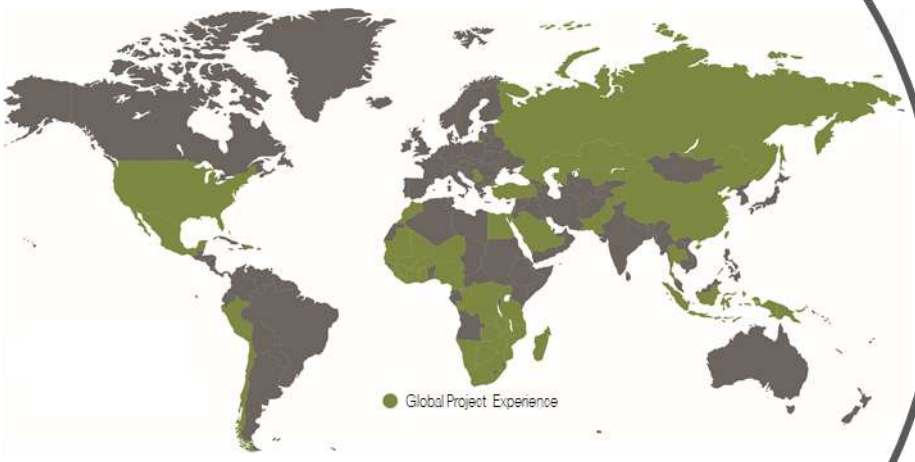

DIGBY WELLS
ENVIRONMENTAL

Your Preferred Environmental and Social Solutions Partner

Providing innovative and sustainable solutions throughout the resources sector

Exxaro Dorstfontein East Coal Mine Expansion Project, near Kriel, Mpumalanga

Final Environmental Scoping Report

Prepared for:
Exxaro Coal Central (Pty) Ltd

DMRE Reference Number:
MP30/5/1/2/2/51MR

Project Number:
EXX5725

January 2021

Digby Wells and Associates (South Africa) (Pty) Ltd
Company Registration: 2010/008577/07

Turnberry Office Park,
Digby Wells House.
48 Grosvenor Road,
Bryanston,2191

Phone: +27 (0) 11 789 9495
Fax: +27 (0) 11 789 9495
E-mail: info@digbywells.com
Website: www.digbywells.com

Directors: J Leaver (Chairman)*, NA Mehlomakulu*, DJ Otto, M Rafundisani
*Non-Executive

This document has been prepared by Digby Wells Environmental.

Report Type:	Final Environmental Scoping Report
Project Name:	Exxaro Dorstfontein East Coal Mine Expansion Project, near Kriel, Mpumalanga
Project Code:	EXX5725

Name	Responsibility	Signature	Date
Njabulo Mzilikazi	Report Compiler		January 2021
Xan Taylor	Project Manager and 1st Reviewer		January 2021
Kelly Tucker	Project Sponsor and 2nd Reviewer		January 2021

IMPORTANT NOTICE

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

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

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

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

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

OBJECTIVE OF THE SCOPING PROCESS

The objective of the scoping process is, through a consultative process, to: -

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

EXECUTIVE SUMMARY

Introduction

Exxaro Coal Central (Pty) Ltd (hereafter ECC) holds an approved Mining Right for opencast and underground mining at the Dorstfontein East Coal Mine (DECM) situated in Kriel, Mpumalanga Province. The current proposal aims to extend the approved underground mining area and introduce ancillary surface infrastructure to achieve this.

Project applicant

The details of the Project Applicant are included in the table below.

Name of Applicant:	Dorstfontein Coal Mines (Pty) Ltd		
Contact persons:	William Seabi – Sustainability Manager Lorenzo van den Heever – Environmental Specialist		
Physical address:	Dorstfontein West Regional Offices. Dorstfontein Farm 71 IS, R57, Kriel		
Postal address:	Private Bag X5007, Ga-Nala		
Postal code:	2271	**Cell phone:**	063 847 9524
Telephone:	011 441 7911	**Fax:**	
Email:	William.Seabi@exxaro.com Lorenzo.vandenheever@exxaro.com		

Project overview

The project aims to expand the DECM's underground mining area within the existing Mining Right Area **MP30/5/1/2/2/51MR**. DECM was previously owned by Total Coal South Africa (Pty) Ltd (Total) and was ceded to ECC on 20 August 2015, which has an approved Environmental Management Plan (EMP), dated 14 August 2009. ECC is also approved to undertake underground mining of deeper coal reserves at DECM. ECC is now applying to expand the underground mining areas as approved under Total. Subsequently, additional coal reserves have been identified for mining which are not covered under the existing approval. The underground mining operations will be accessed from the existing Pit 2 open cast and Dorstfontein West operations. DECM therefore intends to further extend the Life-of-Mine (LOM) through the exploitation of these identified additional coal reserves.

The required infrastructure proposed for the extension includes:

- Sewage Treatment Plant;
- Water Treatment Plant;
- Potable Water storage tank;
- Erikson dam;
- A new 22 kV overhead powerline from the existing substation to a new 22kV substation;
- Run of Mine (ROM) Stockpile conveyor at portal;
- Portal ventilation fan;
- Pipelines for sewer and water management;
- Change house;
- Lamp room;
- Office;
- Workshop area; and
- Stone dust silo.

Purpose of this report

The purpose of this Scoping Report includes the following:

- To provide a description of the proposed Project and its activities;
- To provide a high-level baseline environment;
- To predict potential impacts as a result of the Project and its activities;
- To provide a detailed plan of study for the Environmental Impact Assessment (EIA) Phase; and
- To share Project information with Interested and Affected Parties (I&APs) and to record comments and issues.

Environmental consultants

Digby Wells Environmental has been appointed by ECC as an independent Environmental Assessment Practitioner (EAP) to conduct the following environmental-regulatory processes in relation to this Project:

- An Environmental Authorisation Application process, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- A Water Use Licence Application (WULA) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA);

- All relevant specialist studies in support of the applications; and the required Public Participation Process (PPP).

The details of the Environmental Assessment Practitioner are as follows.

Company name:	Digby Wells Environmental
Contact person:	Xan Taylor
Physical address:	Turnberry Office Park, 48 Grosvenor Road, Bryanston, 2191
Telephone:	011 789 9495
Email:	Xan.taylor@digbywells.com

Approach and methodology for the PPP

A PPP as per the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) has been initiated, which is central to the investigation of environmental and social impacts, as it is important that stakeholders who are affected by the Project are given an opportunity to identify concerns to ensure that local knowledge, needs and values are understood and taken into consideration as part of the EIA process.

This Draft Scoping Report was available for public comment for a period of 30 days from **13 November 2020 to 14 December 2020** and all comments or concerns raised by Interested and Affected Parties (I&APs) were recorded and responded to in the Comments and Responses Report (CRR) contained in this Final Scoping Report.

The following activities were also undertaken during the Project's and Scoping Phase:

- Background Information Documents (BID) were distributed to identified I&APs throughout the Scoping Phase;
- A newspaper advertisement was placed in the Witbank News on 13 November 2020**;**
- An announcement letter including a registration form were distributed to identified I&APs via email on 13 November 2020;
- Site notices were placed around the site on 13 November 2020; and
- The Draft Scoping Report and future Project communications are made available to I&APs through a data free website allowing access to download with no cost. The electronic copy can be accessed and downloaded from the Digby Wells website - www.digbywells.com (Public Documents).

Project Alternatives

The alternatives considered in this report and during the pre-feasibility studies undertaken include the mining method, resource access, mining equipment requirements, production and scheduling, employment and the "No-Go" alternative (the option of not proceeding with the Project).

Environmental Baseline

The following baseline specialist studies have been undertaken and included in the Scoping Report:

- Hydropedology;
- Hydrology;
- Hydrogeology;
- Heritage;
- Groundwater;
- Ecology (fauna and flora);
- Freshwater Ecosystems (Wetland and Aquatic Biodiversity);
- Soils, Land Use and Capability;
- Social and Economic;
- Public Participation Process.

These baseline environmental investigations found that most of the Project Area consists of disturbed/transformed vegetation as a result of existing structures/developments, agricultural practices and associated infrastructure. Small patches of the study site do consist of recovered natural vegetation. The aquatic environments are also modified and negatively impacted by agricultural and mining activities. Socioeconomically speaking, the employment and training opportunities are a need in the local area.

The preliminary impacts of the underground mining extension and ancillary infrastructure can be summarised as follows:

- Water quality deterioration;
- Increased surface water runoff;
- Terrestrial and aquatic habitat disturbance, loss and/or fragmentation;
- Soil erosion and compaction;
- Spread of alien and invasive species;
- Disturbance and destruction of heritage resources; and
- Employment opportunities and skills development.

The Project has the opportunity to have a significantly beneficial impact through providing employment opportunities, SMME development, education support (ABET, portable skills training, bursary programmes), as well as community development initiatives.

Closure, rehabilitation and climate change studies shall be undertaken and included in the EIA Phase as they do not provide baseline information.

Conclusion

All specialist studies shall be finalised in the EIA Phase for the completion of the impact assessment and further mitigation measures can then be recommended for the Project. Comments received from I&APs will be used to inform further aspects of the specialist studies. The EIA Phase will allow for an in-depth assessment of the impacts, potential mitigations and further recommendations with regards to the proposed Project proceeding.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1 Introduction

Exxaro Coal Central (Pty) Ltd (hereafter ECC) holds an approved Mining Right (**MP 30/5/1/2/2/51 MR)** for opencast and underground mining at the Dorstfontein East Coal Mine (DECM) situated in Kriel, Mpumalanga Province. DECM was previously owned by Total Coal South Africa (Pty) Ltd (Total) and was ceded to ECC on 20 August 2015. The current proposal aims to extend underground mining in the approved mining area and introduce ancillary surface infrastructure to support this.

ECC has approval to mine the Lower 4 Seam and the Lower 2 Seam, and also authorised to mine three open pits. The operation has an approved Environmental Impact Assessment and Environmental Management Plan (EIA/EMP), dated October 2017, and compiled by SRK Consulting.

DECM is in possession of the following environmental related authorisations opencast and underground mining related activities:

- Environmental Management Programme (EMPr) in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) dated 2009;
- Notification of Intent to Develop (NID) in accordance with Section 38(1) of the Heritage Resource Management (HRM) process in accordance with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA);
- EA for listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) associated with the Pit 1 Extension and Water Transportation Pipeline Project dated 2017 (Reference no. MP 30/5/1/2/3/2/1 (51) (EM)) issued by the Mpumalanga Department of Mineral Resources;
- Environmental Authorisation (EA) for construction of a conveyor and railway loop (Reference no. 17/2/2/2 NK-7) issued on 9 November 2009 by the Mpumalanga Department of Agriculture and Land Management;
- EA for listed activities in terms of the NEMA associated with diesel storage tanks (EA Reference no. 17/2/3 N-19) issued in 19 May 2011 by the Mpumalanga Department of Economic Development, Environment and Tourism; and
- Integrated Water Use Licence (IWUL) for the water use related activities in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) dated September 2019 (Licence no. 06/B11B/ACIJ/9138).

As the DECM has approved EMPr's and an IWUL for the current operations, and Exxaro has appointed Digby Wells to align previous approved EMPs. An alignment process will ensure that ECC Mining incorporates all current and future proposed activities associated for the DECM operation. The EIA Phase of the project will align the EMPr's (as listed above) issued to DECM to produce one operational EMP for the entire Dorstfontein East Mining Right Area.

The following EMPr's require alignment into one operational EMPr for the DECM operations:

- EMPr for Mining Right [Ref. No. MP 30/5/1/2/2/51MR] (April 2008);
- EMPr Amendment for Mining Right [Ref. No. MP 30/5/1/2/2/51MR] (August 2009); and
- EIA/EMPr for the Dorstfontein East Mine Extension of Pit 1 and Water Transportation Pipeline from Dorstfontein West to Dorstfontein East (SRK, October 2017).

The proposed expansion of the underground mining operation and introduction of ancillary infrastructure triggers Listed Activities in terms of the EIA Regulations, 2014 (as amended) as promulgated under NEMA, requiring that a Scoping and EIA Process be undertaken to obtain Environmental Authorisation.

Furthermore, a Water Use Licence Application (WULA) in terms of Section 21 of the NWA is required to lawfully undertake the proposed mining activities. The application requires supporting technical documents including specialist studies and technical reports.

In support of these applications, the following specialist studies have been included to assess the baseline environment and impacts of the Project on these environments and will also be further assessed during the EIA phase:

- Hydropedology;
- Hydrology;
- Hydrogeology;
- Air Quality;
- Heritage;
- Noise;
- Groundwater;
- Ecology (fauna and flora);
- Freshwater Ecosystems (Wetland and Aquatic Biodiversity);
- Soils, Land Use and Capability;
- Visual;
- Social and Economic;
- Traffic;
- Climate Change;
- Closure and Rehabilitation; and
- Public Participation Process.

This application focuses on the inclusion of the extension of underground mining areas for both the 4 and 2 Seams. The goal of this process is therefore to include the extension areas and ultimately align the EMPs associated with the DECM operations during the EIA Phase.

The detailed description of the proposed infrastructure is provided in Section 5.

2 Administrative details

This section provides the details of the Applicant as well as the Environmental Assessment Practitioners (EAP).

2.1 Details of the applicant

Exxaro Coal Central (Pty) Ltd is the proponent in this application. The details of the applicant are presented in Table 2-1.

Table 2-1: Contact details of the Applicant

Name of Applicant:	Dorstfontein Coal Mines (Pty) Ltd		
Registration number (if any):	1952/003176/07		
Trading name (if any):	Dorstfontein Coal Mines (Pty) Ltd		
Responsible person: ***(E.g. CEO, Director, etc.)***	Business Unit Manager - Daniel Jacobus Christoffel Stapelberg		
Contact person:	William Seabi – Sustainability Manager Lorenzo van den Heever – Environmental Specialist		
Physical address:	Dorstfontein West Regional Offices. Dorstfontein Farm 71 IS, R57, Kriel		
Postal address:	Private Bag X5007, Ga-Nala		
Postal code:	2271	**Cell phone:**	063 847 9524
Telephone:	011 441 7911	**Fax:**	
Email:	William.Seabi@exxaro.com Lorenzo.vandenheever@exxaro.com		

2.2 Details of EAP

Digby Wells Environmental has been appointed by ECC as the Environmental Assessment Practitioner (EAP) to manage the application processes. The details of the EAP are contained in Table 2-2 and the Curriculum Vitae and EAP qualifications are attached in Appendix A.

Table 2-2: Details of the EAP

Name of EAP:	Xan Taylor
Professional affiliation/registration:	EAPASA registration pending

Contact person: ***(if different from EAP)***	Njabulo Mzilikazi (SACNASP Reg. No. 120568)		
Company:	Digby Wells and Associates (South Africa) (Pty) Ltd		
Physical address:	Digby Wells House, 48 Grosvenor Road, Bryanston, Johannesburg, 2191		
Postal address:	Private Bag X10046, Randburg, South Africa		
Postal code:	2125	**Cell phone:**	
Telephone:	011 789 9495	**Fax:**	011 789 9498
Email:	xan.taylor@digbywells.com		

3 Description of the property

Table 3-1 contains the details of the farm portions included in the application, the municipal district and nearest town to the site (see Appendix B for regional and local setting of the Project Area). The land tenure map is depicted in Figure 4-1 and provided in Appendix B.

Table 3-1: Property Description

Farm Name:	Farm Name	Farm Portion	Area (ha)
	Bosch Krans 53 IS	12/53	311,83
	Dorstfontein 71 IS	8/71	207,24
	Dorstfontein 71 IS	2/71	664,68
	Fentonia 54 IS	2/54	227,93
	Fentonia 54 IS	3/54	331,16
	Fentonia 54 IS	1/54	272,81
	Welstand 55 IS	4/55	359,58
	Welstand 55 IS	10/55	5,22
	Welstand 55 IS	11/55	83,22
	Welstand 55 IS	13/55	157,60
	Welstand 55 IS	5/55	231,99
Application Area (Ha):	3288,53 ha (surface area)		
Magisterial District:	Nkangala District Municipality		
Distance and direction from nearest town:	16 km north east of the town of Kriel.		
21-digit Surveyor General Code for each farm portion:	T0IS00000000005300012 T0IS00000000007100008		

	T0IS00000000007100002
	T0IS00000000005400002
	T0IS00000000005400003
	T0IS00000000005400001
	T0IS00000000005500004
	T0IS00000000005500010
	T0IS00000000005500011
	T0IS00000000005500013
	T0IS00000000005500005

4 Locality map

The DECM is situated in the Mpumalanga Province near the town of Kriel. The Regional and Local maps are depicted in Figure 4-2 and Figure 4-3 respectively, and provided in Appendix B.

