Mine infrastructure.

6.4.1 Mine layout

The layout of the opencast mining areas and the associated surface infrastructure area as shown on Figure 4 is dictated by the mining costs, which in turn is determined by the thickness of the overburden, the thickness and grades of the coal seams.

Pit 1

Pit 1 will be mined to a depth of about 88 meters. Mining will commence in the northern part of the proposed pit and progress towards the south.

Pit 2

Pit 2 will be mined to a depth of about 109 meters. Mining will commence in the north-eastern part of the proposed pit and progress towards the north-west.

The location of the exterior haul roads and associated infrastructure are dictated by the perimeters of the final open pits. A topsoil stockpile will be constructed between the perimeter of the open pits and adjacent public roads, where possible.

6.4.2 Site Location and Layout

Site location alternatives are limited by the availability of undeveloped areas between the adjacent Grootegeluk Coal Mine operations to the north-west, the Medupi Power Station to the south, the Matimba Power Station to the east and Road D2001 to the north (Figure 4). The currently undeveloped open area to the west of the proposed Turfvlakte project area is located inside the Grootegeluk Coal Mine Mining Right area but it is already earmarked for future opencast mining.

Alternative site layout configurations were considered during the concept planning of the proposed project. The alternatives varied mainly on the placement of supporting infrastructure, inside the proposed footprint area, around the location of the pits as well as the requirement for the current project to be able to interlink with the existing Grootegeluk Coal Mining infrastructure and operational processes.

6.5 Motivation for not considering alternative sites

Refer to discussed in section 6.4.2 above.

6.6 Statement motivating the preferred site and layout

The site and layout shown on Figure 4 represent the best overall option as determined *via* the site selection and layout process

7.0 ENVIRONMENTAL IMPACT ASSESSMENT

The proposed mining of the coal ore reserves on the farm Turfvlakte 463 LQ has a potential to impact on some biophysical and socio-economic aspects of the local environment.

One of the main purposes of the EIA process is to understand the significance of these potential impacts and to determine to what extent they can be minimised or mitigated. Based on experience with and past studies on similar mining operations, supported by site-specific specialist studies, the impacts on soils, surface water, groundwater, air quality, the ecology and the local socio-economic fabric can be predicted and appropriate mitigation measures can be formulated.

The EIA process for this project has been designed to comply with the requirements of the MPRDA and the EIA Regulations that commenced on 7 April 2017 (See section 3.0). Cognisance has also been taken of the following key principles contained in the National Environmental Management Act (Act 107 of 1998) (NEMA), which is South Africa's framework environmental legislation:

- Sustainability – development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs;
- Mitigation hierarchy – avoidance of environmental impact, or where this is not possible, minimising the impact and remediating the impact; and

- The duty of care of developers towards the environment.

The assessment of the impacts of Exxaro's proposed mining operations on the farm Turfvlakte 463 LQ will be conducted in accordance with these principles.

Based on the findings of the EIA, a comprehensive Environmental Management Programme (EMPr) will be developed and implemented to control and minimise the impacts during construction, operation and decommissioning of the proposed mine.

7.1 Plan of study for impact assessment

The impact assessment component of the EIA is subdivided into several specialist fields of study. The findings of the specialist studies will be integrated into the EIA report. The significance of the impacts will be assessed in terms of the methodology described in section 6.0 of this report.

The terms of reference for the specialist investigations are set out below. The description is presented in fairly general terms, but all the issues that need to be addressed by the studies are captured. Where applicable, the cumulative effects of this project on the existing impact experienced in the surrounding areas will be assessed.

7.1.1 Geology

The effects of the proposed project on the current geological properties of the intended mining area, as described in section 4.1, will be described and assessed, together with any potentially feasible mitigation measures.

7.1.2 Air Quality

An air quality assessment will be conducted to assess the anticipated air quality impacts resulting from the proposed project on the current air quality in the surrounding area, which is described in section 4.3. The impact assessment study will encompass the following:

- A review of applicable air quality legislation, policies and standards;
- Identification of sensitive receptors in the vicinity of the project area;
- Compilation of an emissions inventory for the proposed Turfvlakte project;
- Dispersion simulations for the identified key atmospheric pollutants for the cumulative impacts associated with the proposed Turfvlakte operations, proposed Thabametsi operations, Grootegeeluk Coal Mine and Reductants emissions;
- Development of appropriate mitigation measures to reduce the impacts on sensitive receptors; and
- Recommendations for an air quality management / monitoring plan for implementation by the project.