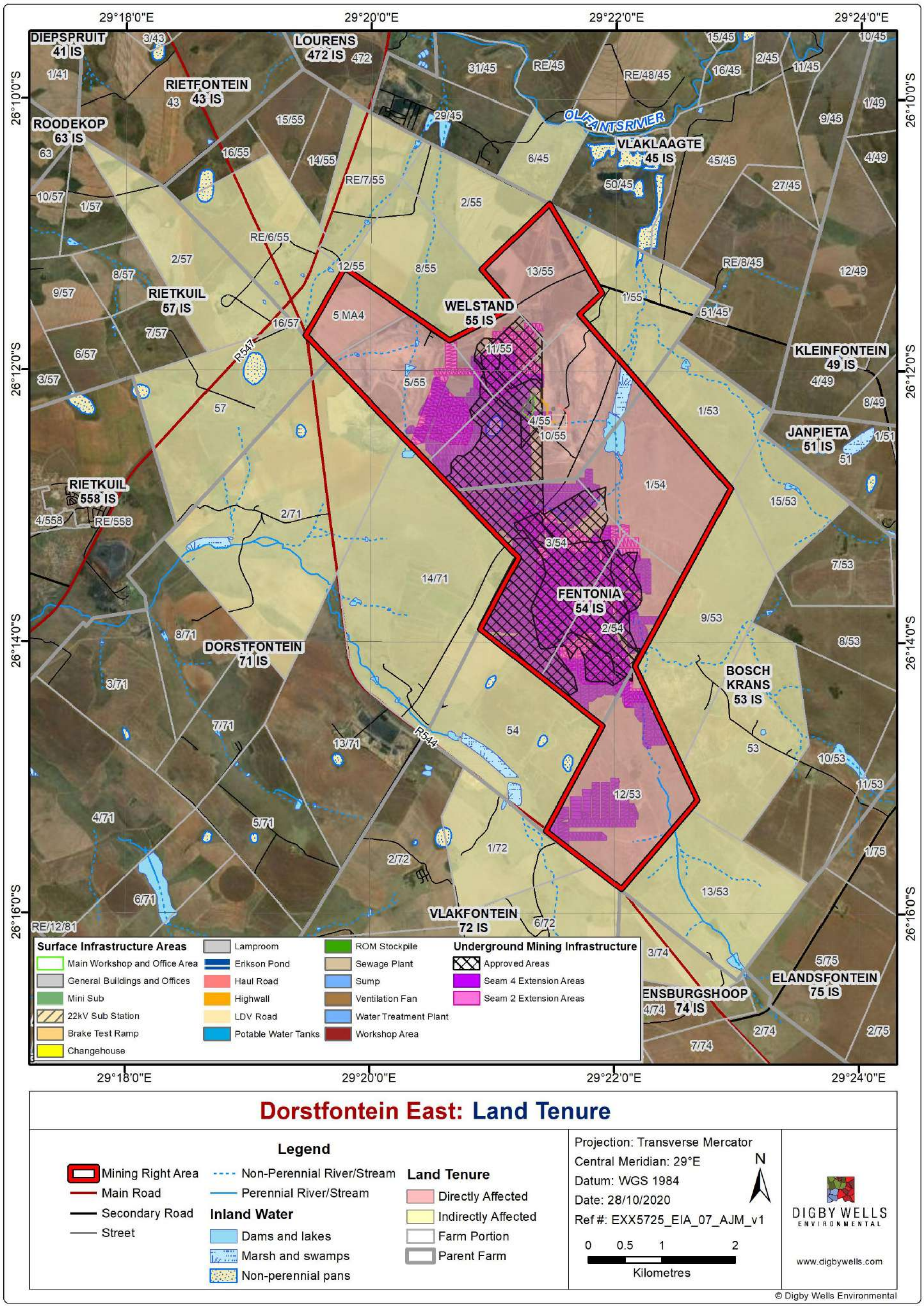

Figure 4-1: Land Tenure Map

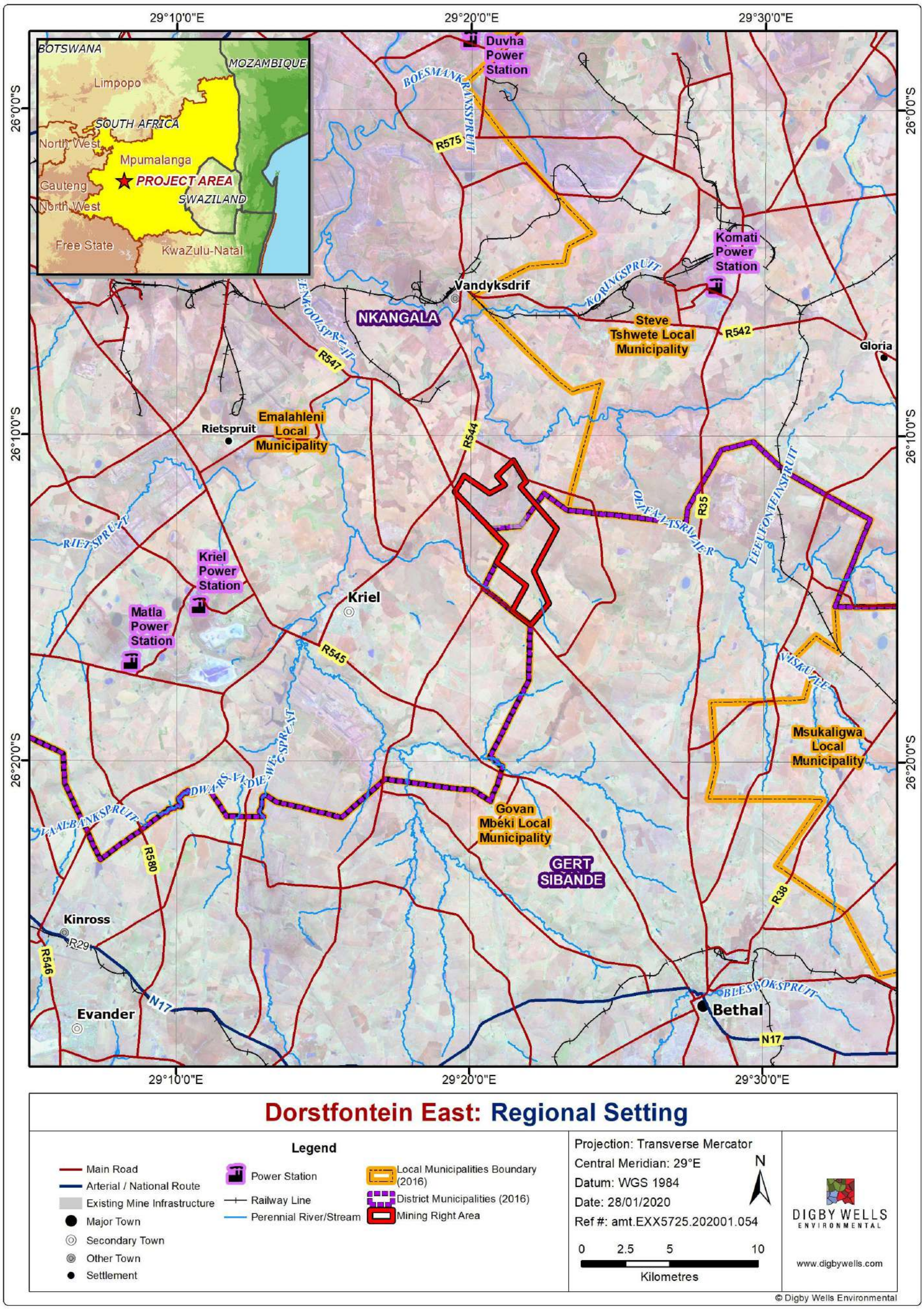

Figure 4-2: Regional Setting of the DECM

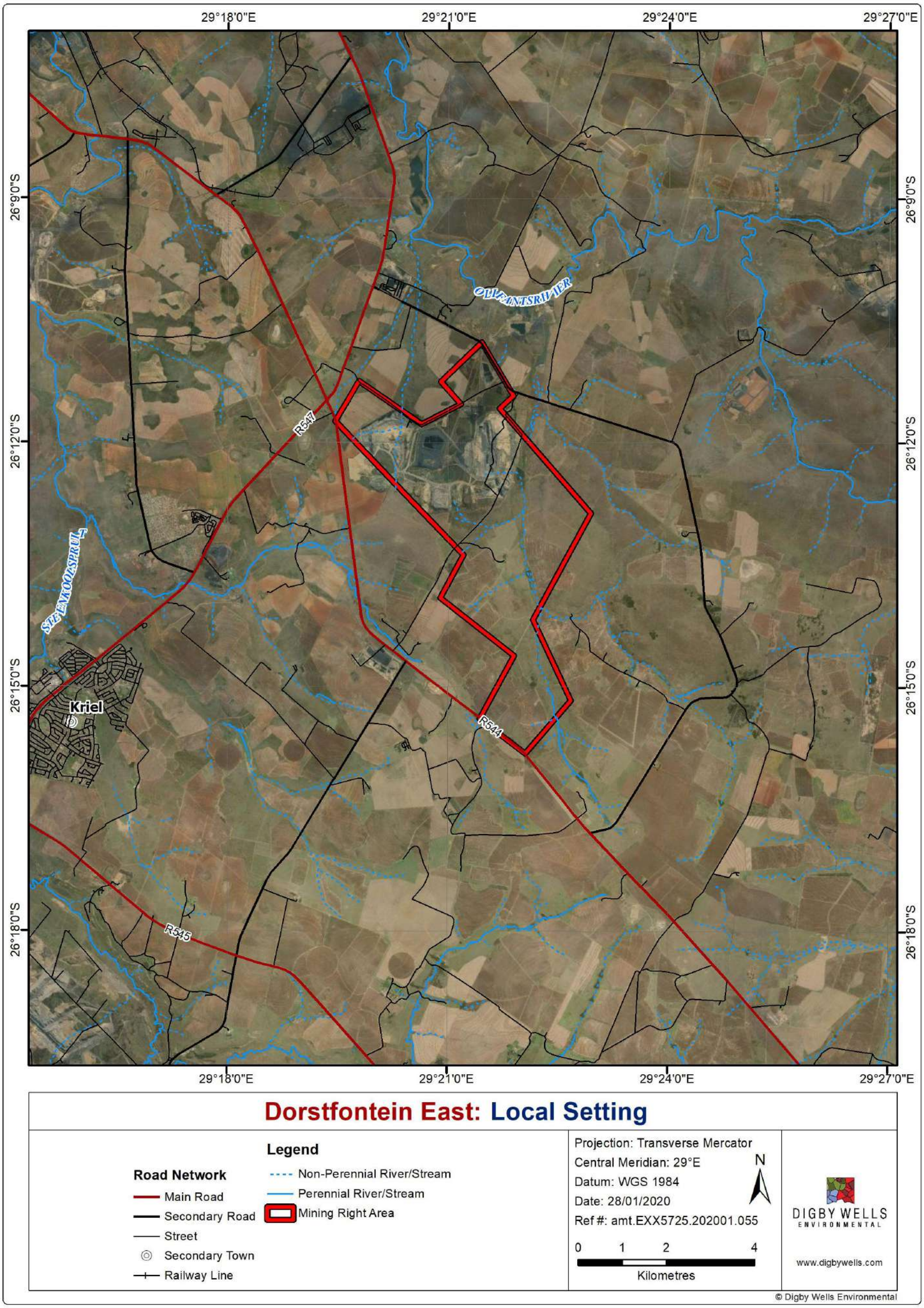

Figure 4-3: Local Setting of the DECM

5 Project Description

This section provides a description of the Project in terms of the activities to be undertaken as well as specific Listed Activities in accordance with legislation.

5.1 Description of the activities to be undertaken

The project aims to expand the DECM's underground mining area within the existing Mining Right Areas MP 30/5/1/2/2/51 MR. DECM was previously owned by Total Coal South Africa (Pty) Ltd (Total) and was ceded to ECC on 6 December 2006 which has an approved Environmental Management Plan (EMP), dated October 2017. ECC is now applying to expand the underground mining areas as approved under Total. Subsequently, additional coal reserves have been identified for mining which are not covered under the existing approval. ECC is also approved to undertake underground mining of deeper coal reserves at DECM. The underground mining operations will be accessed from the existing Pit 2 open cast and Dorstfontein West operations. DECM therefore intends to further extend the Life-of-Mine (LOM) through the exploitation of these identified additional coal reserves between 2021 until 2034 (14 years).

A portion of the Seam 4 underground extension area situated in the `south west portion of the DECM Mining Right boundary (Figure 5-3) will also be mined. This portion will be accessed from the Dorstfontein West operations. The required infrastructure proposed for the extension includes:

- Sewage Treatment Plant;
- Water Treatment Plant;
- Potable water storage tank;
- Erikson Dam;
- A new 22 kV overhead powerline from the existing substation to a new kV substation;
- Run of Mine (ROM) Stockpile conveyor at portal;
- Portal ventilation fan;
- Sewer and water management;
- Change house;
- Lamp room;
- Office;
- Workshop area; and
- Stone dust silo.

The surface infrastructure layout plan Figure 5-1 depicts the ancillary infrastructure required to support the underground mining expansion. Figure 5-2 and Figure 5-3 show the already

approved underground mining areas and the proposed extent of the extensions. These plans are also attached as Appendix B for reference.

Figure 5-1: Surface Infrastructure Layout

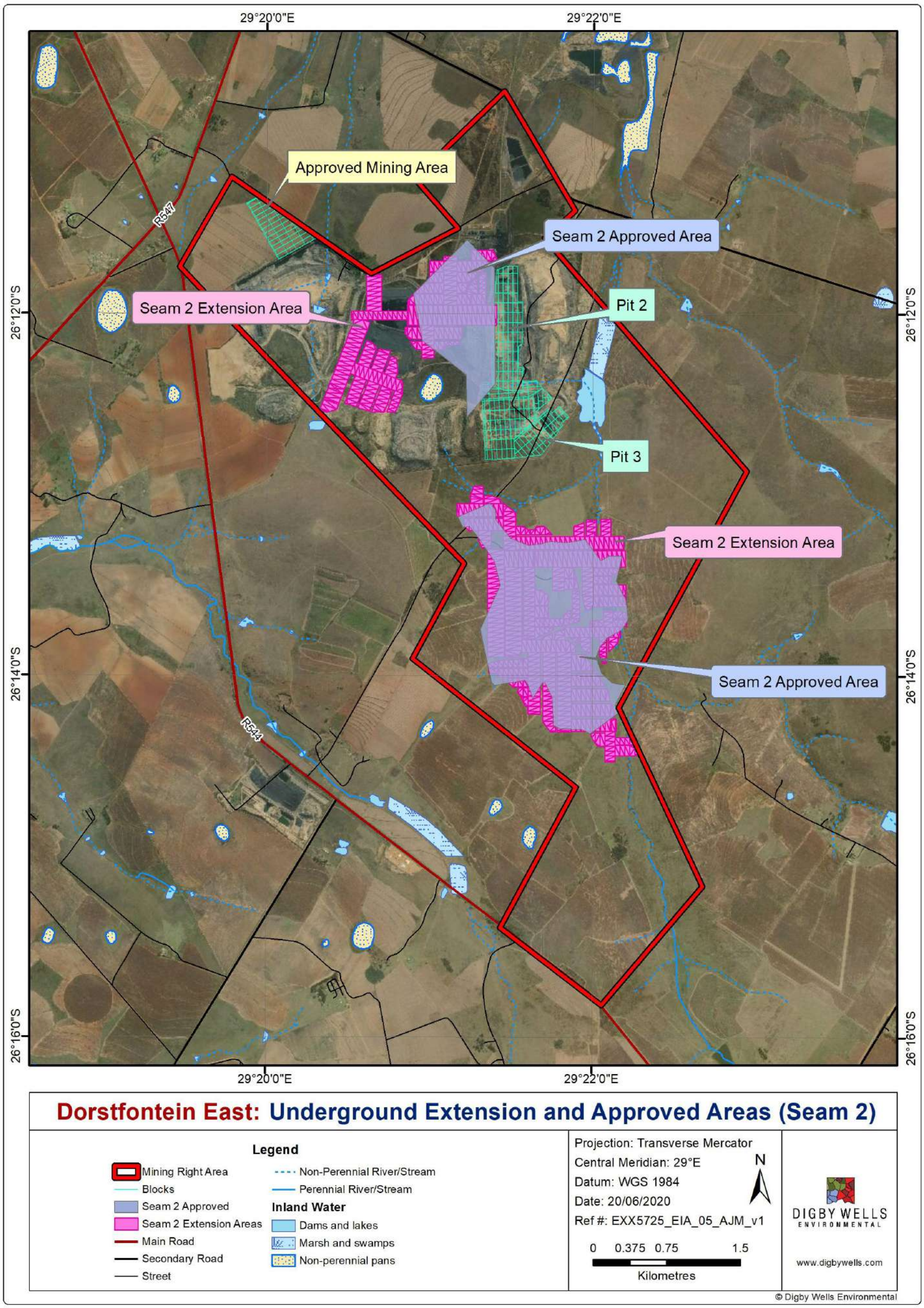

Figure 5-2: Existing Approved and Underground Extension Areas in Seam 2

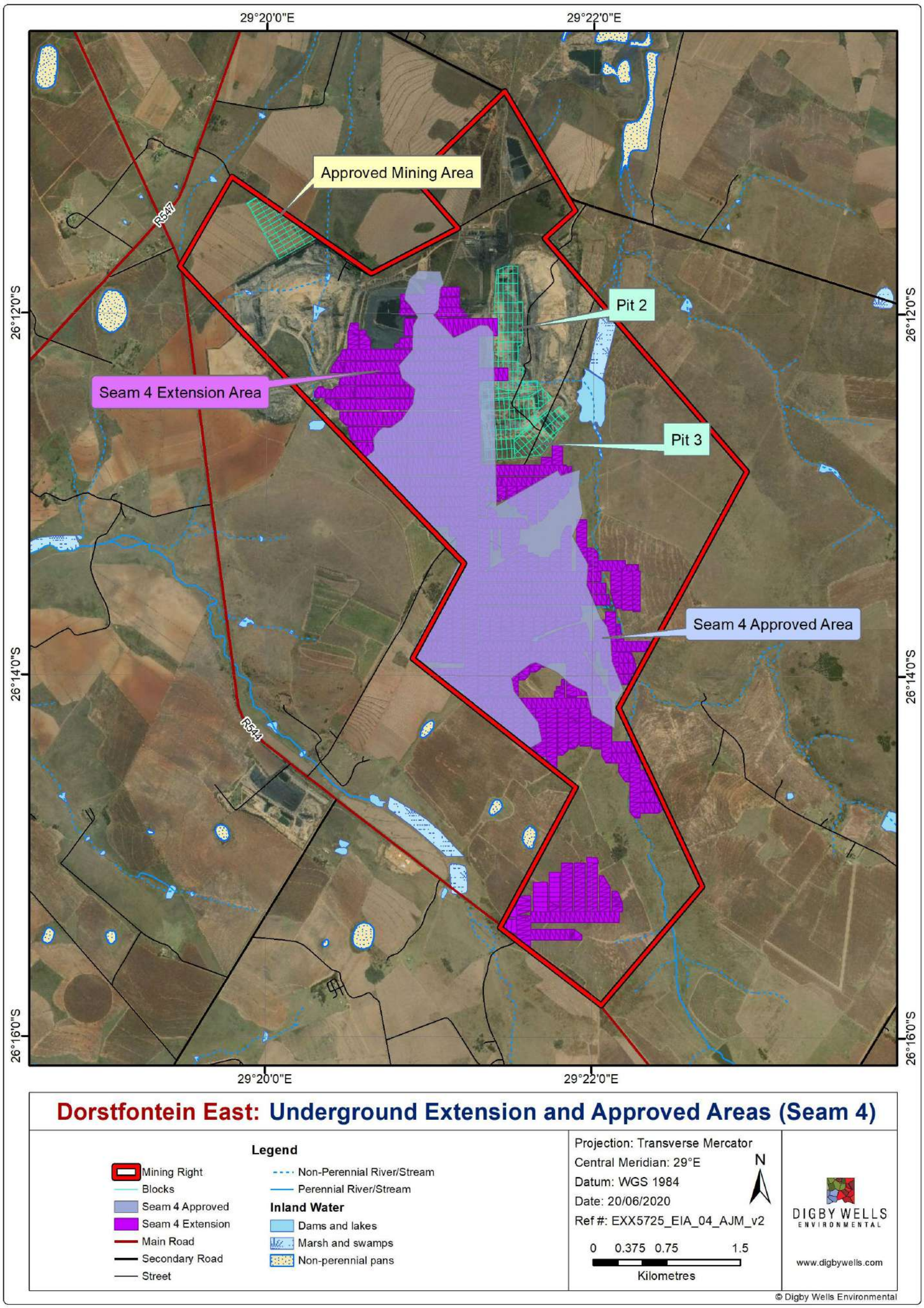

Figure 5-3: Existing Approved and Underground Extension Areas in Seam 4

5.1.1 Additional surface infrastructure

For the proposed expansion, DECM will require a new Sewage Treatment Plant, a new Water Treatment Plant, and a water storage tank.

5.1.1.1 Sewage Treatment Plant

DECM has an approved Sewage Treatment Plant on site, however, with the extension of underground operations additional sewage capacity is required. The plant will be located in a "dirty water area" in the main workshop and office area, and will service up to 220 people per day. The treatment plant will require 45m^3 of water per day to process 16.2kg of organic load. The plant is 3m high, with a 2.3m diameter, with a 10m^3 volume. The STP will discharge into the existing PCD.

5.1.1.2 Water Treatment Plant

The proposed Water Treatment Plant is located north of the main workshop and office area, also within a previously disturbed area. The plant will treat domestic wastewater only, therefore, no gypsum or brine by-products will result from the treatment process. The effluent emanating from the plant will be collected by the existing pollution control dams (PCDs).

5.1.1.3 Water Storage Tank

Water from the PCDs will be stored in a raw water tank with a capacity of 300m^3. This dirty water will be fed into the sewage treatment plant.

5.2 Listed and specified activities

This section details the proposed project activities to be undertaken on site, as well as the Listed Activities in terms of the NEMA EIA Regulations (2014, as amended). Table 5-1 details the project activities per phase (Construction, Operational and Decommissioning Phases), and Table 5-2 provides the identified Listed Activities as provided by the NEMA EIA Regulations, 2014 (as amended).

Table 5-1: Activities per Project phase

Project Phase	Project Activity
Construction Phase	• In-pit ROM stockpiling
Operational Phase	• Blasting (only when dykes and other geological features are encountered); • In-pit ROM Stockpiling; • Transportation of coal from pit for further processing; • Underground Mining Machinery Maintenance; • Operation of water and sewer reticulation; and • Use of existing haul roads.

Project Phase	Project Activity
Decommissioning Phase	• Demolition and removal of infrastructure – once mining activities have been concluded infrastructure will be demolished in preparation of the final land rehabilitation; • Rehabilitation – rehabilitation mainly consists of spreading of the preserved subsoil and topsoil, profiling of the land and re-vegetation; and • Post-closure monitoring and rehabilitation.

Table 5-2: Listed Activities applicable to the Project

Name of Activity	Areal extent of the activity	Listed Activity	Applicable Listing Notice	Waste Management Authorisation
Listing Notice 1				
Construction of access and haulage roads *The development of a road-* *(i) 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; or* *(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;* *but excluding a road-* *(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;* *(b) where the entire road falls within an urban area; or* *(c) which is 1 kilometre or shorter.*	The construction of access and haul roads will be confirmed during the Scoping Phase.	X-24 *(ii)*	GN R983, under NEMA	-
Operating sewage and water reticulation *The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes-* *(i) with an internal diameter of 0,36 metres or more; or* *(ii) with a peak throughput of 120 litres per second or more;* *excluding where-* *(a) such infrastructure is for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or* *(b) where such development will occur within an urban area.*	This will be confirmed during the Scoping and EIA Process	X-10	GN R 983	GN R 921 under NEM: WA Category B 4 (10)
Power line construction *The development of facilities or infrastructure for the transmission and distribution of electricity-* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or* *(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more*	22kV line, 2.3 km long	X- 11	GN R983, under NEMA	-
Listing Notice 2				
Mining of coal by underground mining *Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including-* *(a) associated infrastructure, structures and earthworks directly related to the extraction of a mineral resource; or* *(b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing.*	**Seam 2**: 92.1 ha (excluding approved area) **Seam 4**: 185.2 ha (excluding approved area)	X- 17	GN R 984 under NEMA	-

Name of Activity	Areal extent of the activity	Listed Activity	Applicable Listing Notice	Waste Management Authorisation
Water Use Licence *The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent*	Inclusive of all water and sewage management infrastructure on site. To be confirmed during the EIA Phase.	X- 6	GN R 984 under NEMA	GN R 921 under NEM: WA Category B 4 (11)

6 Policy and legislative context

The section provides a description of the policy and legislative context within which the project is proposed.

Table 6-1: Policy and Legislature Applicable to the Project

Applicable legislation and guidelines used to compile the report	Reference where applied
The Constitution of the Republic of South Africa, 1996 Under Section 24 of the Constitution of the Republic of South Africa, 1996 (the Constitution) it is clearly stated that: *Everyone has the right to* *(a) an environment that is not harmful to their health or well-being; and* *(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -* *(i) Prevent pollution and ecological degradation;* *(ii) Promote conservation; and* *(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*	ECC is undertaking an EIA process to identify and determine the potential impacts associated with the Project. Mitigation measures recommended will aim to ensure that the potential impacts are managed to acceptable levels to support the rights as stipulated in the Constitution.
National Environmental Management Act, 1998 (Act No 107 of 1998) and EIA Regulations (as amended in 2017) The Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA), as amended was set in place in accordance with Section 24 of the Constitution. Certain environmental principles under NEMA must be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that: *The potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.* The EIA Regulation, 2014 was published under GN R 982 on 4 December 2014 (EIA Regulations) and came into operation on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R 983 (Listing Notice No. 1), GN 984 (Listing Notice No. 2) and GN R 985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended. The EIA Regulations have been made applicable to prospecting and mining activities.	Activities associated with the proposed mine are identified as Listed Activities in the Listing Notices (as amended) and therefore require environmental authorisation prior to being undertaken. This Scoping Report and proceeding EIA Report will be informed by the requirements of the NEMA and Regulations thereunder.
Mineral and Petroleum Resource Development Act. 2002 (Act No. 28 of 2002) The MPRDA sets out the requirements relating to the development of the nation's mineral and petroleum resources. It also aims to ensure the promotion of economic and social development through exploration and mining related activities. The MPRDA requires that mining companies assess the socio-economic impacts of their activities from start to closure and beyond. Companies must develop and implement a comprehensive Social and Labour Plan (SLP) to promote socio-economic development in their host communities and to prevent or lessen negative social impacts.	The Applicant is the holder of an existing Mining Right. The EIA process will be undertaken to meet the requirements of the MPRDA read with the EIA Regulations, 2014 (as amended). Financial Provisioning and Closure Costs will be included in the EIA.
National Water Act, 1998 (Act No. 36 of 1998) (NWA) The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA. GN R 704 was published in June 1999 and aims to regulate the use of water for mining and related activities for the protection of water resources and states the following: ● Regulation 4: No residue deposit, reservoir or dam may be located within the 1:100-year flood line, or less than a horizontal distance of 100 m from the nearest watercourse. Furthermore, person(s) may not dispose of any substance that may cause water pollution; ● Regulation 5: No person(s) may use substances for the construction of a dam or impoundment if that substance will cause water pollution; ● Regulation 6 is concerned with the capacity requirements of clean and dirty water systems, and ● Regulation 7 details the requirements necessary for the protection of water resources.	An IWULA and an associated IWWMP are required in terms of Section 21 of the NWA for the Project. The IWULA and IWWMP will be compiled and submitted to the Department of Water and Sanitation (DWS) as the decision-making authority.

Applicable legislation and guidelines used to compile the report	Reference where applied
DWS[1] Best Practice Guideline – G1: Storm Water Management Plan (SWMP) These are guidelines provided by the DWS for the development of a SWMP. The following will be undertaken to develop the conceptual SWMP: • Delineate the clean and dirty area contributing to runoff (based on the final layout plans) and site-specific hydrological assessments to determine volumes that require to be handled. The SWMP should ensure that temporary drainage installations should be designed, constructed, and maintained for recurrence periods of at least a 25-year, 24-hour event, while permanent drainage installations should be designed for a 50-year, 24-hour recurrence period; and • Site specific assessments to establish the appropriate mitigation measures and surface water monitoring programme.	All water management infrastructure will be designed for a 1:100-year, 24-hour rainfall event.
DWS Best Practice Guideline – G4: Impact Prediction The impacts of mine activities on the groundwater environment must be assessed as part of the MRA, as well as for the IWULA. The baseline conditions must be assessed to define the current aquifer systems, groundwater use and groundwater conditions before mine commencement and to determine the extent of possible future impacts on the groundwater resources.	An IWULA and an associated IWWMP are required in terms of Section 21 of the NWA. The IWULA and IWWMP will be compiled and submitted to the DWS as the decision-making authority. The EIA, as part of the EA application, MRA will assess potential impacts on groundwater resources as a result of the Project.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) The NEM:BA regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and considers the management of alien and invasive species. The following regulations which have been promulgated in terms of the NEM:BA are also of relevance: • Alien and Invasive Species Lists, 2014 published (GN R.599 in GG 37886 of 1 August 2014); • National Environmental Management: Biodiversity Act, 2004: Threatened and Protected Species Regulations; and • National list of Ecosystems Threatened and in need of Protection under Section 52(1) (a) of the Biodiversity Act (GG 34809, GN R.1002, 9 December 2011).	A Fauna and Flora Impact Assessment will be conducted as part of the EIA Phase which will include the characterisation of the natural habitat and provide mitigation measures that must be applied to sensitive habitats (if any are identified). Infrastructure associated with the project has been placed on already disturbed land as far as possible to reduce disturbance of natural vegetation. The expansion activities shall take place largely underground and surface environment disturbance will be minimised.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) The prevailing legislation in the Republic of South Africa with regards to the Air Quality field is the National Environment Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA). According to the Act, the DEA, the provincial environmental departments and local authorities (district and local municipalities) are separately and jointly responsible for the implementation and enforcement of various aspects of NEM: AQA. A fundamental aspect of the new approach to the air quality regulation, as reflected in the NEM: AQA is the establishment of National Ambient Air Quality Standards (NAAQS). These standards provide the goals for air quality management plans and provide the benchmark by which the effectiveness of these management plans is measured. The NEM: AQA provides for the identification of priority pollutants and the setting of ambient standards with respect to these pollutants.	An Air Quality Impact Assessment will be undertaken as part of the EIA Phase. The Project's activities will set out to abide by the NEM: AQA and standards set out in the NAAQS. The required mitigation will be included in the EMP as part of the EIA Phase.
National Dust Control Regulation 2013 The Minister of Water and Environmental Affairs, released on the 01 November 2013 the National Dust Control Regulation, in terms of Section 53, read with Section 32 of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA). In the published National Dust Control Regulations, terms like target, action and alert thresholds were omitted. Another notable observation was the reduction of the permissible frequency of exceedance from three to two incidences within a year. The standard adopted a more stringent approach than previously and would require dedicated mitigation plans now that it is in force.	An Air Quality Impact Assessment will be undertaken as part of the EIA Phase. The Project's activities will set out to abide by the NEM: AQA and standards set out in the National Ambient Air Quality Standards (NAAQS). The required mitigation will be included in the EMP as part of the EIA Phase.

[1] Previously the Department of Water Affairs (DWA)

Applicable legislation and guidelines used to compile the report	Reference where applied
National Noise Control Regulations, R.154 of 1992 (the Noise Regulations) promulgated in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989) The National Noise-Control Regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) (NCRs) form part of the Environmental Conservation Act and these Regulations apply to external noise. The NCRs differentiates between Disturbing Noise levels (which is objective and scientifically measurable which are generally compared to existing ambient noise level) and Noise Nuisance (which is a subjective measure and is defined as noise that "*disturbs or impairs or may disturb or impair the convenience or peace of any person*"). Local Authorities use Controlled Areas to identify areas with high noise levels. Restrictions have been set out for development that occurs in these Controlled Areas. These regulations make provision for guidelines pertaining to noise control and measurements. The regulations refer to the use of the South African National Standards 10103:2008 (SANS) guidelines for the Measurement and Rating of Environmental Noise with Respect to Land Use, Health, and Annoyance and to Speech Communication. As such, a Noise Impact Assessment in accordance with the NCRs must be undertaken for submission to determine the potential disturbing and nuisance noise levels associated with a development.	A Noise Impact Assessment, including modelling, impacts and proposed mitigation measures will be undertaken for the EIA Phase.
The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) is the overarching legislation that protects and regulates the management of heritage resources in South Africa. The Act requires that Heritage Resources Agency's in this case the South African Heritage Resources Agency (SAHRA) and Provincial Heritage Resources Authority of Gauteng (PHRA-G), be notified as early as possible of any developments that may exceed certain minimum thresholds. This act is enforced through the National Heritage Regulations GN R 548 (2000).	A Heritage Impact Assessment will form part of this process.
GN R 1147 (Financial Provisioning Regulations), 2015 The Financial Provisioning Regulations prescribe methods for determining the quantum of financial provision for rehabilitation and mechanisms for providing for it. Section 41 (1) of the MPRDA has been repealed and Section 24P of the NEMA, as amended, which provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. The financial provision must guarantee the availability of sufficient funds.	The Financial Provisioning Regulations are applicable to rehabilitation and closure plans as they prescribe the minimum content of an annual rehabilitation plan and the minimum content of a final rehabilitation, decommissioning and mine closure plan. This will be finalised and included in the EIR.
GN R 527 (MPRDA Regulations), 2004 Regulation 527 (GN R. 527) specifies that the EMP must include environmental objectives and specific goals for mine closure. The applicant for a mining right must make prescribed financial provision for the rehabilitation or management of negative environmental impacts, which must be reviewed annually. R527 provides specific principles for mine closure including safety and health, residual and latent environmental impacts etc.	A preliminary EMP is provided in Section 12.9 of this report.

7 Need and Desirability of the Proposed Activities

The need and desirability of a proposed development forms a key component of an application for environmental authorisation. The Guideline on Need and Desirability (2017) published by the Department of Environmental Affairs sets out a list of questions aimed at interrogating ecological sustainability and justifiable economic and social development in the context of proposed developments. For the purposes of a Scoping Report, the assessment of such shall be summarised and investigated in further detail through the EIA Phase.

The DECM is currently operating as an opencast mine. ECC holds an existing Mining Right for coal in the area. ECC is facing challenges regarding the continuation of open cast mining which is projected to produce substantially less ROM coal than what was predicted in ECC's current approved business plan.

The extension of the mining activities underground is proposed to increase the ROM Coal and thus lead to greater revenue for the DECM. The Project will be able to contribute to the local economy through job creation and procurement. Increased employment will lead to increased expenditure. The Emalahleni Local Municipality (ELM) in which the Project Area lies is characterised by unemployment rates of 26.6% according to the municipality's latest Integrated Development Plan (IDP). The Project could assist in alleviating this unemployment rate.

The Social and Labour Plan (SLP) ensures that the Mining Right holder contributes to the socioeconomic areas in which they are operating. The SLP further stipulates that ECC commits to providing opportunities and resources for employees to fully develop in the mine's job disciplines. Through external training programmes, learnerships and skills programmes, ECC will develop its employees and the surrounding community.

The mining sector is the strongest contributor to ELM's economy, accounting for almost 55%. The area is rich in coal reserves and supplies the power stations in the area. This contributes to the energy supply of South Africa and employment. By expanding the mining operations at DECM, these benefits can be realised further into the future of the area through the extended ROM.

8 Period for which Environmental Authorisation is required

The proposed Project will continue underground mining in the new extension areas in the year 2022 for a period of 14 years.

9 Description of the process followed to reach the proposed preferred site

This section explains the selection of the preferred site.

9.1 Details of alternatives considered

The areas of mining which have been proposed are within the existing mining rights and disturbed areas.

9.1.1 Mining method

ECC considered open cast mining the extension areas versus underground mining. Digby Wells and ECC consulted with the Department of Human Settlement and Water and Sanitation (DHSWS) and the Department of Mineral Resources and Energy (DMRE) at the pre-application phase of the project. These consultations allowed ECC to present the different mining options as well as the potential environmental impacts thereof. Due to the sensitivity of the wetlands on the surface, ECC has opted for underground mining. The impact to watercourse features as a result of underground mining will be investigated during the EIA Phase, but based on information available at this time, it is assumed the impact of underground mining will be less significant to the wetlands than open cast mining.

9.1.2 No-Go alternative

Should the proposed Project not proceed ("no-go"), the status quo shall remain. Current surface mining operations are limited in their LOM and thus the financial implications of not extending this LOM shall be negative. Opportunities for further employment and skills development in the area will also not be realised.

The no-go alternative also means that all potential negative impacts associated with the proposed mine and its associated infrastructure would not occur. Hence, the EIA process will determine if the project would result in any environmental or social fatal flaws that may result in the project the no-go alternative being the preferred alternative.

9.2 Details of the public participation process followed

During the Scoping Phase, the following core stakeholder engagement activities were undertaken:

- Stakeholders (including Government Departments, landowners, land occupiers, communities, Non-Governmental Organisations, agricultural organisations, Parastatals and businesses) have and will continue to be identified and captured in a stakeholder database;
- A Background Information Document (BID) and letter was distributed to the identified Interested and Affected Parties (I&APs) together with the placement of an advertisement in the Witbank News newspaper and site notices around the Project Area;
- The environmental Scoping Report and associated documentation was made available for public comment for a period of 30 days on a free-of-charge website due to South African COVID-19 Lockdown Regulations;

- Consultation with I&APs was undertaken; and
- Suggestions and concerns were obtained from I&APs, documented and responded to.

A detailed description of these activities is provided in Appendix D of this report.

9.3 Summary of issues raised by I&APs

The Comments and Response Report (CRR) was compiled capturing all stakeholder comments during the Scoping Phase public comment period. The CRR is contained in Table 9-1 overleaf.

Table 9-1: Comments Received During the Draft Scoping Phase

Project Phase	Date of Receipt	Format	Contributor	Organization/ Community	Main Issue Category	Issue Description	Response
Scoping Phase	09-Dec-20	Face to Face	Edmund Muller	Land Owner	Impact of mining activities	How will the fountains in the area be affected by the mining activities?	From the Dorstfontein East Hydrogeological Investigation report compiled by GCS in 2019, it should be noted that two springs were identified on Mr Muller's farm on Farm Fentonia 54 IS and another spring located on Farm Rietkuil 57 IS. These features have been taken into consideration. The impacts to the surface and groundwater features will be assessed further in the Impact Assessment Phase.
						Mining activities will lead to an influx of people which will result in stock theft and veld fires	The extension of the mine will not result in any additional recruitment of new workforce. Exxaro intends to secure employment for the current employee workforce. The mine will ensure that veld fires are contained and that they do not result in any damage or losses. In addition, the mine inspects the fire breaks every

Project Phase	Date of Receipt	Format	Contributor	Organization/ Community	Main Issue Category	Issue Description	Response
							month and removes grass within the firebreak zone.
Scoping Phase	09-Dec-20	Face to Face	Joseph Mtshweni	Ward Councillor (Ward 15)	Access to Information	Requested Background Information Documentation (BID). Indicated that comments will be made and submitted in due time.	Documents handed over to the Councillor.
					Communication	The mine needs to communicate with the community with regards to mining activities in our community and avoid rushing to court to have issues resolved.	The mine will communicate effectively with the affected community to avoid or limit conflicts with the affected community.
					Employment and Business Opportunities	The biggest challenge is the existing community Forums as they will want employment	DCME will have opportunities during the Construction Phase for infrastructure development projects. However, the proposed mine expansion

Project Phase	Date of Receipt	Format	Contributor	Organization/ Community	Main Issue Category	Issue Description	Response
						opportunities and will also want to do business with the mine.	will only create longer term employment for the mine's current workforce.
					Heritage resources	Respect the graves.	Mitigation measures will be put in place to limit impacts on graves. Access will be granted for families who wish to visit the graves. The specialist studies to be undertaken as part of the EIA process will provide further mitigation and management measures. Thus, a conclusive response will be provided once the studies have been concluded.
					Socio-economic	The biggest issue is the extent of the mine that might affect the community.	*A plan was shown in the presentation of the directly and indirectly affected farm portions.* All mining which forms part of this application will be underground mining. The impacts associated with mining the underground area will be assessed by the team of specialists and the impacts will be presented in detail during the Impact Assessment Phase.
					Groundwater	Protect the boreholes.	A network of monitoring boreholes will be provided by Digby Wells'

Project Phase	Date of Receipt	Format	Contributor	Organization/ Community	Main Issue Category	Issue Description	Response
							Hydrogeology team and these boreholes will form part of Exxaro's monitoring programme. Exxaro must monitor these boreholes to see whether the water level is dropping or if the water is being contaminated. If any impact occurs and is caused by mining, Exxaro will be liable to either rectify the issue (in the case of water quality impacts) or compensate the borehole user in instances where water loss is experienced.
Scoping Phase	11-Dec-20	Teams Meeting	Maggy Magagula	Ward Councillor (Ward 25)	Access to Information	The community is not using the library, so where will the scoping report be placed? Is it possible that a different location can be used for the document? The Community Forum comes to the office requesting information which I am not is	Thank you for noting this. In future, copies of the public comment documents will be placed at the Councillor's offices. Communication between Exxaro and the community is through the Forum. Exxaro communicates with them since the Council does not attend Forum meetings, of which information ends only with the Forum. It is suggested that the Council establishes communication with the ward constituents so that information can be shared easily.

Project Phase	Date of Receipt	Format	Contributor	Organization/ Community	Main Issue Category	Issue Description	Response
						possession of and I do not want to be part of the Forums.	
					Business Opportunities Skills Development and Training	Are there any business opportunities that will be offered to the community? The people that you are training are you going to hire them?	The current application will allow limited opportunities for employment during the construction phase. However, Exxaro does already offer training programmes as part of the approved Social and Labour Plan.
					Location of Project	The project is in the area of Dorstfontein. How many hectares will be utilised, and is it private land?	The application area is 3288,53 ha (surface area). Exxaro owns most of the farms however Farm Fentonia 54 IS Portions 1,2 and 3 are privately owned.
					Impact of mining activities	Are you going to blast?	Yes. But all activities will be underground. The severity of blasting underground is less than blasting for open cast mining.
					Applications	On the presentation, you mention that you applied for a	Yes. Exxaro will apply for a Water Use Licence through Digby Wells Environmental. Currently, the process is in the Scoping Phase. The Water Use

Project Phase	Date of Receipt	Format	Contributor	Organization/ Community	Main Issue Category	Issue Description	Response
						water license. Is it approved?	Licence process will align with the EIA Phase. These processes rely on the Specialist Reports being completed to inform the EIA Report and the IWWMP Report. Digby Wells intends to release these reports out to the public simultaneously for review. Also note that the Scoping Report must be approved by the Department of Mineral Resources and Energy before the process can proceed to the EIA Phase.
				Department of Agriculture	Land and Soil Management	The Department of Agriculture, Land Reform and Rural Development has no comments at this stage. Comments will be provided upon receiving the EIA Report.	Noted

10 The environmental attributes associated with the sites

The section provides a summary of the baseline environment affected by the proposed activity, type of current land uses, environmental features, and current land use, based on desktop assessments undertaken by the relevant specialists.

10.1 Climate

The ELM is characterised by a temperate climate with hot summers and cold, dry winters. During the summer months (December, January and February), the average daily temperature is 27°C. In winter (June, July and August), the daily average temperature is 4°C.

Most (65%) of the rainfall in the area occurs during the summer, largely as thunderstorms. The rainfall averages between 700 and 750 mm per annum.

The predominant wind direction is northerly or easterly in summer, easterly during autumn and southerly in winter.

Pollution and climate change can mostly be attributed to the anthropogenic activities in the area including coal-fired power stations, industries, mining activities, domestic fuel burning and motor vehicles.

10.1.1 Topography

The topography of the ELM is that of undulating plains and gentle slopes. It is located on the Highveld plateau and the Project Area lies between 1515m and 1660m above sea level. Drainage occurs predominantly in a northern direction of the Project Area.

Valley slopes are generally flat with gradients between 1:20 and 1:40. Slopes steeper than this gradient are found near rivers in the Project Area.

10.2 Geology

The DECM is situated in the Witbank coalfield within the Karoo Supergroup. The Karoo Supergroup within the Project Area comprises the Ecca Group as well as the Vryheid Formation. The Ecca Group is where rich coal deposits are found.

The geology can be stratigraphically classified as indicated in Table 10-1 and visually represented in Figure 10-1.

Table 10-1: Stratigraphy of the regional geology

	Subgroup	Lithology	Formation
Karoo Supergroup	Upper Ecca	Sandstones	Volksrust
	Middle Ecca	Sandstones	Vryheid
		Shales	
		Coal	
	Lower Ecca	Shale	Pietermaritzburg

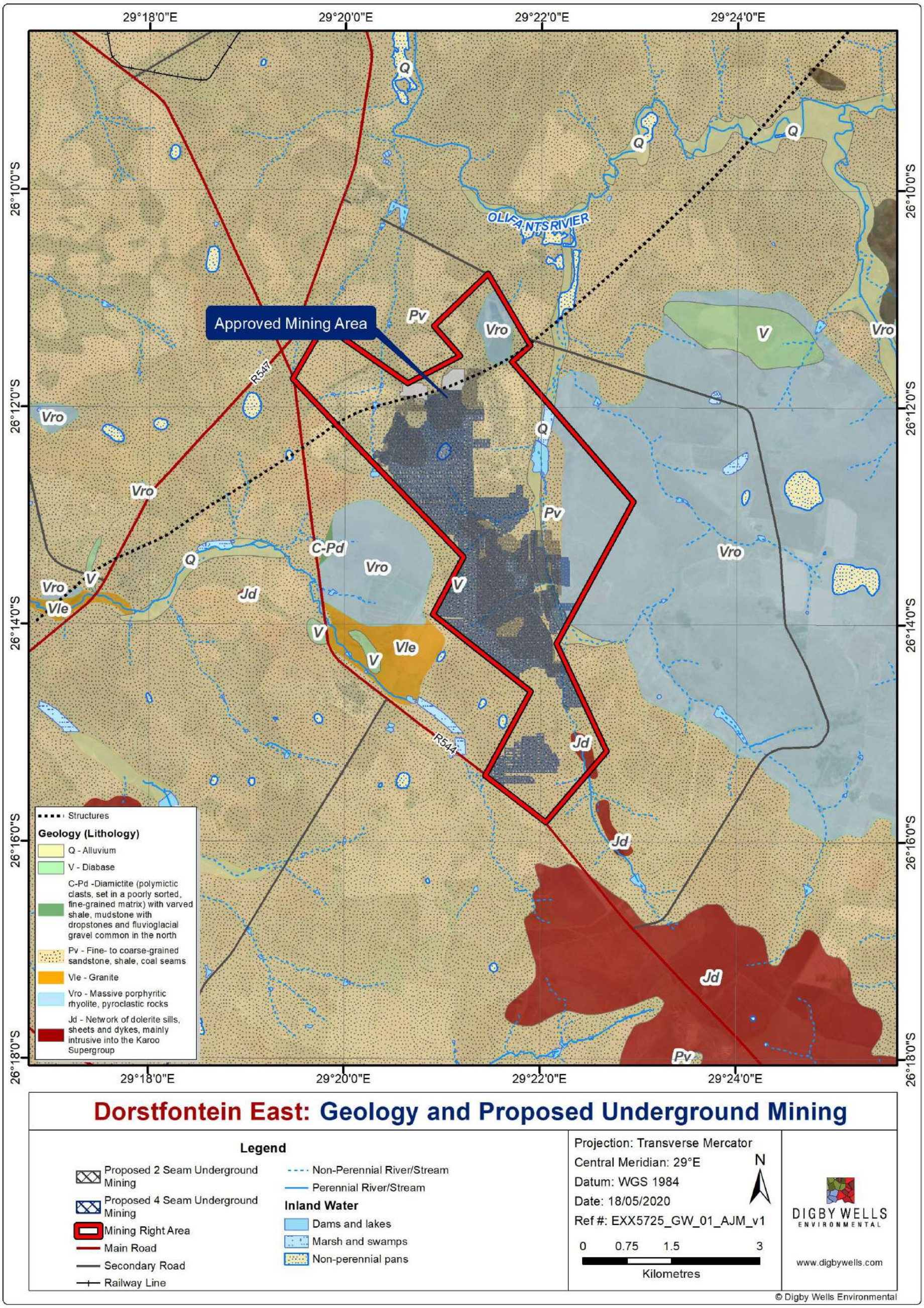

Figure 10-1: Geological Setting of the Project Area

10.3 Groundwater

This section provides the hydrogeological setting of the Project Area including aquifer classification, results of the hydrocensus survey, and groundwater quantity and quality.

10.3.1 Hydrogeology

The aquifers of South Africa are defined according to their water supply potential, water quality and local importance for strategic purposes within an aquifer classification scheme and map. The aquifer classification map (Parsons, 1993) identifies the Karoo aquifers in the Project Area as minor systems with relatively good water quality (total dissolved solids less than 300 milligrams per litre), moderate vulnerability and medium susceptibility to contamination, where:

- Vulnerability is defined as the likelihood for contamination to reach a specific position in the aquifer; and
- Susceptibility is defined as the ease at which (or lack thereof) contamination can reach a groundwater aquifer.

The groundwater system in the Mpumalanga coalfields is composed of three distinct superimposed aquifers. Hodgson et al. (1998) has classified the aquifer systems in the following manner:

- The upper weathered Ecca aquifer which can be described as shallow and occurs within weathered shales and sandstones of the Karoo rocks;
- The fractured aquifers in the Ecca comprising of shale, sandstone and coal seams in which groundwater movement is mainly limited to the fractures; and
- The fractured pre-Karoo aquifer with low permeability basement granites.

10.3.2 Hydrocensus survey

A hydrocensus survey was previously conducted by GCS from the 25th to 27th August 2016. The survey was conducted within a 2 km survey radius of the DECM. A total of 18 boreholes were visited. Borehole sampling points are shown in Table 10-2.

Conclusions of the hydrocensus survey are summarised below:

- Eleven of the boreholes are used for domestic and livestock watering purposes at nearby farm portions. ECC owns three monitoring boreholes;
- The main source of water supply in and around the proposed mining area is groundwater; and
- Groundwater elevation levels are influenced by the ongoing mine dewatering activities. Borehole DFTNM03 shows a gradual increasing trend (increasing water level depth) while Borehole DFTNM16 and DFTNM12 show significant increasing trends since September 2018. Groundwater levels within the Project Area generally follow topographical gradients.

Table 10-2: Hydrocensus boreholes visited in 2016 (source: GCS, 2016)

ID	Coordinates			Owner Information		Bore/Spring Status & Equipment						Hydrogeological Information	
						Primary Water Application			Equipment:	Equipment Status:	Abstraction Rate [L/s]	Static Water Level	
	Easting [m]	Northing [m]	Elevation [m aMSL]	Owner	Farm Name	Primary Use	Other Uses					[m bRL]*	[m aMSL]**
							Domestic	Stock Watering					
NBH4	29.34047	26.2387	1621	N.Hirschowitz	Portion RE. Dorstfontein 71 IS	Domestic	Yes (Small Scale)	Not Applicable	Submersible pump	Good	0.5l/s	8.7	1612.3
NBH5	29.17827	26.17827	1571	BHP Billiton	North of DCME	Monitoring BH	Not Applicable	Not Applicable	N/A	N/A	0	8.6	1562.4
NBH5A	29.3566	26.17029	1543	BHP Billiton	North of DCME	Monitoring BH	Not Applicable	Not Applicable	N/A	N/A	0	11.74	1531.26
D10	29.40315	26.21818	1651	CJ Lourens	Jan Dieta	Domestic	Yes (Small Scale)	Not Applicable	Submersible pump	Not in use	0	8.48	1642.52
D10A	29.40088	26.21537	1649	CJ Lourens	Jan Dieta	Domestic	Yes (Small Scale)	Yes (Small Scale)	Submersible pump	Good	1l/s	7.8	1641.2
DFTNM3	29.36247	26.21579	1571	Exxaro	Fentonia	Monitoring BH	Not Applicable	Not Applicable	None	N/A	N/A	20.1	1550.9
DFTNM4	29.35756	26.21637	1588	Exxaro	Fentonia	Monitoring BH	Not Applicable	Not Applicable	None	N/A	N/A	14.82	1573.18
DFTNM12	29.32458	26.19538	1595	Exxaro	Welstand	Monitoring BH	Not Applicable	Not Applicable	None	N/A	N/A	7.22	1587.78
WSBH2	29.323872	26.183087	1599	Mr.Swart	Welstand	Domestic	Yes (Small Scale)	Yes (Small Scale)	Submersible pump	Good	1l/s	21.94	1577.06
WSBH1	29.323277	26.185065	1598	Mr.Swart	Welstand	Domestic	Yes (Small Scale)	Not Applicable	Submersible pump	Good	1l/s	15.18	1582.82
WSWP1	29.322077	26.1185085	1599	Mr.Swart	Welstand	Domestic	Yes (Small Scale)	Yes (Small Scale)	Windmill	Good	N/A	20.61	1578.39
NBH23	29.311926	26.188684	1612	IJG De Wet	Portion 2, Rietkuil	Domestic	Yes (Small Scale)	Yes (Small Scale)	Submersible pump	Good	1l/s	50.69	1561.31
NBH24	29.311639	26.191264	1614	IJG De Wet	Portion 2, Rietkuil	Domestic	Yes (Small Scale)	Yes (Small Scale)	Submersible pump	Good	1l/s	13.2	1600.8
BHU1	29.3231	26.18395	1604	BHP Billiton	Welstand	Monitoring BH	Not Applicable	Not Applicable	None	N/A	0	46.85	1557.15
D7	29.3906	26.24647	1633	E.Muller	Portion 2, Boschkrans	Domestic	yes (Small Scale)	Not Applicable	Submersible pump	Not working	0	10.68	1622.32

ID	Coordinates			Owner Information		Bore/Spring Status & Equipment						Hydrogeological Information	
	Easting [m]	Northing [m]	Elevation [m aMSL]	Owner	Farm Name	Primary Water Application			Equipment:	Equipment Status:	Abstraction Rate [L/s]	Static Water Level	
						Primary Use	Other Uses					[m bRL]*	[m aMSL]**
							Domestic	Stock Watering					
D12	29.35677	26.17828	1565	Unknown	Vlaklaagte	Domestic	yes (Small Scale)	Yes (Small Scale)	Windmill	Good	Unknown	3.12	1561.88
D4	29.38127	26.27678	1626	E.Muller	Portion 2, Boschkrans	Domestic	yes (Small Scale)	Not Applicable	Submersible pump	Good	1l/s	12.18	1613.82
D4A	29.38028	26.27031	1621	E.Muller	Portion 2, Boschkrans	None	Not Applicable	Not Applicable	N/A	Not in use	0	3.12	1617.88

*m bRL = meters below reference level (i.e. top of casing or surface level)

** m aMSL = meters above mean sea level

10.3.3 Groundwater Quality

Current groundwater quality data (as shown in Table 10-3) was taken from the DECM monitoring database as received from the client and compared to the standards set in the Water Use License (WUL).