7.1.3 Groundwater

The groundwater investigation will aim to provide an understanding of the groundwater baseline of the in-situ hydrogeological conditions at the project area, including the flow regime (drawdown and inflow), groundwater chemistry as well as the rock geochemistry (acid generating characteristics).

The groundwater investigation will encompass the following:

- Impact assessment of the proposed project on the receiving groundwater environment by using the source-pathway-receptor (SPR) approach. The SPR approach aims to quantify relationships between sources of contamination and (potential) receptors of contamination by considering relevant pathways/exposure mechanisms and processes;

- Desktop study of proposed mining plans, available geological information, borehole maps and logs, groundwater reports and monitoring data in the vicinity of the proposed mining area;
- Hydro-census of identified boreholes within 5 km of the project footprints. In addition to measuring the static water level, pH and conductivity in the field, the boreholes will be sampled and analysed for major cations (Na, K, Mg, Ca), major anions (Cl, F, SO₄), physico-chemical parameters (pH, conductivity, Total Dissolved Solids, Total alkalinity) and trace elements (including Fe, Cr, Se, Pb, Mn, Al, Zn, NO₃ and others determined by ICP-OES);
- Review of available groundwater quality information from the Grootegeluk Coal Mine;
- Sampling and pump-testing of boreholes to characterise the groundwater regime;
- The data collected above will be used to define an initial understanding of the hydrogeological situation and to prepare a site specific conceptual model of the dynamics of the groundwater system. The conceptual model will indicate the location of sources, geological cross-section, dynamics of the groundwater system, aquifer distribution, role of geological structures and groundwater flow directions.
- Geochemical characterisation of the mine and residue material will be done in according to the Global Acid Rock Drainage (GARD) Guide (INAP, 2010);
- Geochemical modelling to predict the geochemical risk;
- Assessing the impact of the proposed mining operations on the groundwater regime;
- Develop mitigation measures for expected major impacts; and
- Update the Grootegeluk complex groundwater flow and transport model to include the Turfvlakte project.

7.1.4 Terrestrial Ecology

The principle aim of the flora and fauna assessments will be to expand the baseline ecological characterisation of the Turfvlakte project area, as described in section 4.6, and determine how this will be affected by the proposed mining operations.

Specific objectives include, *inter alia*:

- Identifying important and sensitive species, habitats and ecological processes;
- Conduct a Phase 1 Protected Tree assessment and permit application, if applicable;
- Identifying and assessing negative ecological impacts resulting from the proposed mining project; and
- Recommending appropriate ecological management and mitigation measures.

7.1.5 Noise and Vibration

The characterisation of the study area in terms of pre-project noise levels, topographical features and locations of sensitive receptors, as described in section 4.9, was done in March 2018. The noise and vibration impacts of the proposed opencast mining operations will be assessed by comparing the predicted levels against pre-project baseline conditions and acceptable levels in terms of standards, guidelines and good practice. Suitable mitigation measures will be recommended.

7.1.6 Surface hydrology

The impact assessment will be done by exploring and predicting the effects of the of the proposed mining project on the pre-project baseline conditions described in section 4.7 and acceptable levels as defined by standards, guidelines and good practices. The surface water study will also take into consideration the requirements of

Regulation 704 under the National Water Act, Act 36 of 1998(NWA) and make recommendations for achieving compliance with the requirements of this regulation. The surface water study will include the following:

- Determining the quantity and quality of runoff from the proposed mining areas for rainfall events with 50-year and 100-year recurrence intervals to properly size and design storm water control measures;
- Delineating clean and dirty areas on site from the mining and infrastructure layout plan;
- Determining the site water balance and identifying opportunities for recycling runoff from the dirty water collection areas to the mining process. The water balance model will also be used for the water use licence application;
- Design criteria will be set up for sizing the storm water management structures;
- A model will be set up and applied to determine the layout and sizes of the conveyance structures required for the clean and dirty water collection systems and pollution control dams to meet the requirements of Regulation 704 of the NWA; and
- The impacts of the proposed mining operations on the local surface water resources will be assessed and appropriate mitigation measures will be recommended for inclusion in the EMP.