The purpose of the interpretation is to determine the current groundwater quality and whether the boreholes are currently affected by any site activities. The following observations were made:

- The pH varies between 6.6 and 9.8 with an average of 7.8. All monitoring boreholes are within the recommend WUL of 6.5-8.4 except borehole DFTNM14, DFTNM15, DFTNM16;
- All boreholes are within the recommended WUL limits for all WUL parameters except for aluminium, manganese and sodium concentrations;
- Boreholes DFBH, DFTNM5 and SBH exceeded the recommended WUL limit of 0.18 mg/L for manganese. Elevated manganese concentrations are likely not mine-related and are understood to be naturally occurring as a result of water rock interaction with pre-Karoo minerals; and
- Borehole DFBH, DFTNM03, DFTNM04, DFTNM09, DFTNM10, DFTNM10x, DFTNM12, DFTNM14 and DFTNM16 exceeded the recommended WUL limit for sodium of 21.12 mg/L. The slightly elevated sodium concentration is likely not mine-related and is understood to be naturally occurring as a result of the dissolution of rock minerals.

Table 10-3: Groundwater quality monitoring from January 2020 - April 2020

Parameter (mg/L)			pH	EC mS/m	TDS	Alkalinity as CaCO3	K	Cl	SO_4	F	NO_3 as N	PO_4	Free & Saline Ammonia as N	Al	Ca	Cr	Fe	Mg	Mn	Na
WUL Water Resource Limits			**6.5-8.4**	**NS**	**650**	**NS**	**NS**	**25**	**400**	**NS**	**NS**	**NS**	**NS**	**0.18**	**NS**	**NS**	**NS**	**NS**	**0.18**	**21.12**
Borehole ID	DFBH	02/03/2020 11:54	7.3	81.5	606	92.0	9.6	13.0	342.0	0.30	0.10	<0.1	0.30	<0.1	58.00	<0.025	<0.025	49.00	0.69	39.00
	DFTNM03	11/03/2020 11:43	7.7	33.9	230	180.0	2.2	10.0	<2	1.20	0.40	<0.1	0.20	<0.1	19.00	<0.025	<0.025	13.00	<0.025	37.00
	DFTNM04	11/03/2020 11:31	7.9	48.1	350	180.0	3.7	11.0	55.0	0.30	0.40	0.10	0.30	<0.1	29.00	<0.025	0.03	12.00	0.05	61.00
	DFTNM05	11/03/2020 10:26	6.8	33.3	144	112.0	8.1	3.0	<2	0.40	0.40	0.80	17.00	<0.1	24.00	<0.025	0.31	5.00	0.52	6.00
	DFTNM09	04/03/2020 11:03	7.5	39	306	124.0	4.2	9.0	20.0	0.30	12.00	<0.1	<0.1	<0.1	30.00	<0.025	<0.025	17.00	<0.025	23.00
	DFTNM10	06/03/2020 10:51	7.4	56.5	446	140.0	4.8	10.0	135.0	1.30	0.40	<0.1	0.10	<0.1	48.00	<0.025	0.03	32.00	0.14	27.00
	DFTNM10x	06/03/2020 10:52	7.4	56.6	454	140.0	4.7	10.0	130.0	1.70	0.40	<0.1	<0.10	<0.1	46.00	<0.025	<0.025	32.00	0.05	26.00
	DFTNM12	04/03/2020 10:27	6.6	39.6	280	164.0	4.9	14.0	24.0	0.40	0.50	<0.1	<0.1	<0.1	16.00	<0.025	0.07	12.00	<0.025	50.00
	DFTNM14	09/03/2020 14:41	8.5	39.1	238	132.0	10.6	4.0	68.0	0.20	0.30	<0.1	<0.1	<0.1	22.00	<0.025	<0.025	15.00	0.07	33.00
	DFTNM15	09/03/2020 14:52	9.4	26.4	162	104.0	7.4	6.0	35.0	<0.2	0.30	<0.1	0.20	<0.1	8.00	<0.025	<0.025	16.00	<0.025	19.00
	DFTNM16	02/03/2020 12:06	9.8	17	78	56.0	3.0	19.0	<2	0.3	<0.1	<0.1	0.70	<0.1	3.00	<0.025	<0.025	2.00	<0.025	25.00
	ECBH	02/03/2020 14:39	7.5	9.8	50	12.0	3.2	10.0	13.0	<0.2	0.10	<0.1	0.10	<0.1	6.00	<0.025	<0.025	3.00	<0.025	6.00
	SBH	02/03/2020 11:18	6.7	16.2	94	68.0	3.7	8.0	<2	0.8	<0.1	<0.1	0.10	<0.1	11.00	<0.025	<0.025	3.00	0.33	17.00

KEY:

Exceeds the standard

No Standard NS

10.4 Hydrology (Surface water)

This section summarises the baseline regional hydrological setting.

10.4.1 Quaternary catchment and drainage

South African water resources are grouped into nine Water Management Areas (WMA) which are managed by their own water boards called Catchment Management Agencies (CMA). Within these WMAs, there are quaternary catchments which relate to drainage regions and these are further subdivided into four known divisions based on size.

As depicted by Figure 10-2, the Project Area is situated within the Olifants Water Management Area (WMA 2) and within quaternary catchments B11B and B11D as revised in the 2012 water management area boundary descriptions (RAS Government Gazette No. 35517, 2012). Drainage systems in proximity to the DECM project site include the Steenkoolspruit and the Olifants River and their tributaries. The hydrological setting of the project area is presented in Figure 10-3.

10.4.2 Sensitivity assessment

The B11B quaternary catchment is drained by the Olifants River and its tributaries while quaternary catchment B11D is drained by the Steenkoolspruit and its tributaries. The major rivers, non-perennial streams, dams, marshes, pans and wetlands constitute sensitive water features within and around the DECM Project Area (see Figure 10-4). The Olifants River flows in a north-westerly to east direction towards Mozambique and then into the Indian Ocean.

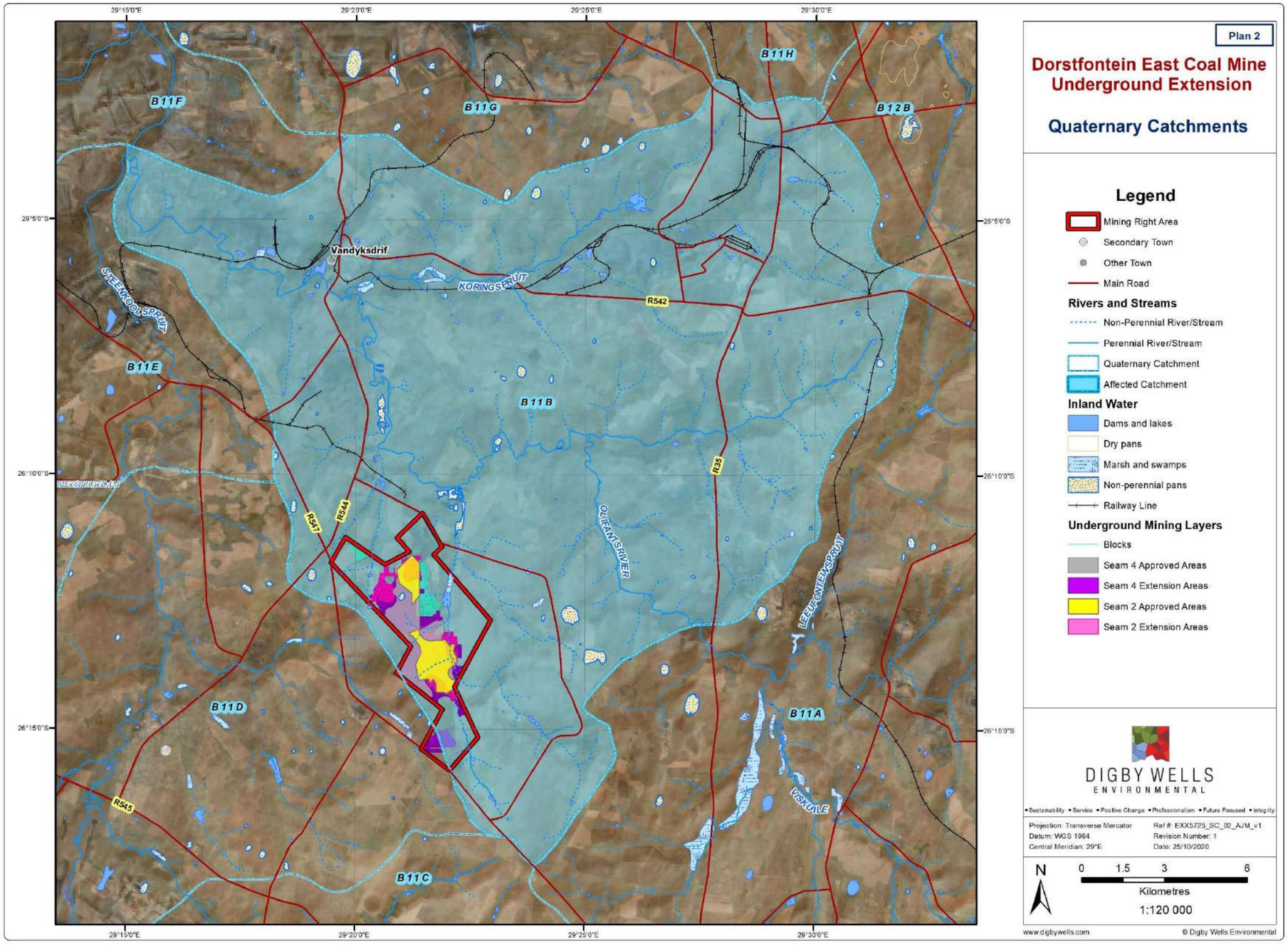

Figure 10-2: Quaternary Catchments

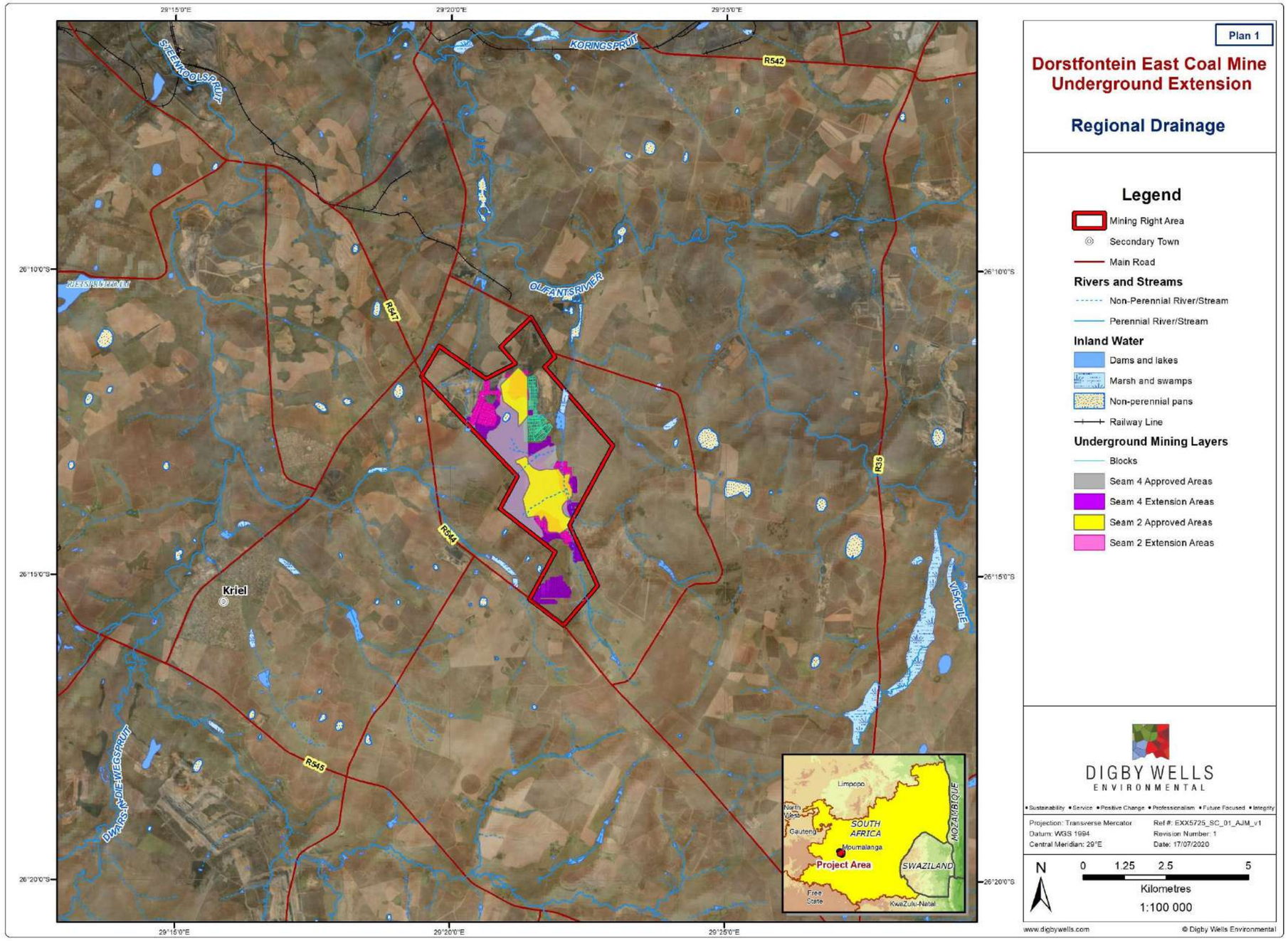

Figure 10-3: Hydrological Setting of the DECM Project Area

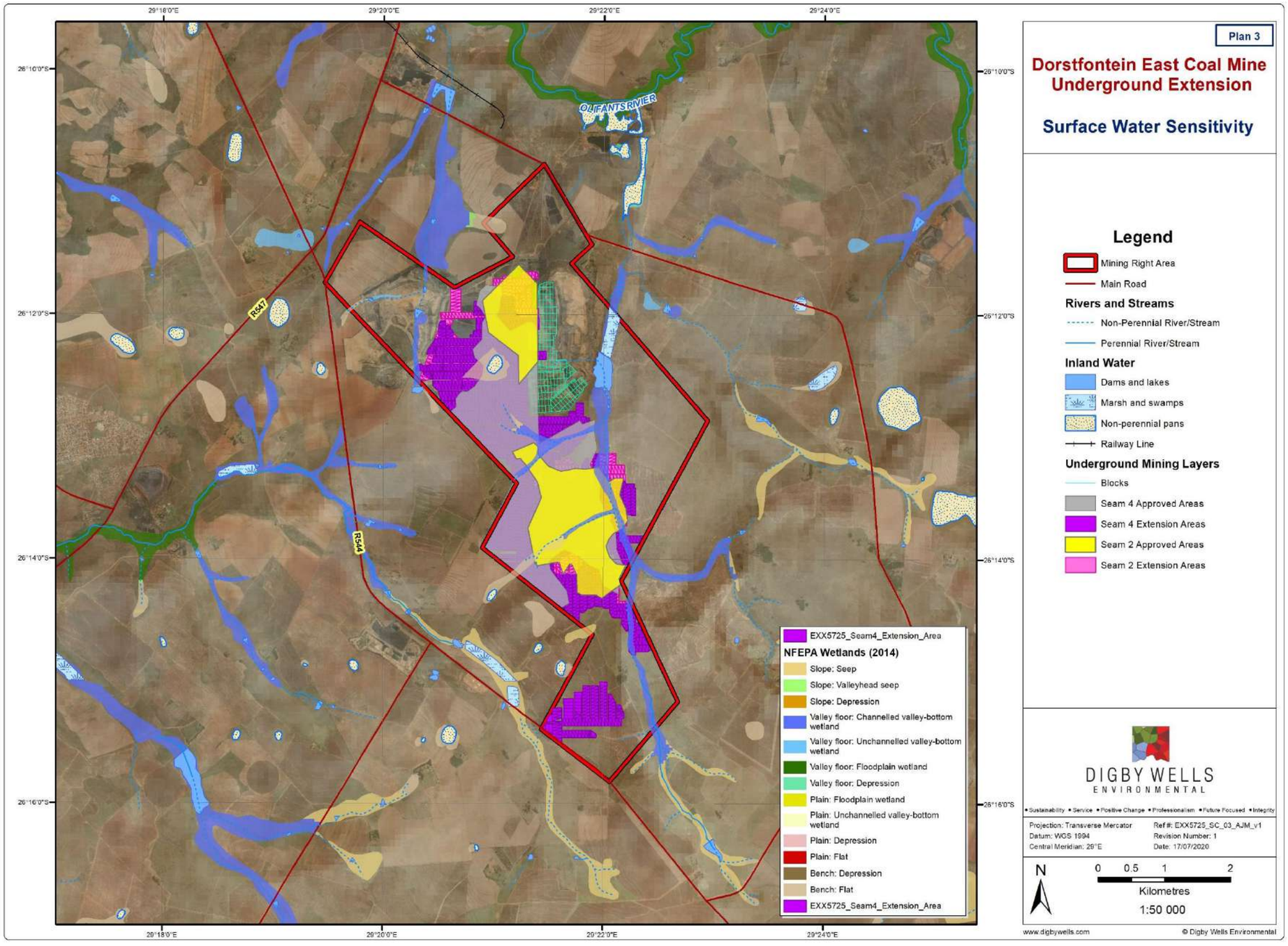

Figure 10-4: Surface water sensitivities in the DECM Project Area

10.5 Soil, land use and land capability

This section details the baseline soils, land use and land capability environment associated with the proposed Project. This section was completed using desktop and site survey information.

10.5.1 Land types and soil forms

The land type data gathered suggested that the dominant land type for the DECM is **Bb4** with small areas of **Bb5** and **Fa8** on the eastern corner of the Project Area. The land types found in the Project Area are described in Table 10-4 and Figure 10-5 below together with the most common associated soil forms. Avalon, Pinedene, Clovelly, Glencoe and Kroonstad soil forms dominate the Project Area. Avalon, Pinedene, Hutton and Clovelly soils are typically deep soils. Kroonstad and Glencoe soils are shallow and have a high clay content.

Table 10-4: Land Types and dominant Soil Forms

Land Type	Soil Forms	Geology	Characteristics
Bb4	Avalon Hutton Glencoe Mispah Longlands Sterkspruit Kroonstad	Shale, sandstone, clay and conglomerate of the Ecca Group, Karoo Sequence. Dolerite, occasional felsitic lava of the Rooiberg Group, Transvaal Sequence.	Dominated by moderately deep to deep well drained red soils on the upper slopes with soils getting shallower down slope, increasing in clay content and lower in permeability. The Hutton soil form usually indicates deep, fertile soils, good for agriculture, where Mispah soil forms are only slightly permeable due to the high clay content. Mispah and Glenrosa have low potential for agricultural due to shallow bedrock and low permeability with a high erosion hazard and a shallow rooting depth.
Bb5	Mispah Hutton Glencoe Rensburg Wasbank Avalon Swartland Longlands Kroonstad	Shale, sandstone, clay, conglomerate, marl and limestone of the Ecca Group. Dolerite, lava, sandstone, conglomerate, siltstone and rhyolite (Loskop Formation)	These soils are commonly found in the lower parts of the terrain, with shallower soils, low drainage and high clay content due to the plinthic B-horizons. These soils are commonly associated with wetlands.

Land Type	Soil Forms	Geology	Characteristics
Fa8	Mispah Hutton Clovelly Estcourt	Rhyolite of the Selonsriver Formation, Rooiberg Group. Bushveld Igneous Complex	These soils are described as sandy-loam to sandy-loam-clay soils. These soils are common in the upper parts of the catchment as well as in the lower foot-slope. Lower in the terrain/slope the clay content is mostly higher and therefore this soil type is associated with seepage and valley bottom wetlands.

10.5.2 Land use

The current land use of the Project Area is dominated by grassland. Other identified land uses include livestock farming, mining, infrastructure (buildings, roads, powerlines, fence lines), dams and large stands of *Eucalypts Sp*. and Alien Invasive Plant Species (AIPs). These land uses are visually depicted in Figure 10-6.

10.5.3 Land capability

The dominant land capability class in the Project Area is **Class II** (Arable Land, capable for intensive cultivation), with **Class IV** (Arable Land capable for moderate grazing) and **Class VI** (Grazing capable for moderate grazing) as described in Table 10-5 and shown in Figure 10-7.

Table 10-5: Land Capability Classification

Land Capability Class	Description	Dominant Limitation Influencing the Physical Suitability for Agricultural Use
II	Arable Land – Intensive Cultivation	Soils have moderate limitations that reduce the choice of plants or require moderate conservation practices
IV	Arable Land – Moderate Grazing	Soils have very severe limitations that restrict the choice of plants or require very careful management, or both
VI	Grazing – Moderate Grazing	Soils have severe limitations that make them generally unsuited to cultivation and that limit their use mainly to pasture, range, forestland, or wildlife food and cover

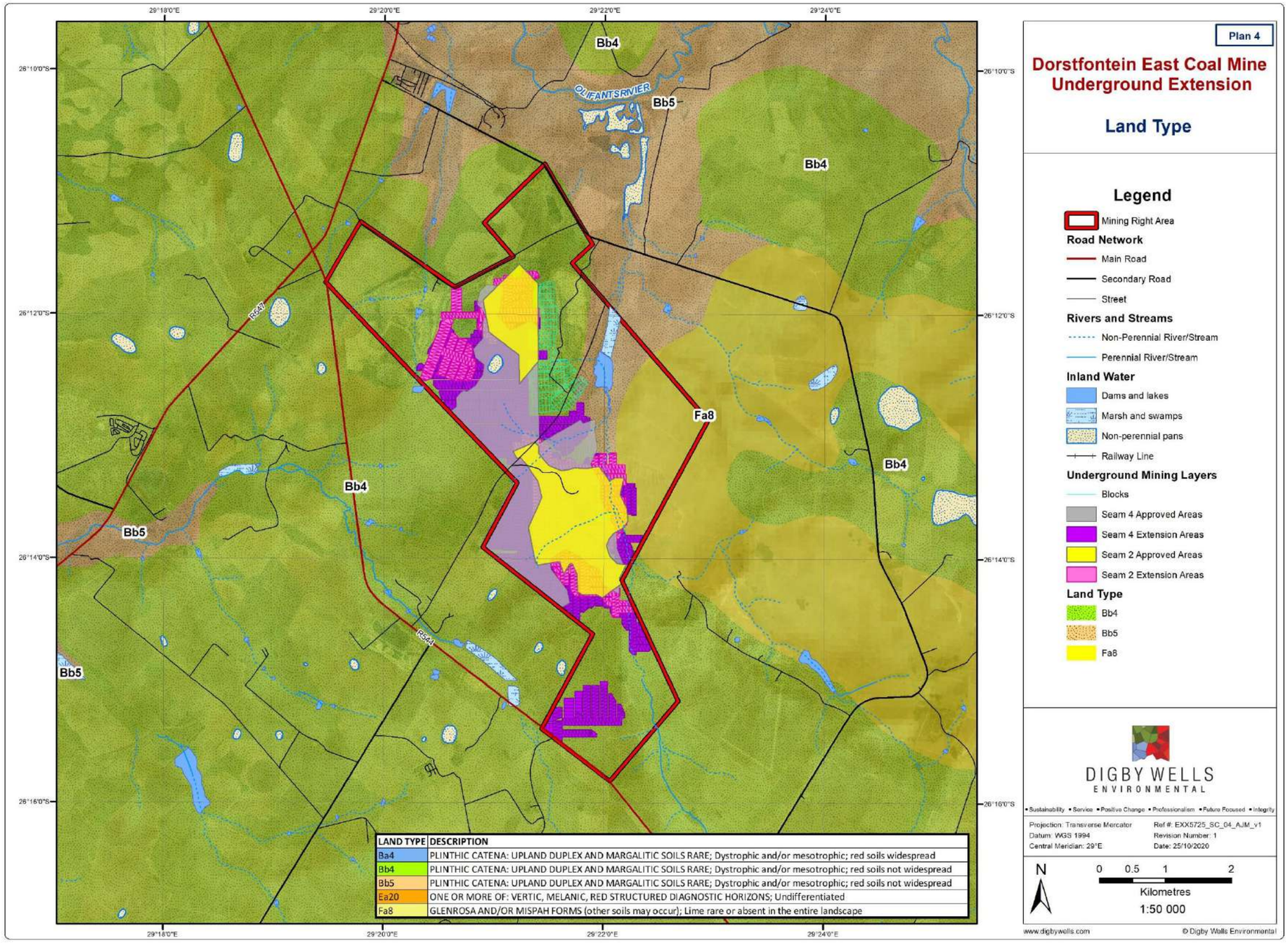

Figure 10-5: Land Type Units

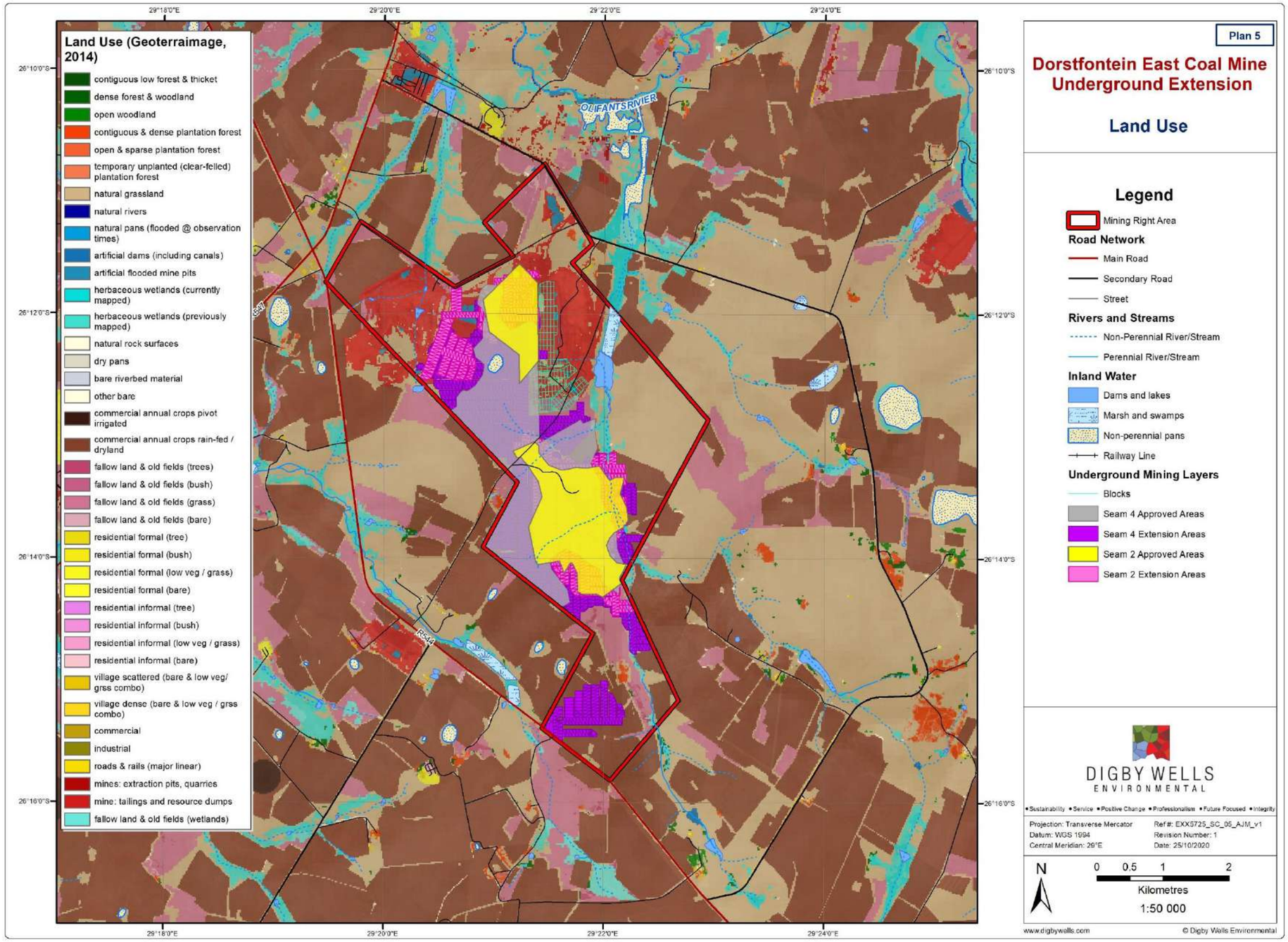

Figure 10-6: Land Use in the DCME Project Area

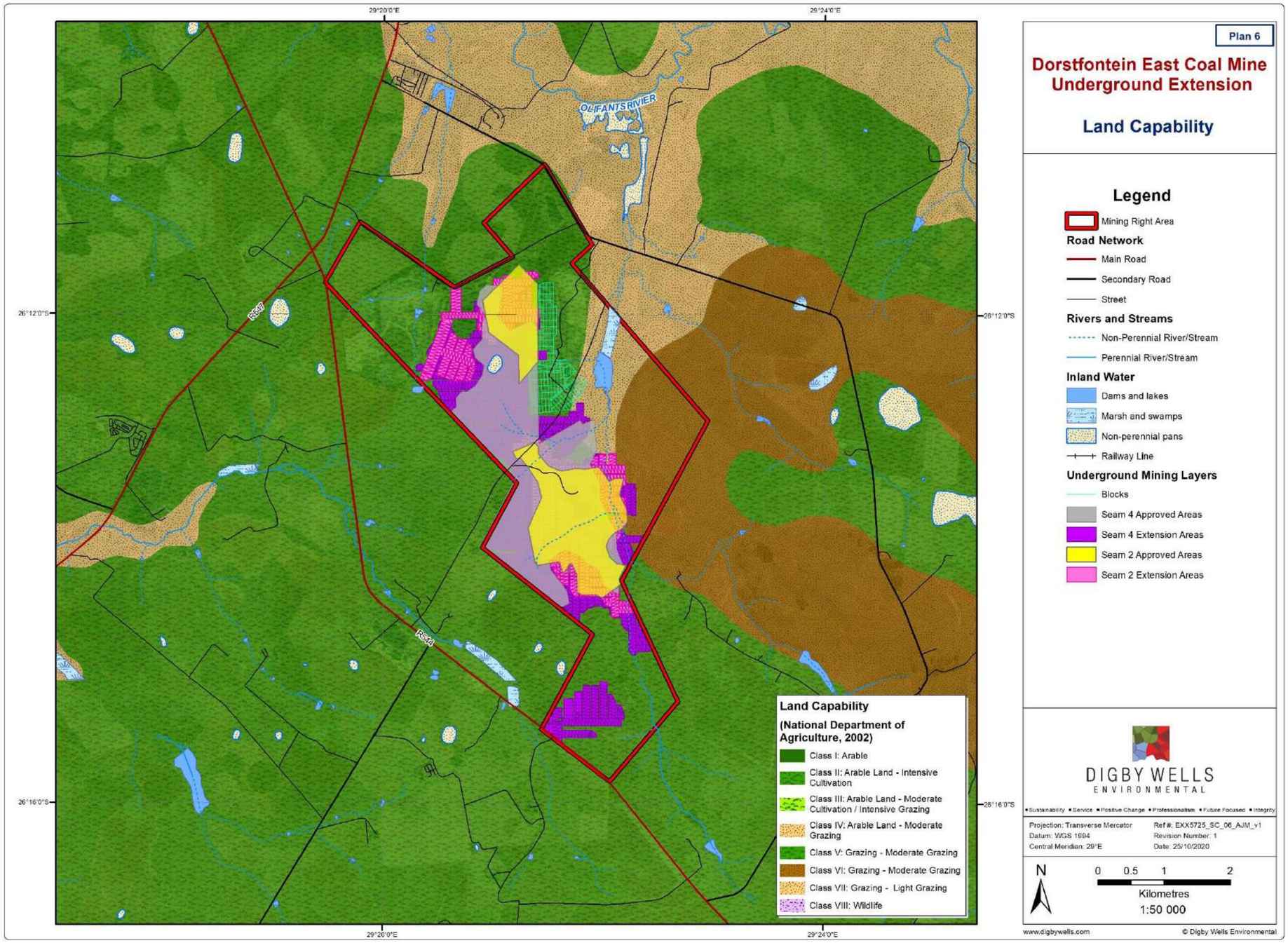

Figure 10-7: Land Capability in the DCME Project Area

10.6 Fauna and Flora

The Fauna and Flora baseline has been completed using desktop information and will be updated with site visit findings during the EIA phase.

10.6.1 Terrestrial ecology

The proposed Project Area falls within the Mesic Highveld Grassland Bioregion of the Grassland Biome of Southern Africa, which occupies approximately 16.5 % of the country and is primarily found on the high central plateau of Mpumalanga, Gauteng, North West, Free State and the inland areas of KwaZulu-Natal and the Eastern Cape provinces.

10.6.2 Fauna

The faunal assessment considers mammals, avifauna, invertebrates and herpetofauna.

10.6.2.1 Mammals

A total of 17 mammal species may occur in the Project Area based on search results on the Animal Demography Unit (formerly the Avian Demography Unit) database. Four of these species are listed as Species of Conservation Concern (SCC). A list of these 17 species is provided in Table 10-6.

Table 10-6: Potentially Occurring Mammal Species

Family	Scientific Name	Common name	Category
Felidae	Felis nigripes	Black-footed Cat	Vulnerable (2016)
Felidae	Leptailurus serval	Serval	Near Threatened (2016)
Muridae	Gerbilliscus brantsii	Highveld Gerbil	Least Concern (2016)
Muridae	Mastomys coucha	Southern African Multimammate mouse	Least Concern (2016)
Muridae	Mus (Nannomys) minutoides	Southern African Pygmy Mouse	Least Concern
Muridae	Otomys auratus	Southern African Vlei Rat	Near Threatened (2016)
Muridae	Rhabdomys pumilio	Xeric Four-striped Grass Rat	Least Concern (2016)
Mustelidae	Hydrictis maculicollis	Spotted-necked Otter	Least Concern (IUCN 2008)
Nesomyidae	Dendromus mystacalis	Chestnut African Climbing Mouse	Least Concern (2016)

Family	Scientific Name	Common name	Category
Soricidae	Crocidura mariquensis	Swamp Musk Shrew	Near Threatened (2016)
Soricidae	Myosorex varius	Forest Shrew	Least Concern (2016)
Herpestidae	Atilax paludinosus	Water mongoose	Least Concern (2016)
Canidae	Canis mesomelas	Black-backed jackal	Least Concern (2016)
Muridae	Aethomys chrysophilus	Red vlei rat	Least Concern (2016)
Herpestidae	Herpestes sanguineus	Slender Mongoose	Least Concern (2016)
Muridae	Mus minutoides	Pygmy mouse	Least Concern (2016)
Leporidae	Lepus saxatilis	Scrub hare	Least Concern (2019)

10.6.2.2 Herpetofauna

Based on the Animal Demography Unit database search results, the following herpetofauna species may occur in the Project Area (Table 10-7). None of these species is listed as Red Data species.

Table 10-7: Potentially Occurring Herpetofauna Species

Family	Scientific name	Common name	Category
Colubridae	Crotaphopeltis hotamboeia	Red-lipped Snake	Least Concern (SARCA 2014)
Elapidae	Naja mossambica	Mozambique Spitting Cobra	Least Concern (SARCA 2014)
Gekkonidae	Lygodactylus ocellatus	Spotted Dwarf Gecko	Least Concern (SARCA 2014)
Gekkonidae	Pachydactylus affinis	Transvaal Gecko	Least Concern (SARCA 2014)
Gekkonidae	Pachydactylus capensis	Cape Gecko	Least Concern (SARCA 2014)
Lamprophiidae	Boaedon capensis	Brown House Snake	Least Concern (SARCA 2014)
Lamprophiidae	Lycodonomorphus inornatus	Olive House Snake	Least Concern (SARCA 2014)
Lamprophiidae	Lycodonomorphus rufulus	Brown Water Snake	Least Concern (SARCA 2014)
Lamprophiidae	Lycophidion capense capense	Cape Wolf Snake	Least Concern (SARCA 2014)

Family	Scientific name	Common name	Category
Lamprophiidae	Psammophylax rhombeatus	Spotted Grass Snake	Least Concern (SARCA 2014)
Leptotyphlopidae	Leptotyphlops scutifrons conjunctus	Eastern Thread Snake	-
Scincidae	Trachylepis punctatissima	Speckled Rock Skink	Least Concern (SARCA 2014)
Typhlopidae	Afrotyphlops bibronii	Bibron's Blind Snake	Least Concern (SARCA 2014)
Viperidae	Causus rhombeatus	Rhombic Night Adder	Least Concern (SARCA 2014)
Bufonidae	Amietophrynus gutturalis	African common toad	Least Concern
Bufonidae	Cacosternum boettgeri	Boettger's dainty frog	Least Concern
Hyperoliidae	Kassina senegalensis	Senegal running frog	Least Concern
Phrynobatrachidae	Phrynobatrachus natalensis	Natal dwarf puddle frog	Least Concern
Pyxicephalidae	Amietia angolensis	Angola river frog	Least Concern
Bufonidae	Schismaderma carens	African red toad	Least Concern
Pyxicephalidae	Strongylopus fasciatus	Striped stream frog	Least Concern
Hyperoliidae	Semnodactylus wealii	Weale's running frog	Least Concern
Pipidae	Xenopus laevis	African clawed frog	Least Concern
Pyxicephalidae	Pyxicephalus adspersus	Giant Bullfrog	Least Concern

10.6.2.3 Birds (Avifauna)

235 avifauna species are potentially occurring in the Project Area. These have been recorded in past ecological studies and Southern African Bird Atlas Project 2 (SABAP2). Table 10-8 provides a list of Red Data avifaunal species only.

Table 10-8: Red Data Avifauna Species

Scientific Name	Common Name	Global status	S.A status
Recurvirostra avosetta	Pied Avocet	LC	NT
Oxyura maccoa	Maccoa Duck	NT	LC
Tyto capensis	African Grass-owl	LC	VU
Eupodotis caerulescens	Blue Korhaan	NT	NT
Sagittarius serpentarius	Secretarybird Secretarybird	VU	NT

Scientific Name	Common Name	Global status	S.A status
Phoenicopterus ruber	Greater Flamingo	LC	NT
Sagittarius serpentarius	Secretarybird Secretarybird	VU	NT
Phoenicopterus minor	Lesser Flamingo	NT	NT
Tyto capensis	African Grass-owl	LC	VU

10.6.2.4 *Invertebrates*

A total of four scorpion, two spider and six butterfly species are potentially present in the Project Area. These species are listed in Table 10-9 below.

Table 10-9: Potentially Occurring Invertebrate Species

Family	Scientific Name	Common Name	Category
Hesperiidae	*Metisella meninx*	Marsh sylph	Least Concern (SABCA 2013)
Lycaenidae	*Zizeeria knysna knysna*	African grass blue	Least Concern (SABCA 2013)
Nymphalidae	*Junonia hierta cebrene*	Yellow pansy	Least Concern (SABCA 2013)
Nymphalidae	*Telchinia rahira rahira*	Marsh acraea	Least Concern (SABCA 2013)
Nymphalidae	*Vanessa cardui*	Painted lady	Least Concern (SABCA 2013)
Pieridae	*Eurema brigitta brigitta*	Broad-bordered grass yellow	Least Concern (SABCA 2013)
Buthidae	*Uroplectes triangulifer*	-	-
Hormuridae	*Cheloctonus jonesii*	-	-
Hormuridae	*Opistacanthus validus*	-	-
Buthidae	*Pseudolychas pegleri*	-	-
Theraphosidae	*Harpactira hamiltoni*	-	-
Theraphosidae	*Harpactira hamiltoni*	-	-

10.6.3 Flora

This section details describes the baseline floristic characteristics of the Project Area and surrounds.

10.6.3.1 Regional vegetation

The Project Area lies in an area classified as Eastern Highveld Grassland (Gm12) as visually depicted in Figure 10-8, below.

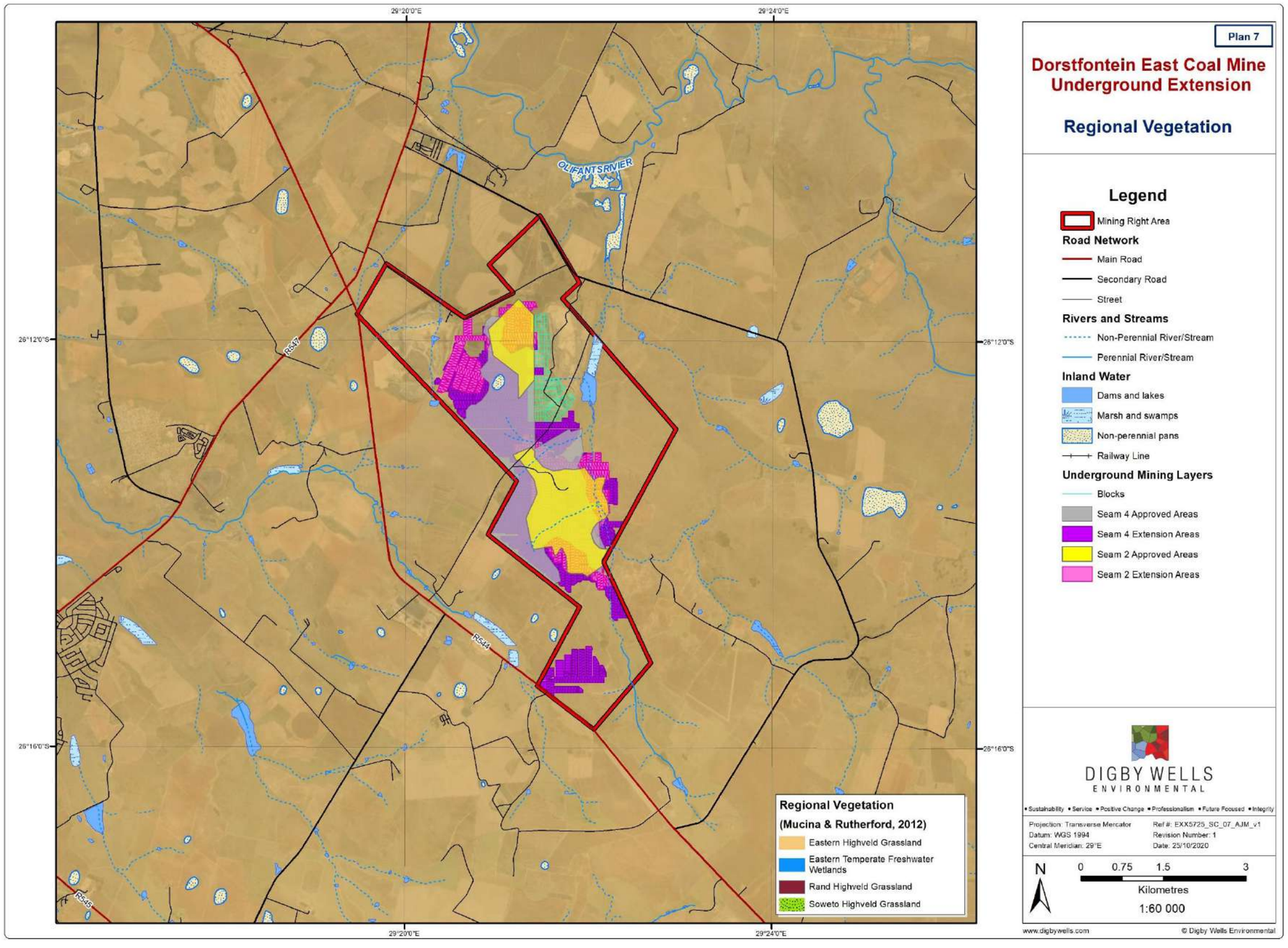

Figure 10-8: Regional Vegetation

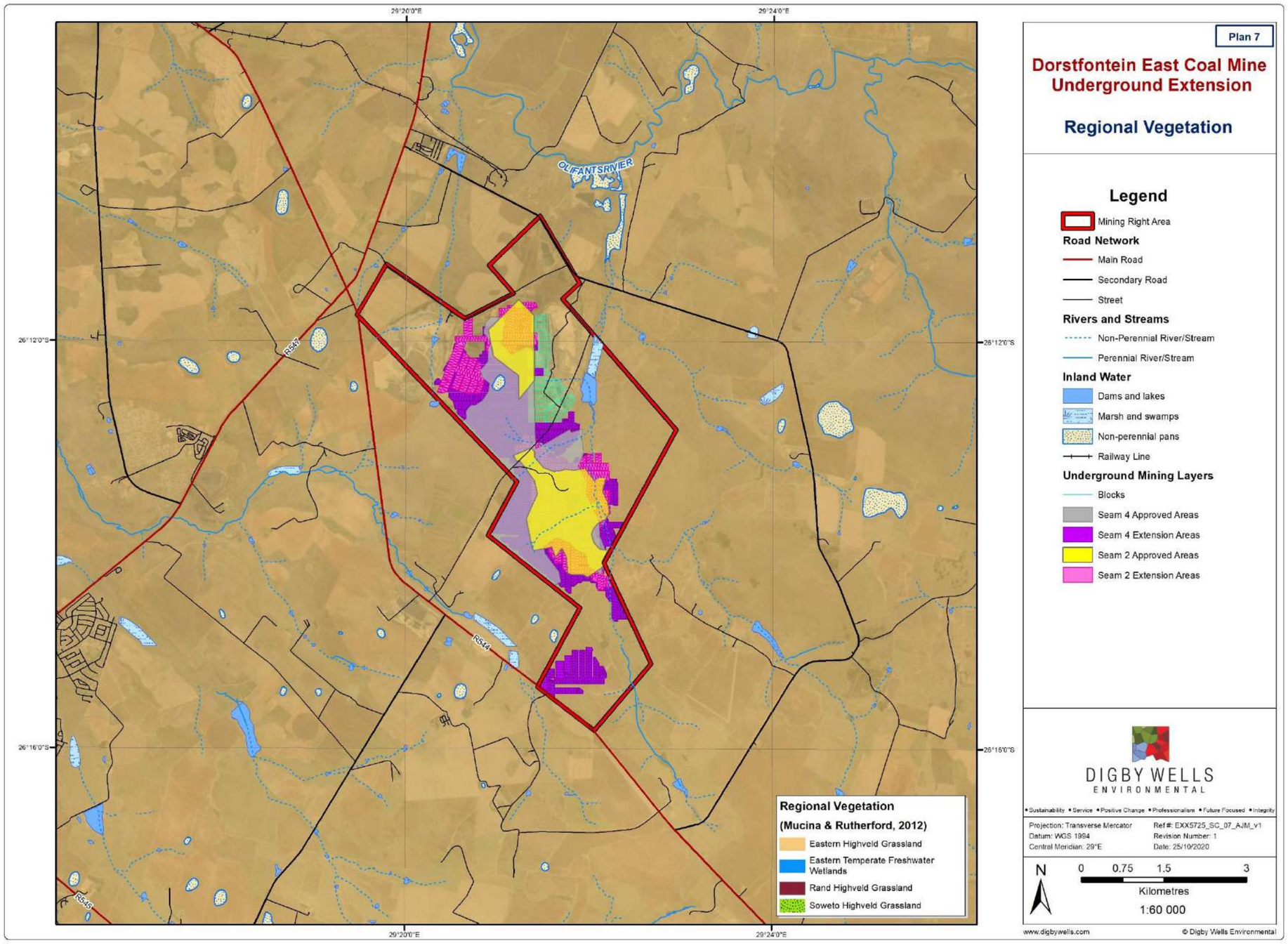

Figure 10-9: Regional Vegetation Types

The Eastern Highveld grassland is classified as an endangered vegetation type (Rouget *et al*. 2004; Ferrar, Lötter, and Parks Agency 2007; Mucina *et al*. 2014) due to mining activities within the provinces (see Table 10-10), with a conservation target of 24% (Rouget *et al*. 2004). Approximately 44% of the Eastern Highveld Grassland has been transformed, primarily by cultivation, plantations, mining, urbanization, and building of dams (Mucina & Rutherford; 2006). The conservation status of this vegetation type is very poor and is now largely ploughed, with natural vegetation restricted to patchy remnants, which are often heavily grazed. Cultivation may have had a more extensive impact, indicated by land-cover data. Only a very small fraction is conserved in statutory reserves (Nooitgedacht Dam and Jericho Dam Nature Reserves) and in private reserves (Holkranse, Kransbank, Morgenstond). No serious alien invasions are reported, but *Acacia mearnsii* or Black Wattle can become dominant in disturbed areas. Erosion is very low (Mucina and Rutherford 2012).