7.1.7 Socio economics

Anticipated positive and negative impacts of the proposed project on the current socio-economic fabric of the surrounding area will be identified. Information on the capital cost (local and imported) and the estimated local spend on remuneration, goods and services to assess the socio-economic impact of the proposed project on relevant socio-economic characteristics of the area such the population demographics, the number of employment opportunities, the number of unemployed and the gross geographical product will be used. Mitigation measures and approaches to avoid or alleviate adverse socio-economic impacts and enhance positive socio-economic impacts will be provided.

7.1.8 Cultural and Heritage Resources

As required in terms of Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), the South African Heritage Resources Agency (SAHRA) will be notified of the intended development and a phase I heritage study will be undertaken to assess the impacts of the proposed project on the baseline situation as described in section 4.11. Where appropriate, mitigation measures will be formulated. These will include chance find procedures, as the possibility of unearthing buried artefacts or human remains during construction and stripping of topsoil and overburden cannot be ruled out.

7.1.9 Palaeontology

As required in terms of Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), the South African Heritage Resources Agency (SAHRA) will be notified of the intended development and a phase I paleontological field study will be undertaken to assess the impacts of the proposed project on the baseline situation as described in section 4.12. Where appropriate, mitigation measures will be formulated. These will include chance find procedures, as the possibility of unearthing palaeontological resources during construction and stripping of topsoil and overburden cannot be ruled out.

7.1.10 Soils, Land Capability and Land Use

In addition to having determined the baseline soil, land use and land capability conditions as described in section 4.5, the study will involve the following:

- Review of the historic and recent aerial imagery, evaluating topographic, land cover, land use, land type maps and memoirs, and geological maps of the study area to inform the field survey and preliminary soil observation locations;
- Conduct a semi-detailed reconnaissance field survey, at a scale of 1: 20 000, to delineate and document the land use, natural resources climate, terrain form and the soil type of the project area;
- Conduct laboratory analysis of the soil samples to analyse the topsoil for the following properties as required for classification purposes:
 - Phosphorus (Bray 1);
 - Exchangeable cations – Na, K, Ca, Mg (Ammonium Acetate Extraction);
 - pH (water);
 - Clay content; and
 - Acid saturation (%).

The subsoil will be analysed for Exchangeable cations – Na, K, Ca, Mg (Ammonium Acetate Extraction).

- Classify the land capability of the project area according to the Land Capability Classification System for South Africa (Schoeman, et al, 2000) as well as the land capability classification based on the Chamber of Mines of South Africa and Coaltech Research Association guideline.
- Assessment of anticipated positive and negative impacts on soils during the construction, operation and decommissioning phases and after mine closure, and
- Description of recommended mitigation measures for incorporation into the EMP.

7.1.11 Visual Impact

The visual impact assessment will be undertaken against the backdrop of the baseline characterisation provided in section 4.10 and will involve the following:

- Identification of potentially sensitive receptors;
- Impact assessment by visual observation, GIS-based viewshed analysis and photographic analysis to evaluate:
 - Visual intrusion;
 - Visibility; and
 - Visual exposure;
- Identification of potential visual mitigation strategies and implementation measures.

7.1.12 Traffic

The traffic baseline characteristics provided in section 4.13 will be supplemented by a traffic impact assessment involving the following:

- Observation of current travel patterns, access routes and existing issues on surrounding roads;
- Traffic intersection counts at major intersections for morning, midday and afternoon peak hour periods on a typical week day;

- Conduct a traffic study in accordance with the Manual for Traffic Impact Studies, Department of Transport, Directorate: Research and Development, R93/635, 1995 or the latest 2012 guideline;
- Conduct an impact assessment on the current and future road and traffic systems to determine the potential impact as a result of the proposed project;
- Propose mitigation measures where necessary, to mitigate the assessed impact and inclusion in the EMPr.

7.2 Impact Assessment Methodology

The significance of identified impacts will be determined using the approach outlined below (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998). This approach incorporates two aspects for assessing the potential significance of impacts, namely occurrence and severity, which are further sub-divided as follows:

Occurrence		Severity	
Probability of occurrence	Duration of occurrence	Scale/extent of impact	Magnitude of impact

To assess these factors for each impact, the following four ranking scales are used:

Magnitude	Duration
10- Very high/unknown	5- Permanent (>10 years)
8- High	4- Long term (7 - 10 years, impact ceases after site closure has been obtained)
6- Moderate	3- Medium-term (3 months- 7 years, impact ceases after the operational life of the activity)
4- Low	2- Short-term (0 - 3 months, impact ceases after the construction phase)
2- Minor	1- Immediate
Scale	Probability
5- International	5- Definite/Unknown
4- National	4- Highly Probable
3- Regional	3- Medium Probability
2- Local	2- Low Probability
1- Site Only	1- Improbable
0- None	0- None

Once these factors are ranked for each impact, the significance of the two aspects, occurrence and severity, is assessed using the following formula:

$$\text{Significance Points} = (\text{Magnitude} + \text{Duration} + \text{Scale}) \times \text{Probability}.$$

The maximum value is 100 significance points (SP). The impact significance will then be rated as follows:

Points	Significance	Description
SP>60	High environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
SP 30 - 60	Moderate environmental significance	An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated.
SP<30	Low environmental significance	Impacts with little real effect and which will not have an influence on or require modification of the project design.
+	Positive impact	An impact that is likely to result in positive consequences/effects.

For the methodology outlined above, the following definitions were used:

- Magnitude is a measure of the degree of change in a measurement or analysis (e.g., the area of pasture, or the concentration of a metal in water compared to the water quality guideline value for the metal), and is classified as none/negligible, low, moderate or high. The categorization of the impact magnitude may be based on a set of criteria (e.g. health risk levels, ecological concepts and/or professional judgment) pertinent to each of the discipline areas and key questions analysed. The specialist study must attempt to quantify the magnitude and outline the rationale used. Appropriate, widely-recognised standards are to be used as a measure of the level of impact;
- Scale/Geographic extent refers to the area that could be affected by the impact and is classified as site, local, regional, national, or international;
- Duration refers to the length of time over which an environmental impact may occur: i.e. immediate/transient, short-term (0 to 7 years), medium term (8 to 15 years), long-term (greater than 15 years with impact ceasing after closure of the project), or permanent; and
- Probability of occurrence is a description of the probability of the impact actually occurring as improbable (less than 5% chance), low probability (5% to 40% chance), medium probability (40% to 60% chance), highly probable (most likely, 60% to 90% chance) or definite (impact will definitely occur).

7.3 Method of assessing duration significance

Duration refers to the length of time over which an environmental impact may occur: i.e. immediate/transient, short-term (0 to 7 years), medium term (8 to 15 years), long-term (greater than 15 years with impact ceasing after closure of the project), or permanent.

7.4 Stages at which competent authority will be consulted

The competent authority will be consulted:

- Upon submission of the application for environmental authorisation;
- During the 30-day period for public review of the draft scoping report;
- During the 43-day period of evaluation of the scoping report by the DMR;
- During the 106-day period of development of the EIR and EMPr;
- During the 30-day period for public review of the draft EIR and EMPr;

- During the 107-day period of evaluation of the EIR and EMPr by the DMR; and
- In the event of an appeal.

7.5 Public Participation during the Impact Assessment Phase

Public participation during the impact assessment phase of the EIA will entail a review of the findings of the EIA, presented in the EIA Report and EMPr, and the specialist studies. These reports will be made available for public comment for a period of 30 days.

7.5.1 Notification of interested and affected parties

Public participation during the impact assessment phase of the EIA will entail a review of the findings of the EIA, presented in the Draft EIA Report and Environmental Management Programme (EMPr), and the volume of specialist studies. These reports will be made available for public comment during the public consultation period on the draft EIA Report.