Table 10-10: Vegetation Types Under the Most Pressure from Mining (Adapted from Riuget *et al*., (2004))

Vegetation Type	% High	% Medium
Namib Seashore Vegetation	100	0
Subtropical Seashore Vegetation	96	0
Richtersveld Coastal Duneveld	87	0
Subtropical Dune Thicket	87	0
Northern Escarpment Dolomite Grassland	67	0
Namaqualand Seashore Vegetation	58	0
Wakkerstroom Montane Grassland	0.5	89
Nwambyia-Pumbe Sandy Bushveld	0	83
Eastern Highveld Grassland	0.2	72
Springbokvlakte Thornveld	0.3	66
Soweto Highveld Grassland	46	61
Delagoa Lowveld	0	53

10.6.3.2 Floral species composition

Based on the results of a search of historical records for the Quarter Degree Square (QDS) 2629AB on the Botanical Research and Herbarium Management Software (BRAHMS) New Plants of southern Africa website a total of 99 species are indicated to occur in the Project Area. This is not regarded an accurate reflection of the true floristic diversity of the region. However, due to the disturbed nature of the site the floristic diversity in the Project Area and immediate surroundings might be potentially low.

No flora species of conservation concern (SCC) occur in the Project Area. No floral SCC that is listed as protected under the Mpumalanga Nature Conservation Act and South African

National Biodiversity Institute's (SANBI) Threatened Species Programme (TSP) occur in the Project Area. No protected trees have been historically recorded or have an increased probability of occurrence (POC). No plant species protected in terms of the Mpumalanga Nature Conservation Act, 1998 (No. 10 of 1998) have increased POC.

10.6.3.3 Alien and exotic vegetation

AIPs have been classified according to Alien Invasive Species List (GN R864 in GG 40166 of 29 July 2016) of the NEM: BA. Each of the categories listed in this Act has different legal obligations and conditions as indicated below:

- Category 1a: Species requiring compulsory control. Any individuals that fall into this category must be removed by law and no permits are issued;
- Category 1b: Invasive species controlled by an Alien Invasive Species Management Programme. These species must be removed and destroyed;
- Category 2: Invasive species controlled by area, and;
- Category 3: Invasive species controlled by activity.

A total of 20 NEM: BA listed as well as unlisted weed species may potentially occur in the Project Area. These are listed Table 10-11 below.

Table 10-11: Potentially Occurring Alien Invasive Plant Species

Family	Species Name	Growth Form	Category
Fabaceae	*Acacia mearnsii*	Tree	2
Amaranthaceae	*Amaranthus hybridus*	Forb	Weed
Asteraceae	*Berkheya setifera*	Forb	Weed
Asteraceae	*Bidens formosa*	Forb	Weed
Asteraceae	*Bidens pilosa*	Forb	Weed
Asteraceae	*Campuloclinium macrocephalum*	Forb	Weed
Asteraceae	*Cirsium vulgare*	Forb	1b
Asteraceae	*Conyza bonariensis*	Forb	Weed
Solanaceae	*Datura stramonium*	Forb	1b
Myrtaceae	*Eucalyptus camaldulensis*	Tree	1b
Meliaceae	*Melia azedarach*	Tree	1b
Salicaceae	*Populus x canescens*	Tree	2
Asteraceae	*Gnaphalium luteo-album L.*	Forb	Weed
Salicaceae	*Salix babylonica*	Tree	Weed
Asteraceae	*Schkuhria pinnata*	Forb	Weed

Family	Species Name	Growth Form	Category
Asteraceae	*Tagetes minuta*	Forb	Weed
Verbenaceae	*Verbena bonariensis*	Forb	1b
Verbenaceae	*Verbena brasiliensis*	Forb	1b
Asteraceae	*Xanthium spinosum*	Forb	1b
Asteraceae	*Xanthium strumarium*	Forb	1b

10.7 Wetlands

The Scoping Phase of the Wetland assessment was undertaken at a desktop level.

10.7.1 Bioregional context

The proposed infrastructure at Dorstfontein East falls within the primary drainage region B of the Olifants WMA and the B11B and B11D quaternary catchments, namely Sub-Quaternary Reaches (SQR) B11B-01327 (Olifants River) and B11D-01366 (Steenkoolspruit). The Project Area also includes numerous non-perennial drainage lines, which report to the Olifants River

The area is also characterized by multiple pans, as well as a few river-associated wetlands. The wetlands are species-rich and contain few rare or endemic species. The dominant species within the eastern wetlands include *Carex acutiformis* and *Cyperus fastigiatus*. The wetland systems in the east remain fresh all year round, whereas the wetlands in the western part tend to become saline (Darwall *et al.,* 2009).

10.7.2 Ecoregion

The Project Area is located within the Southern Temperate Highveld freshwater ecoregion according to Darwall et al. (2009) and Scott (2015). This ecoregion is situated in the interior of South Africa, with the western boundary formed by the Magaliesberg, Pilanesberg and Waterberg mountain ranges, the northern boundary formed by the Soutpansberg, and the eastern boundary formed by the Drakensberg Mountains (Scott, 2015).

10.7.3 National Freshwater Ecosystem Priority Areas

Based on a desktop-based modelled wetland condition and a combination of special features, including expert knowledge (e.g. intact peat wetlands, presence of rare plants and animals, etc.) and available spatial data on the occurrence of threatened frogs and wetland-dependent birds, each of the wetlands within the inventory were ranked in terms of their biodiversity importance and as such, Wetland Freshwater Ecosystem Priority Areas (FEPA's) were identified in an effort to achieve biodiversity targets (Driver et al., 2011).

Whilst being an invaluable tool, it is important to note that the National Freshwater Ecosystem Priority Areas (NFEPA's) were delineated and studied at a desktop and low-resolution level.

Thus, the wetlands delineated on site during the EIA phase may differ from the NFEPA layers. The NFEPA assessment does, however, hold significance from a national perspective.

Figure 10-10 depicts the distribution of NFEPA wetlands within the Project Area. The dominant wetland types are valley-floor wetlands, particularly channelled valley-bottom wetlands and floodplain wetlands.

10.7.4 Mpumalanga Biodiversity Sector Plan

The Project Area falls predominantly within the areas classified as 'Moderately and Heavily Modified', with the 'Moderately Modified Areas' described as old lands. A fair portion of the Project Area is classified as 'Other Natural Areas', while the north-eastern most corner is classified as a Critical Biodiversity Area (CBA) irreplaceable. Further to this, a large portion land to the east of the Project Area is regarded as CBA irreplaceable.

10.7.5 Mining and Biodiversity Guidelines

The Mining and Biodiversity Guideline (2013) is a cumulative finding of all available biodiversity and ecological related information with a final mapped area. The assessment looks at NFEPA and regional biodiversity plans such as the MBSP. This is shown in Figure 10-11 below.

The Project Area is classified as 'Highest Biodiversity Importance: Highest Risk for Mining', with some areas designated as 'Moderate Biodiversity Importance: Moderate Risk for Mining'.

10.7.6 Wetland delineation and classification

565.80 ha of wetland areas were identified within the proposed Project Area and its associated 500 m zone of regulation with 488.76 ha within the proposed Project Area, of which 395.69 ha are affected by the proposed underground mining while the open cast mining option is expected to impact 96.07 ha. Several HGM units were identified and categorized based on terrain units. These included pans, hillslope seeps, unchannelled valley bottoms and channelled valley bottoms. Figure 10-12 indicates the location of each in relation to the surrounding landscape.

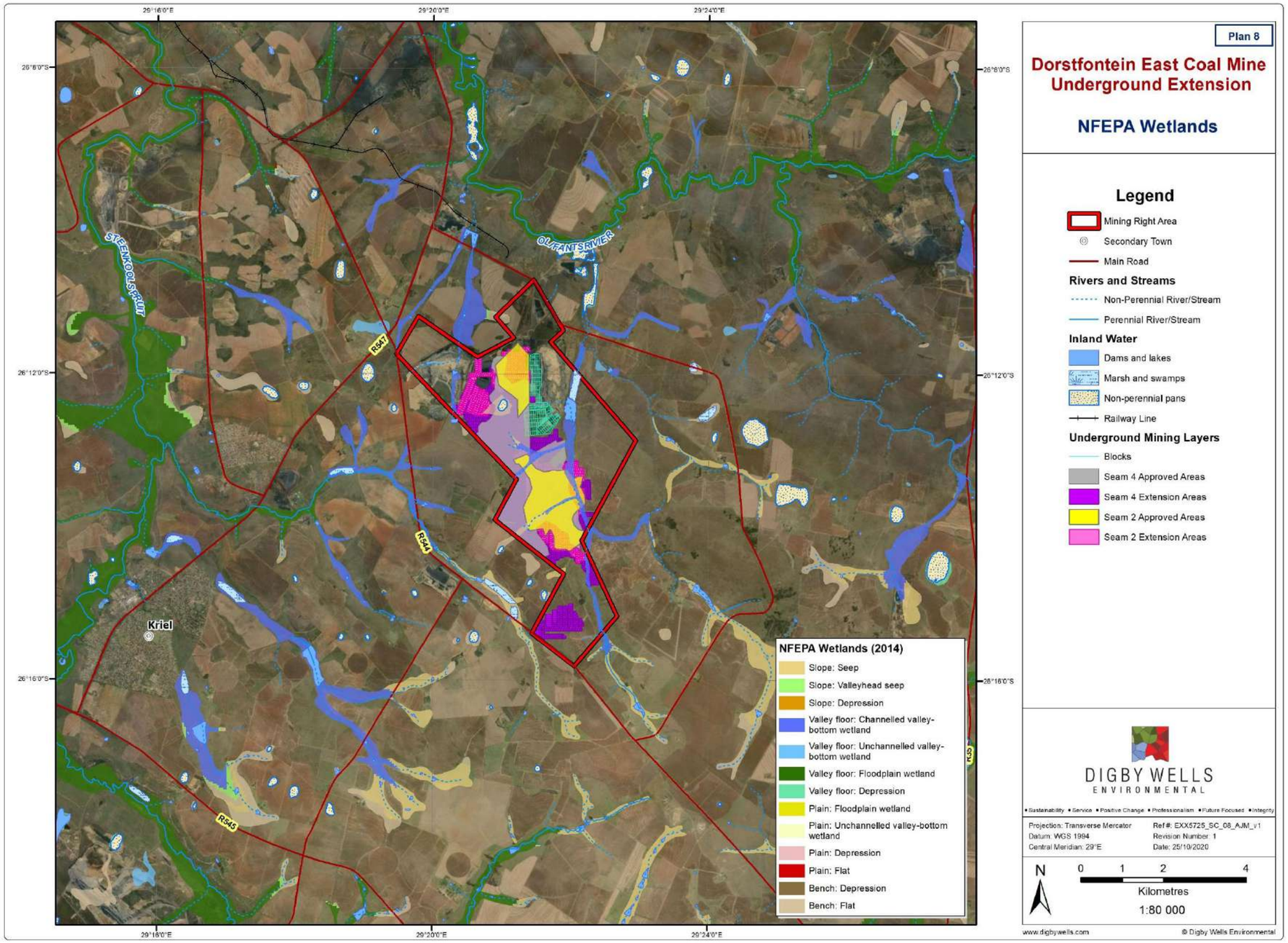

Figure 10-10: NFEPA Wetlands

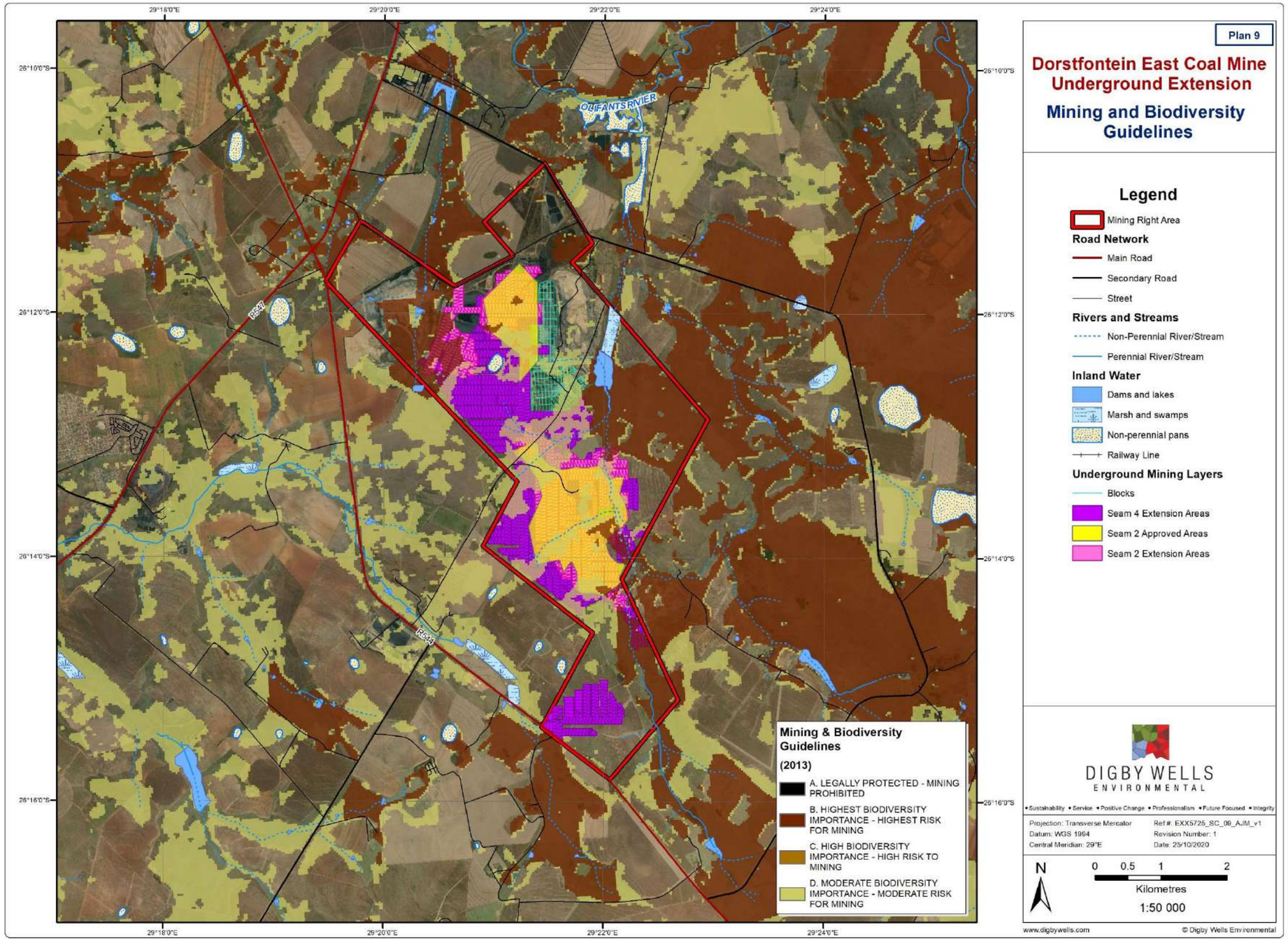

Figure 10-11: Mining and Biodiversity Guideline

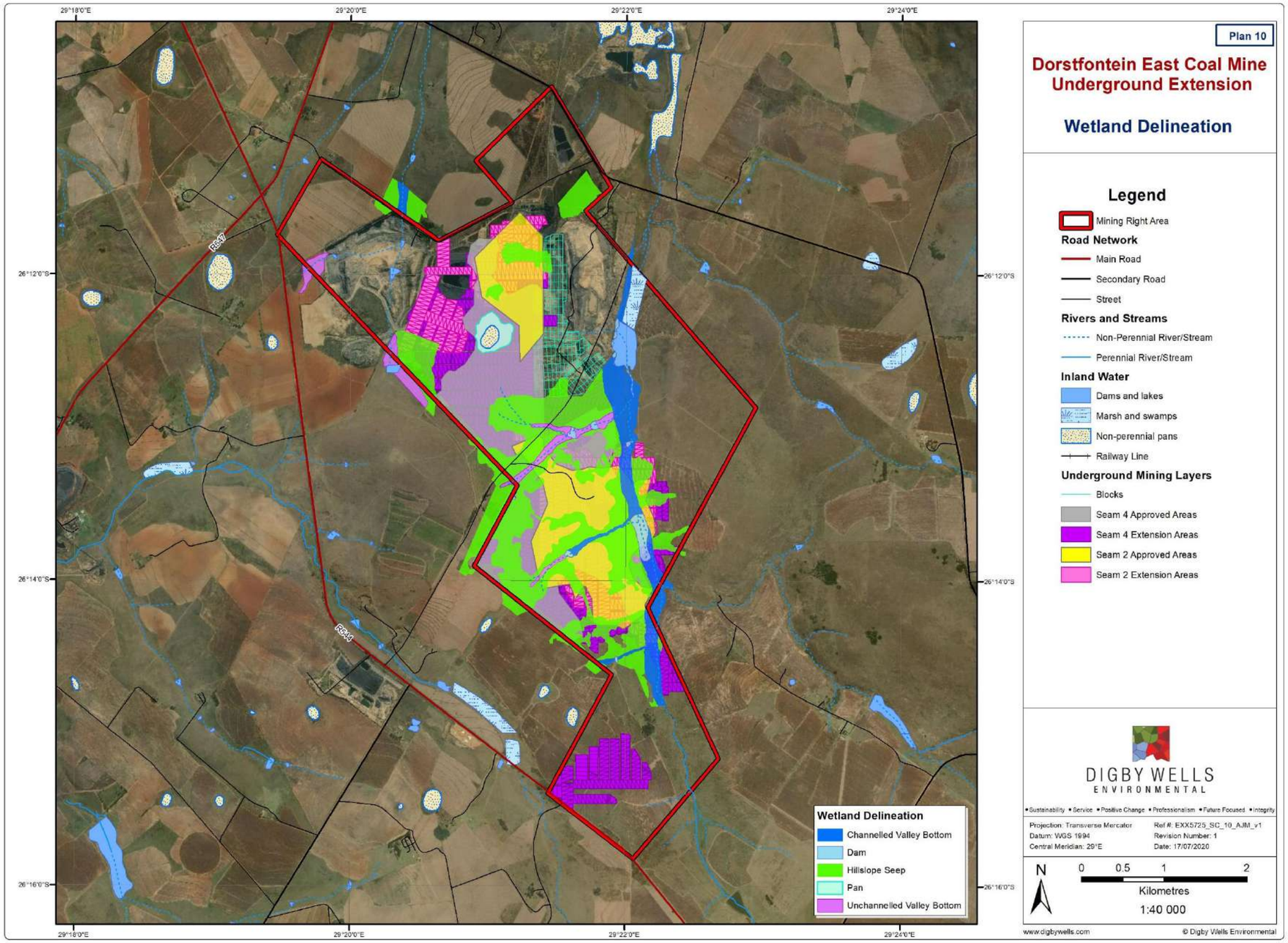

Figure 10-12: Wetland Delineation

10.8 Aquatic Ecology

The proposed Project Area falls within primary drainage region B of the Olifants WMA and the B11B and B11D quaternary catchments, namely Sub-Quaternary Reaches (SQR) B11B-01327 (Olifants River). The Olifants River is a third order stream which drains from south-east along the north-eastern boundary of the Project Area. The Project Area also includes numerous non-perennial drainage lines, which report to the Olifants River which flows in a north-easterly direction into Mozambique and then joins the Limpopo River and drains into the Indian Ocean. Figure 10-3 indicated the freshwater resources associated with the study area.

10.8.1.1 Desktop Present Ecological Status, Importance and Sensitivity

Table 10-12 outlines the desktop aquatic-related data obtained for the Olifants B11B-01327 SQR and the Steenkoolspruit B11D-01366 SQR (DWS, 2014).

According to the desktop data obtained for the Olifants, the reach appears to be in a Moderately Modified state (i.e. Ecological Category C), while the Steenkoolspruit is in a Largely Modified state (i.e. Ecological Category D; DWS, 2014). The Ecological Importance of the Olifants River SQR has been classified as “High”. It is expected to contain a total of 45 macroinvertebrate taxa as well as a total of seven indigenous fish species. The Ecological Importance of the Steenkoolspruit SQR has been classified as “Moderate” and expected to contain a total of 45 macroinvertebrate taxa as well as a total of five indigenous fish species. The latter SQR consists of all fish species found at the Olifants River, excluding *Labeobarbus polylepis* (Smallscale Yellowfish) and *Enteromius neefi* (Sidespot Barb). In terms of their conservation status, all the expected fish species are listed as Least Concern. Two macroinvertebrate taxa are known to occur at the Olifants SQR and not at the Steenkoolspruit SQR (i.e. Elmidae and Tabanidae) and two macroinvertebrate taxa are known to occur at the Steenkoolspruit SQR and not at the Olifants SQR (i.e. Haliplidae and Muscidae) (see Table 10-13).

The Ecological Sensitivity for the SQR’s has been classified as “High”. This, from an instream perspective, is mainly due to the large number of highly sensitive macroinvertebrate and fish species expected.

Table 10-12: Desktop Aquatic data pertaining to the Olifants River

SQR Code/Aquatic Component	B11B-01327	B11D-01366
Ecological Category	C	D
Category Description	Moderately Modified	Largely Modified
Ecological Importance (EI)	High	Moderate
Ecological Sensitivity (ES)	High	High

10.8.1.2 Expected macroinvertebrates

The expected macroinvertebrate taxa for the Olifants River SQR of concern are presented in Table 10-13.

Table 10-13: Expected Macroinvertebrate taxa in the Olifants River

Family names		
Turbellaria	Gerridae	Hydraenidae
Oligochaeta	Hydrometridae	Hydrophilidae
Hirudinea	Naucoridae	Ceratopogonidae
Potamonautidae	Nepidae	Chironomidae
Atyidae	Notonectidae	Culicidae
Hydracarina	Pleidae	**Muscidae
Baetidae 2 sp	Veliidae/Mesoveliidae	*Tabanidae
Caenidae	Ecnomidae	Simuliidae
Leptophlebiidae	*Hydropsychidae 1 sp	Ancylidae
Tricorythidae	**Hydropsychidae 2 sp	Bulininae
Coenagrionidae	Hydroptilidae	Lymnaeidae
Aeshnidae	Leptoceridae	Physidae
Gomphidae	Dytiscidae	Planorbinae
Libellulidae	*Elmidae/Dryopidae	Corbiculidae
Belostomatidae	Gyrinidae	Sphaeriidae
Corixidae	**Haliplidae	Unionidae

Green shading indicates high physio-chemical sensitivity; Blue indicates high-velocity dependence; Orange indicates both high physio-chemical sensitivity and velocity dependence. * occurs at SQR B11B-01327 & SQR B11B – 01304 only; **occurs at SQR B11D-01366 only

Of the 45 expected macroinvertebrate taxa at the Olifants SQR, 7 have been classified as highly sensitive with regards to water quality and velocity/flow dependence (DWS, 2014). Of the seven taxa, one is regarded as sensitive towards water quality changes, whilst the rest are regarded as sensitive to flow conditions only (i.e. high preference for fast-flowing water).

Of the 45 expected macroinvertebrate taxa at the Steenkoolspruit SQR, eight have been classified as highly sensitive with regards to water quality and velocity/flow dependence (DWS, 2014). Of the eight taxa, one is regarded as sensitive towards water quality changes, one is regarded as sensitive to both water quality changes and flow conditions, whilst the rest are regarded as sensitive to flow conditions.

Based on the prevalence of mining and agricultural land use in the adjacent land areas associated with the Project Area, the water in the associated aquatic ecosystems is expected to be of modified quality (DWS, 2014). As a result of this deduction, it is suspected that the watercourses associated with the Project Area will not be able to support aquatic macroinvertebrate taxa sensitive towards water quality, such as numerous Baetidae species. However, due to the number of non-perennial watercourses in the Project Area, the flow dependant macroinvertebrate taxa are expected to be restricted to the perennial Olifants River and Steenkoolspruit and potentially limited in their adjoining tributaries when flow permits.

10.8.2 Expected fish species

The fish species expected in the reaches associated with the Project Area have been provided for in Table 10-14 (DWS, 2014). Additionally, each species sensitivity ratings towards physio-chemical and no-flow conditions have been provided for, together with their conservation statuses according to DWS (2014) and the IUCN Red List of Threatened Species (2018).

Within the reaches associated with the Project Area, a total of seven fish species are expected. All seven species are expected to occur within the Olifants River (SQR B11B-01327) and five are expected to occur at the Steenkoolspruit (SQR B11D-01366). Three of the seven species are regarded as moderately intolerant towards water quality changes and no-flow conditions, namely *Enteromius neefi, Enteromius paludinosus* and *Labeobarbus polylepis*).

Table 10-14: Expected Fish Species in the Reaches associated with the Project Area

SQR		Fish Species	Common Name	Tolerance/ Sensitivity		Status
				Physio-chemical	No-flow	
Olifants River		*Labeobarbus polylepis*	Smallscale Yellowfish	2.9	3.3	LC
		Enteromius neefi	Sidespot Barb	3.4	3.4	LC
	Steenkoolspruit	*Enteromius anoplus*	Chubbyhead Barb	2.6	2.3	LC
		Enteromius paludinosus	Straightfin Barb	3.3	2.8	LC
		Clarias gariepinus	Sharptooth Catfish	1.0	1.7	LC
		Pseudocrenilabrus philander	Southern Mouthbrooder	1.4	1.0	LC
		Tilapia sparrmanii	Banded Tilapia	1.4	0.9	LC
Tolerance: 1-2 = tolerant, 4-5 = sensitive, **Conservation Status:** LC=Least Concern						

E.paludinosus prefers quiet, well-vegetated waters and slow-flowing streams, while *L. polylepis* prefers deep pools and flowing waters of permanent rivers and dams (Skelton, 2001). According to Satellite imagery, the Project Area and its associated watercourses appear to

reflect the availability of such habitat. However, *E.paludinosus* is considered sensitive to changes in flow conditions while *L. polylepis* is considered sensitive to changes in water quality. Therefore it is of low confidence that these species are actually present in the reaches given the Present Ecological States (see Table 10-12).

The conservation statuses of all the aforementioned fish species are Least Concern (LC) according to the IUCN (2019).

10.9 Hydropedology

The below section describes the baseline hydropedological environment. The actual soil forms present on site and hydrological soil types will be verified through field investigations during the EIA phase of the project.

10.9.1 Land type and hydrological soil types

The dominant land type within the project boundary is land type Bb4. Portions of the study area are also occupied by land types Bb5 and Fa8 (See Figure 10-5). The terrain of the land types that are found within the study area are presented in Figure 10-13.

The expected soil forms within land type Bb4 include the Avalon, Hutton, Glencoe, Mispah, Longlands, Rensburg, Estcourt, Katspruit, Valsrivier, Arcadia, Sterkspruit and Kroonstad.

Within land type Bb5, expected soil forms include Mispah, Glenrosa, Hutton, Rensburg, Glencoe, Wasbank, Avalon, Valsrivier, Clovelly, Swartland, Katspruit, Estcourt, Longlands and Kroonstad.

Finally, the expected soil forms within land type Fa8 include Mispah, Clovelly, Hutton, Wasbank and Estcourt. Additionally, bare rocks and stream beds are expected within this land type.

Based on the diagnostic horizons and materials associated with the expected soil forms, the probable hydrological soil types can be summarized as follows:

- Recharge – Hutton, Clovelly;
- Interflow (A/B) – Estcourt, Longlands, Valsrivier, Sterkspruit, Glenrosa;
- Interflow (Soil/Bedrock) - Glencoe, Wasbank, Swartland;
- Responsive (Shallow) – Mispah, Arcadia; and
- Responsive (Saturated) – Avalon, Rensburg, Katspruit, Kroonstad.

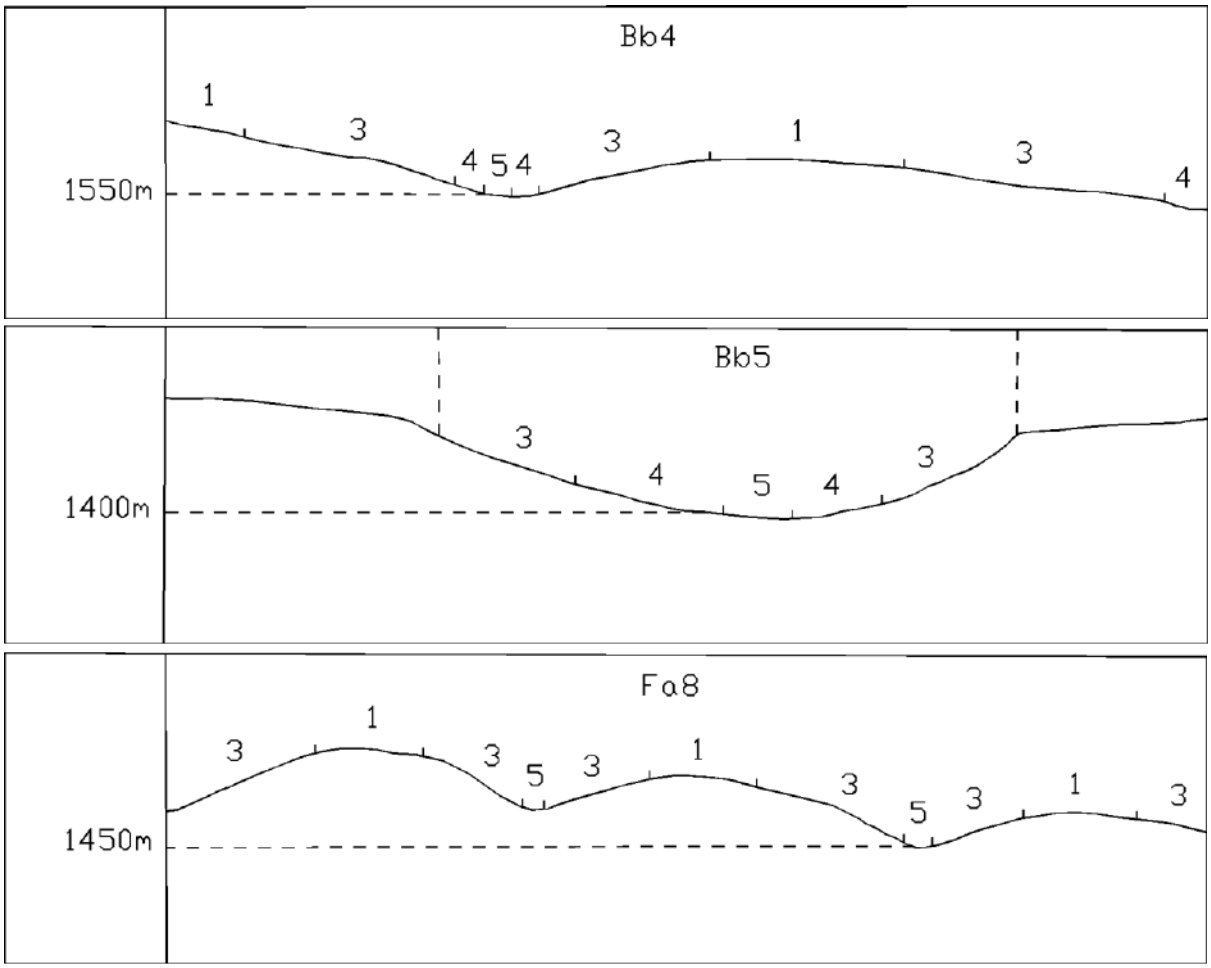

Figure 10-13: Terrain morphological units within the DECM Project Area

10.9.2 Sensitivity assessment

Tributaries of the Olifants River drain the Project Area towards the east, before joining the Olifants River that flows in the North Westerly direction. A number on water features (i.e. non-perennial streams, pans, dams and wetlands) are found within and around the Project Area as indicated in Figure 10-4.

These waterbodies are reliant on the natural hydropedological responses which may be disturbed as a result of the proposed mining and associated activities and due care should be taken to ensure that they are protected from degradation.

10.10 Heritage

The Mpumalanga Province is underlain by valuable geological formations, both in terms of mineral and fossil wealth. The greater study area forms part of the Highveld Coalfield, which extends approximately 7 000 km2 (Johnson, et al., 2006). The regional and local study areas are predominantly underlain by the Main Karoo Basin, which is made of the lithostratigraphic units associated with the Karoo Supergroup. The Bushveld Complex and the Transvaal Supergroup occur within the greater study area. These geological features are represented by the Rooiberg Group and the Lebowa Granite Suite respectively.

The Main Karoo Basin dates to the late Carboniferous to Middle Jurassic Periods, roughly 320 to 145 million years ago (mya). Within the Karoo Supergroup are the sediments of the Ecca Group. These sediments date to the Permian Period and overlie the *Dywka Formation*. The Ecca Group is the most palaeontologically sensitive unit of the Karoo Supergroup and is well known for its wealth of plant fossils, characterised by the assemblage of *Glossopteris* fossils (a plant species defined through fossil leaves). These layers also include significant coal reserves (Johnson, Anhauesser, & Thomas, 2006; Groenewald & Groenewald, 2014).

Fossils associated with the Transvaal Supergroup include stromatolitic dolomite and thick deposits of stromatolites (Groenewald & Groenewald, 2014). Stromatolites are the ancient predecessors of modern algal mats. Although these fossils have been recorded within other formations of the Transvaal Supergroup, no such fossils have been recorded in the Rooiberg Group. Fossils are unlikely to occur within this group due to its fluvial depositional setting and the subsequent metamorphic processes which have taken place within the layers.

The specialist Palaeontological Impact Assessment (PIA) report will present the site-specific geological context and the associated palaeontological sensitivities in more detail.

Table 10-15 presents an overview of the broad timeframes for the major periods of the past in Mpumalanga. Figure 10-14 presents a summary of the heritage resources identified within the larger study area. The figure presents the relative abundance of these heritage resources as grouped by the periods listed in Table 10-15.

Table 10-15: Archaeological Periods in Mpumalanga

The Stone Age	Earlier Stone Age (ESA)	2 mya to 250 thousand years ago (kya)
	Middle Stone Age (MSA)	250 kya to 20 kya
	Later Stone Age (LSA)	20 kya to 500 CE (Common Era[2])

[2] Common Era (CE) refers to the same period as *Anno Domini* (“In the year of our Lord”, referred to as AD): i.e. the time after the accepted year of the birth of Jesus Christ and which forms the basis of the Julian and Gregorian calendars. Years before this time are referred to as ‘Before Christ’ (BC) or, here, BCE (Before Common Era).

There appears to be a gap in the record in Mpumalanga between approximately 7000 and 2000 BCE.		
Farming Communities	Early Farming communities (EFC)	500 to 1400 CE
	Late Farming Communities (LFC)	1100 to 1800 CE
Historical Period[3]	-	1500 CE to 1850 (Behrens & Swanepoel, 2008)

Adapted from Esterhuysen & Smith (Stories in stone, 2007)

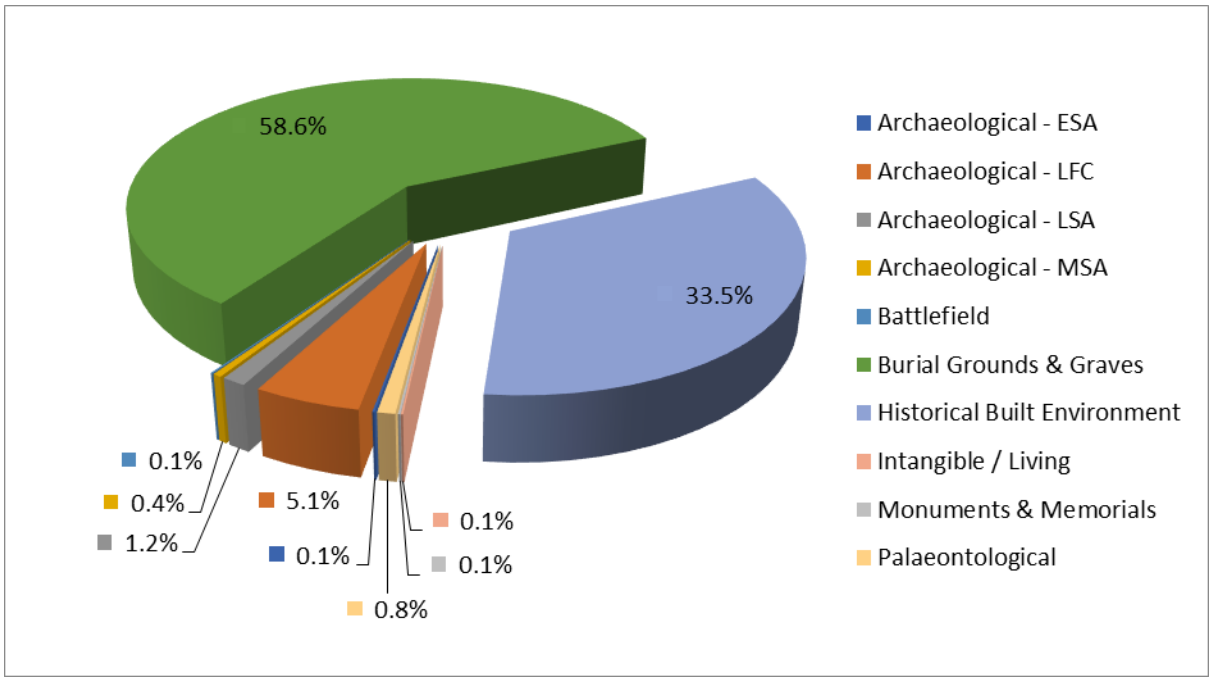

Figure 10-14: Heritage Resources identified within the Regional, Local and Site-specific Study Areas

In total 949 heritage resources were identified within the regional, local and site-specific study areas. The predominant tangible heritage resources recorded in the area under consideration demonstrate affiliations with the historical period, including the historical built environment and burial grounds and graves. This notwithstanding, expressions of the Stone Age, the Farming Community Period, intangible or living heritage, battlegrounds and monuments and memorials have also been recorded in the greater study area.

[3] The author acknowledges that in southern Africa, especially in Mpumalanga, the last 500 years represents a formative period that is marked by enormous internal economic invention and political experimentation that shaped the cultural contours and categories of modern identities outside of European contact. This period is currently not well documented and is being explored through the 500 year initiative (Swanepoel, et al., 2008).

10.10.1 Results of the field survey and historical layering

Table 10-16 includes descriptions of the heritage resources identified during the pre-disturbance and ground-truthing surveys. The Project Area has been disturbed through anthropogenic activity, farming and mining activities. Houses and modern structures, agricultural infrastructure (including cattle kraals, dams and boreholes), electrical infrastructure, and informal/untarred roads have been established within the Project Area. Part of the area had recently been burned, which improved visibility. In other areas, the natural grass was overgrown, limiting ground visibility. Some other areas had been disturbed through animal activity. Burrows were inspected for the presence of any archaeological materials.

Table 10-16: Heritage Resources Identified Through the Pre-Disturbance Survey[4]

Site Name	Description
BGG-001	Burial ground of approximately 19 graves. These are marked through various dressings, including: cement fittings, brick fittings, possible laterite and stone and soil heaps, with or without headstones. Headstones consist of cement or a single upright stone or brick. Two headstones have legible inscriptions although only one has a legible date (1985). The burial ground had a fence at some time, but this is now in a state of disrepair.
HST-001	Remains of what appears to be a one-roomed structure built on a small platform / raised foundation. The structure has one door and no windows were present. The structure was made of stone and plaster. The structure is surrounded by four small rectangles made of brick – it would appear these are gardens.

A preliminary assessment of the Genealogical Society of South Africa (Google Earth Cemetery Initiative, 2011) database did not indicate additional burial grounds are known to exist within the Project Area. Figure 10-15 below presents the results of the historical imagery.

There is a gap in the historical imagery, as seen in the figure. It appears that this area was never photographed, as the flight plan that should have included the northern portion of the Project Area include photographs of the area beyond the Project extent. The age of any structures in this section of the Project Area must therefore be verified through other means before they are impacted by the Project.

HST-001 is not visible on the imagery; however, features in this area suggest there is a structure present and HST-001 is therefore assumed to represent the historical built environment. The historical imagery presents a landscape that is a mix of cultivated land and natural flora. Some parts of the Project Area include large stands of dense trees. There are several roads within the Project Area, some of which are still in use today.

[4] In accordance with SAHRA procedures, the GPS co-ordinates of these heritage resources have not been included in documents available to the public.

Several additional points of interest have been included in Figure 10-15. These represent potential structures or werfs which, if still standing, will be considered built heritage resources. These structures will be afforded general protection under Section 34 of the NHRA.

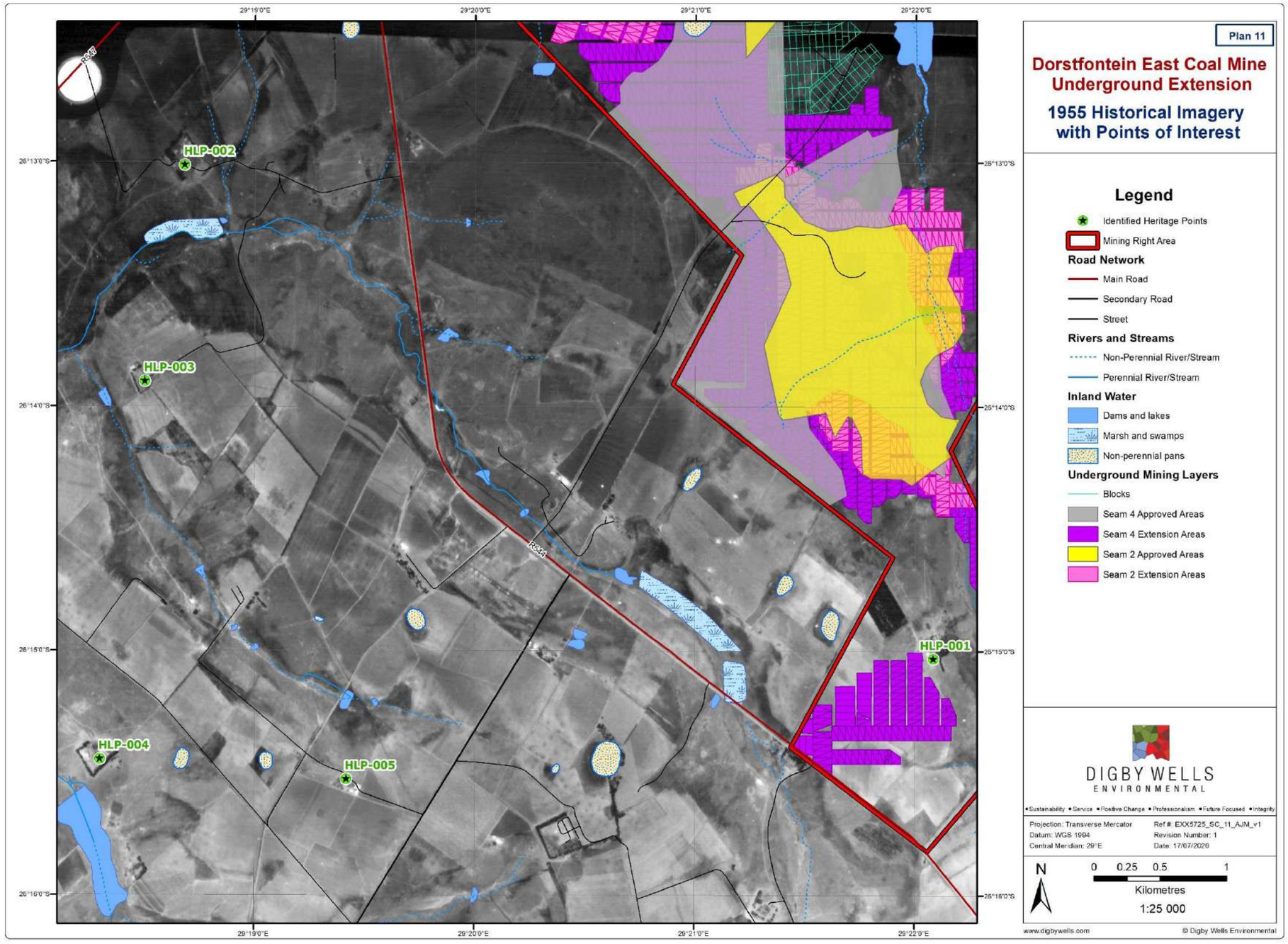

Figure 10-15: Historical imagery showing the Project Area in 1955 with points of interest

10.11 Socio-Economic

On the basis of the information collected through the desktop review, a socio-economic baseline profile was compiled. Topics considered as part of this profile include (but are not limited to) the following:

- Demographics, including population size and density as well as population distribution in terms of age and gender;
- Education levels;
- Employment status and income profiles;
- Economic sectors;
- Infrastructure and services (housing, energy, water and sanitation); and Community needs and development.

10.11.1 The regional study area

The regional study area comprises Mpumalanga Province, the Gert Sibande and Nkangala district municipalities and the Govan Mbeki Local Municipality (GMLM) and Emalahleni Local Municipality (ELM).

Mpumalanga is rich in coal reserves and home to South Africa's major coal-fired power stations. eMalahleni is the biggest coal producer in Africa. The best-performing sectors in the province include mining, manufacturing and services. Tourism and agro-processing are potential growth sectors.

The Mpumalanga Strategy[5] identifies five prioritised economic sectors in the province, namely, agriculture, mining and energy generation, manufacturing, Information Communication Technology, the Green Economy, tourism and cultural industries for job creation, and growth of Small, Medium and Micro Enterprises (SMMEs).

Mpumalanga is divided into three district municipalities, which are further subdivided into 17 local municipalities[6].

Gert Sibande District Municipality (GSDM) comprises seven local municipalities, including GMLM. Spatially, GSDM is the largest of the three districts in Mpumalanga Province. The manufacturing sector, dominated by mining products, electricity generation and petrochemicals, is the leading industry (57.4%), followed by mining (14.1%) and community services (12.3%).

[5] http://www.dedtmpumalanga.gov.za/sites/default/files/publications/STRAT%20PLAN%202015-2020_2.pdf. Sourced on 2019/09/05.

[6] https://municipalities.co.za/provinces/view/6/mpumalanga. Sourced on 2019/09/05.

10.11.1.1 Nkangala District Municipality

The Nkangala District Municipality (NDM) is comprised of six local municipalities, including Emalahleni. The main economic sectors in Nkangala are mining, energy / electricity, manufacturing and agriculture.

The NDM Integrated Development Plan (IDP) for the 2017 to 2022 period incorporates the District Local Economic Development (LED) Strategy, which focuses on seven development sectors, including mining.

GMLM is one of seven local municipalities under the jurisdiction of GSDM. Govan Mbeki has the most diversified economy in the GSDM and is dominated by the petrochemical industry (SASOL II and III complexes) and coal and gold mining. GMLM has the largest underground coal mining complex in the world which renders it an important strategic area within the national context.

The municipality's LED strategy for 2017 – 2022 focuses on the nine initiatives which includes industrialization programme and construction of an industrial park (production of petro-chemical, mining (equipment), agricultural and manufacturing products).

10.11.1.2 Emalahleni Local Municipality

ELM is one of six municipalities under the jurisdiction of the Nkangala District. It has a population of 455, 227 and a population density of 169.7 persons per square kilometre.

Mining is the leading industry in terms of gross value added (GVA) contribution to the Emalahleni economy, contributing 55% in 2017. The concomitant influx of job seekers and workers to mines and power stations has led to population increase and concomitant pressures on housing and social services (water, sanitation, electricity) in the municipal area.

The municipality's LED strategy for 2017 – 2022 focuses on seven initiatives, including mining

10.11.2 The secondary study area

The secondary study area is comprised of Ward 15 of the GMLM and Ward 25 of the ELM. The section below presents key socio-economic indicators for Wards 15 and 25 in relation to provincial, district, local municipal levels as derived from StatsSA data (Census 2011; Community Survey 2016) accessed via Wazimap (2019)[7].