I&APs will be advised timeously of the availability of these reports and how to obtain them. They will be encouraged to comment either in writing (mail or email), by telephone or by attending a public meeting.

All the issues, comments and suggestions raised during the comment period on the Draft EIA Report/EMPr will be added to the Comment and Response Report that will accompany the Final EIA Report/EMPr. The Final EIA Report/EMPr will be submitted to the DMR for a decision about the proposed project.

On submission of the Final EIA Report/EMPr to the DMR, a personalised letter will be sent to every registered I&AP to inform them of the submission and the opportunity to request copies of the final reports.

7.5.2 Information to be provided to I&APs

In addition to all the information provided in this scoping report, specifically the mining layout plan shown in Figure 4, the project description provided in section 2.5, the description of the baseline environment provided in section 4.0, the potential impacts identified in section 5.0 and the potential mitigation measures discussed in section 6.3, the results of the specialist assessments and their recommended mitigation measures will be provided to I&APs during the impact assessment phase.

7.6 Competent authority's decision

Once the DMR has taken a decision about the proposed project, the Public Participation Office will immediately notify I&APs of this decision and of the opportunity to appeal. This notification will be provided as follows:

- A letter will be sent, personally addressed to all registered I&APs, summarising the authority's decision and explaining how to lodge an appeal should they wish to;
- A bulk SMS notification will be sent to all registered I&APs whose mobile numbers are on the stakeholder database, and
- An advertisement to announce the competent authority's decision will be published in the Mogol Pos, if so required by the authorities.

7.7 Task to be undertaken during environmental impact assessment process

The various specialist studies that will be undertaken during the environmental impact assessment process are described in section 7.1 and the associated tasks are briefly summarised here.

7.7.1 Finalisation of site layout

The preliminary site layout and location of infrastructure has been determined by taking into consideration the environmental baseline information generated during the scoping process as well as economical and practical

considerations associated with the proposed mining operations. The layout will be finalised after taking into consideration any additional information that becomes available during the environmental impact assessment process.

7.7.2 Specialist Investigations

The various specialist studies that will be undertaken during the environmental impact assessment process are described in section 7.1 and include the following:

- Air Quality (section 7.1.2)
- Groundwater (section 7.1.3)
- Terrestrial Ecology (section 7.1.4)
- Noise and Vibration (section 7.1.5)
- Surface Hydrology (section 7.1.6)
- Socio-economic (section 7.1.7)
- Cultural and Heritage Resources (section 7.1.8)
- Palaeontology (section 7.1.9)
- Soils, Land Capability and Land Use (section 7.1.10)
- Visual Impact (section 7.1.11); and
- Traffic (section 7.1.12).

7.8 Measures to avoid, reverse, mitigate and manage impacts and determine residual risk

Table 19 outlines possible measures that can be employed to avoid, reverse, mitigate and manage identified impacts and the determination of residual risks associated with the proposed open pit mining operations at Turfvlakte.

Table 19: Activities, impacts, mitigation and residual risks

Activity	Potential Impact	Mitigation Type	Potential Residual Risk
Opencast mining operations and associated infrastructure	Groundwater: <ul style="list-style-type: none"> ■ Lowering of groundwater level; ■ Deterioration of groundwater quality. 	Numerical modelling, Monitoring and appropriate opencast pit dewatering.	Variations in rock permeability and transmissivity could temporarily result in higher inflow than expected. Unknown water pockets could be encountered. Low residual risk if mitigation measures are properly implemented.
	Surface water: <ul style="list-style-type: none"> ■ Changes in surface water quality; 	Monitoring and effective storm water management.	Low residual risk, if mitigation measures are properly implemented.

Activity	Potential Impact	Mitigation Type	Potential Residual Risk
	<ul style="list-style-type: none"> Changes in surface water runoff and erosion. 		
	Wetlands / Pans: <ul style="list-style-type: none"> Loss of wetland habitat; Changes in the surface water quality, changes in the surface and subsurface water flow, and erosion. 	Monitoring and effective storm water management. Appropriate operational management to minimise the impact on wetlands and pans.	It is inevitable that some of the wetlands and pans will be directly and indirectly impacted through the opencast mining operations. There will therefore be an inherent residual risk to the wetland areas. The residual risk can be lowered with the implementation of mitigation measures.
	Ecology: <ul style="list-style-type: none"> Removal of protected trees and vegetation; Reduced habitat for biodiversity. 	Operational management and effective rehabilitation.	Lack of concurrent rehabilitation could result in the loss of habitat for local biodiversity. A low residual risk is expected mitigation measures are sufficiently implemented.
	Air Quality: <ul style="list-style-type: none"> Release of particulates, combustion gases and VOCs into the atmosphere. 	Monitoring, appropriate blast design, and effective operational management.	Possible exceedances of acceptable air quality limits. Low residual risk if mitigation measures are implemented.
	Noise: <ul style="list-style-type: none"> Noise during blasting and operational activities. 	Monitoring, appropriate blast design, and effective operational management.	Possible exceedances of acceptable noise levels. Low residual risk if mitigation measures are implemented.
	Blasting and Vibration: <ul style="list-style-type: none"> Injury or damage due to fly rock, air blast and/or ground vibration. 	Monitoring and adaptive blast design.	Possible injury or damage if a blast is inappropriately designed, but unlikely. A low residual risk is expected.
	Visual:	Monitoring and effective operational control.	A low residual risk is envisaged if mitigation

Activity	Potential Impact	Mitigation Type	Potential Residual Risk
	<ul style="list-style-type: none"> Visual impact due to blasting and operational infrastructure. 		measures are implemented.
	Cultural and heritage: <ul style="list-style-type: none"> Unearthing of unknown graves. 	Monitoring and implementation of chance find protocol.	No residual risk is envisaged if mitigation measures are implemented.
	Palaeontology: <ul style="list-style-type: none"> Unearthing of significant fossils. 	Monitoring and implementation of chance find protocol.	No residual risk is envisaged if mitigation measures are implemented.
	Soils, Land Use and Land Capability: <ul style="list-style-type: none"> Loss and/or degradation of soils, land capability and land use; 	Monitoring and effective operational control.	It is inevitable that some of the soils will be directly or indirectly impacted during the opencast mining operations. There is thus an inherent residual risk to the soils, land capability and land use. This residual risk can however be lowered if the mitigation measures put forward are properly implemented.
	Traffic: <ul style="list-style-type: none"> Increase in traffic. 	Monitoring and effective operational control.	A low residual risk is envisaged if mitigation measures are implemented.
Preparation for mine closure	Inadequate development of personnel skills and/or project that are sustainable after closure.	Progress monitoring during life of mine.	Inability of former personnel to sustain livelihoods after mine closure.

8.0 OTHER INFORMATION REQUIRED BY COMPETENT AUTHORITY

8.1 Impact on socio economic conditions of any directly affected persons

The socio-economic impacts on the local residents close enough to be directly affected can only be determined properly after the specialist studies described in section 7.1 (Plan of Study for Impact Assessment) have been completed. No relocation is required.

8.2 Impacts on any national estate

No cultural/heritage resources close enough to the proposed mining and ore beneficiation activities to be impacted were found by the specialist, but the possibility of chance finds during construction and mining cannot be ruled out.

9.0 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE NEMA

- Section 24(4)(a) (iii) requires that a description of the environment likely to be significantly affected by the proposed activity be provided. This has been done – see section 4.0 of this report;
- Section 24(4)(a) (iv) requires an investigation of the potential consequences for or impacts on the environment as a result of the activity and assessment of the significance of those potential consequences or impacts. See section 0 of this report, where potential impacts were identified. Their assessment, as detailed in the Plan of Study for Impact Assessment (section 7.1) will be done during the impact assessment phase of the EIA;
- Section 24(4)(a) (v) references public information and participation procedures, which have been dealt with in section 3.9.2 and 7.5 of this report.

10.0 UNDERTAKING REGARDING CORRECTIONESS OF INFORMATION

I, Marié Schlechter herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected parties have been correctly recorded in this report.

Date: 24 January 2020

11.0 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I, Marié Schlechter herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with Interested and Affected parties and stakeholders has been correctly recorded and reported herein.

Date: 24 January 2020

12.0 REFERENCES

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APPENDIX A

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