[7] Wazimap data is supported by the South African government, specifically through the Department of Public Service and Administration's (DPSA's) initiative to develop www.data.gov.za as a central point for accessing public government data. Wazimap is a featured app on the website (South Africa National Data Portal, 2019) and provides Census 2011 and Community Survey 2016 socio-economic data adjusted to 2016 ward boundaries. https://wazimap.co.za/, Retrieved between 2019/08/15 and 2019/09/20.

The populations in Wards 15 and 25 are characterized by low education levels, with only 27.7% of the population in Ward 15 and 26% of the population in Ward 25 having achieved a Grade 12.

The unemployment rate in Ward 15 (11%) was significantly lower than the unemployment rate in Ward 25 (24.9%) as well as the national unemployment rate for 2011 (29.8%).

A significant proportion of households in Ward 15 (31%) and Ward 25 (36%) were low-income households, earning an annual income of R1 to R20, 000. A significant proportion of households were female-headed, 24% in Ward 15 and 31% in Ward 25.

In terms of housing, a higher percentage of households in Ward 25 (41.5%) rented their housing than in Ward 15 (29.6%), while a higher proportion of households in Ward 15 (22%) than in Ward 25 (13%) lived in informal dwellings / shacks.

As for access to social services, the percentage of households that access water from a service provider and benefitted from refuse removal by a service provider, was lower in the primary and secondary study areas than at district and provincial levels. In terms of sanitation, the percentage of households in these areas that had access to flush toilets was lower and the percentage of households that didn't have access to any sanitation facilities was higher than at district and provincial levels.

10.11.3 The primary study area

A site visit to the primary study area was not undertaken as part of the scoping study and no primary data was collected for the households located in the primary study area. Thus, for the purposes of the scoping report, the socio-economic indicators presented in Section 4.2 for the populations in Wards 15 and 25, are taken as indicative for the households residing within the primary study area.

If required, a site visit and primary data collection will be undertaken for the social impact assessment phase.

11 Impacts identified

Refer to Table 12-1 for the preliminarily identified impacts per project activity and the proposed mitigation measures.

11.1.1 Methodology used in determining the significance of the environmental impacts

The methodology to identify, determine and assess the potential impacts is provided in this section and will be utilised by the relevant Specialists during the EIA Phase.

11.1.2 Impact assessment methodology

To clarify the purpose and limitations of the impact assessment methodology, it is necessary to address the issue of subjectivity in the assessment of the significance of environmental

impacts. Even though Digby Wells, and the majority of EIA practitioners, propose a numerical methodology for impact assessments, one has to accept that the process of environmental significance determination is inherently subjective.

The weight assigned to each factor of a potential impact, and also the design of the rating process itself, is based on the values and perception of risk of members of the assessment team, as well as that of the I&AP's and authorities who provide input into the process.

The perception of the probability of an impact occurring is dependent on perceptions, aversion to risk and availability of information.

The purpose of the EIA process is to provide a structured, traceable and defendable methodology of rating the relative significance of impacts in a specific context.

11.1.3 Impact rating

The impact assessment methodology utilised during the EIA Phase for the Project consists of two phases namely impact identification and impact significance rating.

Impacts and risks have been identified based on a description of the activities to be undertaken. Once impacts have been identified, a numerical environmental significance rating process will be undertaken that utilises the probability of an event occurring and the severity of the impact as factors to determine the significance of a particular environmental impact.

The severity of an impact is determined by taking the spatial extent, the duration and the severity of the impacts into consideration. The probability of an impact is then determined by the frequency at which the activity takes place or is likely to take place and by how often the type of impact in question has taken place in similar circumstances.

Following the identification and significance ratings of potential impacts, mitigation and management measures were incorporated into the EMP.

Details of the impact assessment methodology used to determine the significance of physical, bio-physical and socio-economic impacts are provided below.

The significance rating process follows the established impact/risk assessment formula:

Significance = CONSEQUENCE X PROBABILITY X NATURE

Where

Consequence = intensity + extent + duration

And

Probability = likelihood of an impact occurring

And

Nature = positive (+1) or negative (-1) impact

The matrix calculates the rating out of 147, whereby intensity, extent, duration and probability are each rated out of seven as indicated in Table 11-2. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts.

Impacts are rated prior to mitigation and again after consideration of the mitigation has been applied; post-mitigation is referred to as the residual impact. The significance of an impact is determined and categorised into one of seven categories (The descriptions of the significance ratings are presented in Table 11-3).

It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, (i.e., there may already be some mitigation included in the engineering design). If the specialist determines the potential impact is still too high, additional mitigation measures are proposed.

Table 11-1: Impact assessment parameter ratings

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
7	Irreplaceable loss or damage to biological or physical resources or **highly** sensitive environments. Irreplaceable damage to **highly sensitive** cultural/social resources.	Noticeable, on-going natural and / or social benefits which have improved the overall conditions of the baseline.	International The effect will occur across international borders.	Permanent: The impact is irreversible, even with management, and will remain after the life of the project.	Definite: There are sound scientific reasons to expect that the impact will definitely occur. >80% probability.
6	Irreplaceable loss or damage to biological or physical resources or **moderate to highly** sensitive environments. Irreplaceable damage to cultural/social resources of **moderate to highly** sensitivity.	Great improvement to the overall conditions of a large percentage of the baseline.	National Will affect the entire country.	Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost certain / Highly probable: It is most likely that the impact will occur. <80% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
5	Serious loss and/or damage to physical or biological resources or **highly** sensitive environments, limiting ecosystem function. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread benefits to local communities and natural features of the landscape.	Province/ Region Will affect the entire province or region.	Project Life (>15 years): The impact will cease after the operational life span of the project and can be reversed with sufficient management.	Likely: The impact may occur. <65% probability.
4	Serious loss and/or damage to physical or biological resources or **moderately** sensitive environments, limiting ecosystem function. On-going serious social issues. Significant damage to structures / items of cultural significance.	Average to intense natural and / or social benefits to some elements of the baseline.	Municipal Area Will affect the whole municipal area.	Long term: 6-15 years and impact can be reversed with management.	Probable: Has occurred here or elsewhere and could therefore occur. <50% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
3	Moderate loss and/or damage to biological or physical resources of **low to moderately** sensitive environments and, limiting ecosystem function. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	Local Local extending only as far as the development site area.	Medium term: 1-5 years and impact can be reversed with minimal management.	Unlikely: Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur. <25% probability.
2	**Minor loss and/or effects** to biological or physical resources or low sensitive environments, not affecting ecosystem functioning. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by a small percentage of the baseline.	Limited Limited to the site and its immediate surroundings.	Short term: Less than 1 year and is reversible.	Rare / improbable: Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. <10% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
1	**Minimal to no loss** and/or effect to biological or physical resources, not affecting ecosystem functioning. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level natural and / or social benefits felt by a very small percentage of the baseline.	Very limited/Isolated Limited to specific isolated parts of the site.	Immediate: Less than 1 month and is completely reversible without management.	Highly unlikely / None: Expected never to happen. <1% probability.

Table 11-2: Probability/consequence matrix

Significance																																						
-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Consequence																																						

Table 11-3: Significance rating description

Score	Description	Rating
109 to 147	A very beneficial impact that may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change	Major (positive) (+)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and / or social) environment	Moderate (positive) (+)
36 to 72	A positive impact. These impacts will usually result in positive medium to long-term effect on the natural and / or social environment	Minor (positive) (+)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and / or social environment	Negligible (positive) (+)
-3 to -35	An acceptable negative impact for which mitigation is desirable. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural and / or social environment	Negligible (negative) (-)
-36 to -72	A minor negative impact requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the natural and / or social environment	Minor (negative) (-)
-73 to -108	A moderate negative impact may prevent the implementation of the project. These impacts would be considered as constituting a major and usually a long-term change to the (natural and / or social) environment and result in severe changes.	Moderate (negative) (-)
-109 to -147	A major negative impact may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts are likely to be irreversible and/or irreplaceable.	Major (negative) (-)

11.2 The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

Table 11-4 provides a basic summary of the environmental aspects expected to be impacted by the Project activities.

Table 11-4: Environmental Aspects affected by Project Activities

Project Activity	Aspect
Site/vegetation clearance	Groundwater
	Surface Water
	Soils
	Fauna and Flora
	Wetlands
	Air Quality
	Noise
	Heritage
Access and haul road construction	Surface Water
	Soils
	Wetlands
Infrastructure construction	Surface Water
	Soils
	Fauna and Flora
	Wetlands
	Air Quality
	Noise
	Heritage
	Socio-Economic
Power line construction	Wetlands
Topsoil stockpiling	Surface Water
	Soils
	Wetlands
Removal of rock (blasting)	Groundwater
	Wetlands
	Fauna and Flora
Stockpiling (ROM) establishment and operation	Groundwater
	Surface Water

Project Activity	Aspect
	Soils
	Wetlands
	Fauna and Flora
Operation of the underground workings (potential subsidence)	Groundwater
	Wetlands
	Heritage
	Fauna and Flora
	Wetlands
	Air Quality
Operating sewage and water reticulation	Surface Water
	Fauna and Flora
Maintenance activities – through the operations maintenance will be undertaken to ensure that all infrastructure and machinery are operating optimally and do not pose a threat to human or environmental health. Maintenance will include haul roads, pipelines, machinery, water and stormwater management infrastructure, stockpile areas etc	Surface Water
	Wetlands
Demolition and removal of infrastructure – once mining activities have been concluded infrastructure will be demolished in preparation of the final land rehabilitation.	Groundwater
	Soils
	Fauna and Flora
	Wetlands
	Socio-Economic
Rehabilitation – rehabilitation mainly consists of spreading of the preserved subsoil and topsoil, profiling of the land and re-vegetation	Groundwater
	Soils
	Fauna and Flora
	Wetlands
Post-closure monitoring and rehabilitation	Groundwater
	Surface Water
	Soils
	Fauna and Flora
	Wetlands

11.3 The possible mitigation measures that could be applied and the level of risk

Possible mitigation measures that could be applied to risks regarding the site layout will be considered and discussed as part of the EIA Phase. The infrastructure layout plan will be designed to limit, prevent and avoid potential environmental and social impacts. The layout plan will also take into consideration the comments received form I&APs once the PPP has been initiated as well as the findings of the specialist investigations as part of the EIA Phase. The proposed mitigation measures for the assumed risks (to be confirmed during the EIA Phase) are also listed in Table 12-1below.

11.4 The outcome of the site selection matrix and final layout plan

The final layout plan will be confirmed during the EIA Phase and included in the EIA Report however, the site selection is based on the position of the coal resource and therefore only infrastructure layout will be finalised during the EIA Phase.

11.5 Motivation where no alternatives sites were considered

The preliminary alternatives considered for the Project include the infrastructure layout, the method of mining and the “No-Go” alternative. Refer to Section 9 above.

11.6 Statement motivating the preferred site

The preferred site locations are mostly determined by the location of the coal resource (and the optimal extraction thereof) and the financial viability to access the resource through underground mining methods. Furthermore, the Applicant holds existing Mining Rights to the areas proposed to be mined. The location of land occupiers and environmental factors are also taken into account.

12 Plan of study for the environmental impact assessment process

The purpose of the EIA phase will be to investigate the potential negative and positive impacts of a proposed project activity on the environment. The potential impacts will then be quantified to assess the significance that an impact may pose on the receiving environment. The objectives of the EIA process are to:

- Ensure that the potential biophysical and socio-economic impacts of the proposed Project, including those as a result of blasting impacts, are taken into consideration during the decision-making process;
- Ensure that the Project activities undertaken do not have a substantial detrimental impact on the environment by presenting management and mitigation measures that will avoid and/or to reduce those impacts;
- Ensure that I&APs are informed about the proposed Project and the PPP to be followed;

- Ensure that I&APs are given an opportunity to raise concerns; and
- Provide a process aimed at enabling authorities to make an informed decision, especially in respect of their obligation to take environmental and social considerations into account when making those decisions.

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

The alternatives assessed are presented in Section 9.1, above, including the “No-Go” alternatives.

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

The EIA Phase will assess the overall aspects affected by the proposed Project in relation to Listed and non-listed Project activities. The identified Listed and specified Activities for the Project are included in Section 5.1.1, above, and the specifically affected environmental aspects which will also form part of the EIA Phase are contained in section 12.3 below.

12.3 Description of aspects to be assessed by specialists

The following Specialist Impact Assessments will be undertaken as part of the EIA Phase:

- Groundwater Impact Assessment;
- Surface Water Impact Assessment;
- Land Use, Land Capability and Soil Impact Assessment;
- Fauna Impact Assessment;
- Flora Impact Assessment;
- Wetland Delineation and Impact Assessment;
- Aquatic Ecology Impact Assessment;
- Hydropedology Impact Assessment
- Air Quality Impact Assessment;
- Noise Impact Assessment;
- Heritage Impact Assessment;
- Social Impact Assessment;
- Geochemical Assessment;
- Rehabilitation; and
- Closure (Financial Provisioning).

12.4 Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives

The full Impact Assessment methodology is included in Section 11.1.2 above and the methodology to be used by the relevant Specialists is described in this section. The methodology used for the assessment of alternatives during the EIA Phase is described below.

12.5 The proposed method of assessing duration significance

The Impact Assessment methodology is contained in Table 11-3, above. For cumulative analysis, the following will be considered:

- Existing operations in the areas that could contribute, inter alia, to air pollution, groundwater contamination, surface water contamination, noise and wetland health;
- Potential of blast impacts on surrounding historical resources, communities and mining operations;
- Acid Mine Drainage (AMD) is considered a factor in the general Project Area, and will further considered in the EIA phase;
- Other contributions to surface water and groundwater pollution; and
- Loss of heritage resources.

12.6 Stages at which the competent authority will be consulted

The relevant authority for this Project is the DMR who will be informed throughout the MRA process. The DMR has also been identified as a Key Stakeholder and will be provided all notifications provided to I&APS, throughout the process. The DMR will also be invited to attend a site inspection and the public meetings. The following project dates apply to the Project Schedule:

- Submission of the Application Form: 13 November 2020;
- Submission of the Draft Scoping Report for Public Review: 13 November 2020 – 14 December 2020;
- Submission of Updated Scoping Report : 25 January 2021;
- Expected submission of the Draft EIA: April/May 2021; and
- Expected submission of Updated EIA: July 2021.

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

Stakeholder comments gathered during the Scoping Phase and outcomes from the public consultations were considered for further Public Participation activities and inclusion for specialist studies (where applicable). The main emphasis of stakeholder consultations as part

of this phase was to share results of the specialist impact studies completed and the associated suggested mitigation measures and recommendations.

It is anticipated that the Stakeholder Engagement process to be implemented for the EIA phase will be similar to the process undertaken for the Scoping phase. The premise of activities is to adhere to various legislative requirements for Public Participation and that a single, integrated process is followed. This will limit stakeholder fatigue and ensure that stakeholders are presented with a single view of the Project. The public shall be consulted during the EIA Phase to present the findings of the EIA process.

It must be noted that cognisance of the current South African Lockdown Regulations and COVID-19 pandemic shall be adhered to during all Public Participation Activities.

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

The following tasks will be undertaken during the EIA phase:

- Further define the project activities;
- Further assess the project alternatives based on technical, economic, social and environmental criteria;
- Supplement the legal review of the project;
- Undertake detailed specialist investigations;
- Confirm sewage generation volume, treatment technology;
- Confirm water requirements for the different phases of the mine and water resource;
- Identification of possible fatal flaws;
- Assess potential impacts using the methodology provided herein;
- Provide detailed and feasible mitigation and management measures in an EMP;
- Align all existing EMPs for the DECM operations into one document applicable to existing and new activities currently under this application; and
- Public participation activities, including public and key stakeholder meetings.

12.9 Measures to avoid, reverse, mitigate, or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored

Table 12-1 provides the proposed project activities, potential impact associated with each activity and proposed preliminary mitigation and residual risk, per environmental aspect.

Table 12-1: Potential Impacts and Mitigation Measures

Aspect	Potential impacts	Mitigation type	Potential for residual risk
Groundwater	• No impact on the groundwater is expected, as the site clearance is expected to take place above the water table	• The said project activity has to cover minimal area and it has to be managed efficiently and be carried in dry season where there less chances of or no recharge into the aquifer.	Low to negligible
	• Temporary storage and handling of hazardous products is considered to have minimal or no impact on the groundwater resource however, if these are not managed and/ or handled with care they may pose risk to groundwater contamination.	• The hazardous products should be stored in low sensitivity areas. Additionally, they need to be handled with caution.	Low
	• Increased zone or cone of depression due to dewatering activities.	• The size of the cone of depression should be maintained at phases of the mine.	Medium
	• Acid Mine Drainage generation and expansion of the TSFs.	• Acid generating rock should be geochemically analyzed and be deposited in a certified waste facility. This should meet the NEMA guidelines or standards. The expansion of the TSF should be conducted in accordance with DWS standards.	Medium
	• Possible impact on the groundwater quality downstream.	• Monitoring leakages and groundwater quality to detect contaminants.	Low
Surface Water	• Sedimentation and siltation of nearby watercourses; • Downstream water users (irrigation, livestock watering and domestic uses) will be negatively affected by reduced water quality.	• Limit clearance and soil disturbance to the development footprint; • Stormwater control including installation of drains, berms and storage structures	Moderate
	• Geological configurations at the project site viewed in relation to drainage networks suggest possible groundwater/surface water interaction through soil-bedrock interflow. Interception of interflow by excavated mine pits will likely cause streamflow reduction in adjacent rivers thereby impacting on downstream water users. This shall be verified through hydropedological assessments in the area. • Increase of paved surfaces and subsequent increase in potential flooding • Contamination of surface water resources leading to deteriorated water quality	• Bunding hydrocarbon storage facilities; • Use of spill kits and accredited vendors for waste disposal; • Training of personnel in proper hydrocarbon and chemical handling procedures.	High

Aspect	Potential impacts	Mitigation type	Potential for residual risk
Soils	• Compaction of soil; • Increased runoff potential; and • Increased erosion and consequently sedimentation potential.	• Keep site clearing to a minimal and restrict vehicle movement outside of dedicated areas, specifically close to wetlands (pans); • Make use of existing roads to encourage minimal impacts/footprint to the Project Area; • During soil stripping, topsoil should me stockpiled separate from subsoil to enhance the rehabilitation process; • Introduce concurrent backfill and rehabilitation of mined areas to reduce the time of stockpiling; • While soils are being stockpiled, the soils should be revegetated to limit erosion and loss of organic material; • Establishment of effective vegetation around constructed infrastructure for adequate soil protection from wind and water erosion; • If any erosion occurs, corrective actions must be taken to minimise any further erosion from taking place at regular intervals or after high rainfall events; • Runoff must be controlled and managed by use of proper stormwater management measures; • Vehicles should regularly be surveyed and checked that oils spills and other contaminants are not exposed to the soils; • Re-fuelling must take place on bunded impervious surfaces to prevent seepage of hydrocarbons into the soil; • All vehicles and machines must be parked within hard park areas and must be checked daily for fluid leaks; and • Fuel, grease and oil spills should be remediated using commercially available emergency clean up kits. However, for major spills (>5L), if soils are contaminated, they must be stripped and disposed of at a licensed waste disposal site.	High
	• Compaction of soil; • Increased runoff potential; • Increased wind and water erosion and consequently sedimentation potential; • Removal of vegetation, basal cover and thus increasing the potential of loss of topsoil, organic material and increased erosion potential; and • Compaction, ponding and landscaping of the area.		Low
	• Increased vehicle movement in the area, increasing soil compaction and runoff potential; • Increased hardened surfaces resulting in increased hydrological functioning; • Potential spillage of hydrocarbons such as oils, fuels and grease, thus contamination of the soils; • Increased dust, erosion and sedimentation; and • Removal of natural vegetation and loss of basal cover.		Low
	• Soil Contamination from Hydrocarbon waste (lubricants, explosives and fuels); and • Soil compaction resulting from the movement of heavy machinery within the Project Area.		High
Fauna and Flora	• Surface movement due to subsidence may lead to areas of destabilisation causing vegetation slumping, tree falls, erosion and root exposure. • Loss of a portion of vegetation that is representative of an endangered vegetation type and reduction of wetland and grassland habitat for fauna through subsidence of soil. • Ground fractures may cause significant changes to hydrology properties of soils	• Limit degradation and destruction of natural environment to designated project areas by keeping the footprint of the disturbed area to the minimum and within designated areas only. • Develop a numerical model based on site geological data to refine predicted cracking and subsidence impacts. The modelling is to inform the finalisation of the subsidence management plan impact methodology and outcomes. • If mining infrastructure is to cross the underground mining footprint, design infrastructure to be resistant to the effects of subsidence • Ensure accurate prediction of dynamic and final surface and subsurface movements. • Ensure properly designed and implemented subsidence mitigation measures.	Low

Aspect	Potential impacts	Mitigation type	Potential for residual risk
	and promote desiccation or inundation that can directly impact vegetation. A breakdown in soil structure may lead to erosion which may in turn lead to increased movement of sediment downstream during rainfall events, therefore reducing water quality. • Depression of the surface due to subsidence may lead to water ponding after rain and can become permanent. Impacts may include inundation of vegetation causing death if ponding happens for substantial periods. If ponding is periodic it may impact on a gradual selection of species.	• Establish monitoring locations One year prior to commencement of underground mining. • Establish exclusion zones and remove cattle from underground mining footprint.	
Aquatics	• Habitat fragmentation; • Spread of alien and invasive species; • Soil disturbance and/or compaction; • Increased incidence of erosion; • Sedimentation from erosion; • Potential water quality deterioration; and • Disturbance to avifauna and other fauna utilising the freshwater resources thus resulting in an overall loss of biodiversity.	• Environmental Practitioner to be present during vegetation clearing to prevent unnecessary clearing of extensive areas not part of the direct footprint area. • The edge of the non-directly impacted freshwater resources, and at least a 100m buffer or 1:100 floodline buffer, should be clearly demarcated in the field with wooden stakes painted white as no-go zones that will last for the duration of the construction phase. • Freshwater resource monitoring must be carried out during the construction phase by a wetland and aquatic specialist to ensure no unnecessary impact to the freshwater resources occur; and if so that a solution is put in place as soon as possible. • An alien and invasive plant species management programme must be implemented during the construction phase. • Carry out the Storm Water Management Plan. This must be in operation prior to the construction phase and freshwater resources must be highlighted as sensitive receptors.	Low
	• Fragmentation of the freshwater resources as a result of road crossings; • Loss of freshwater resource habitat (soils and vegetation) due to both direct and indirect impacts; • Potential loss of wetland ecosystems or part thereof; and • Loss of ecological services at the local and catchment scale.	• The clean and dirty water separation systems must be some of the first infrastructures installed on site and care must be taken to ensure that contamination of the receiving environment as a result of the open pit mining activities is minimised as far as possible; • Ensure a soil management programme is implemented and maintained to minimise erosion and sedimentation; • Actively re-vegetate disturbed areas immediately after construction; • Install vegetation covers on all topsoil stockpiles; • Implement and maintain an alien vegetation management programme; • If it is absolutely unavoidable that any of the wetland areas will be affected, disturbance must be minimised and suitably rehabilitated; • Ensure no incision and canalisation of the wetland features takes place;	Low

Aspect	Potential impacts	Mitigation type	Potential for residual risk

		• Erosion berms should be installed on roadways and downstream of stockpiles and waste rock dumps to prevent gully formation and siltation of the freshwater resources. The following points should serve to guide the placement of erosion berms:
		  ◦ Where the track has a slope of less than 2%, berms every 50m should be installed;
		  ◦ Where the track slopes between 2% and 10%, berms every 25m should be installed;
		  ◦ Where the track slopes between 10%-15%, berms every 20m should be installed; and
		  ◦ Where the track has a slope greater than 15%, berms every 10m should be installed.
		• All erosion observed within the construction footprint should be remedied immediately and included as part of an ongoing rehabilitation plan;
		• All soils compacted as a result of construction activities should be ripped/scarified (<300mm) and profiled;
		• The edge of the freshwater resources, and at least a 100m buffer or 1:100 floodline buffer, should be clearly demarcated in the field with wooden stakes painted white as no-go zones that will last for the duration of the construction phase.
		• Allow only essential personnel within the buffer areas for all freshwater features identified;
		• All areas of increased ecological sensitivity should be designated as “No-Go” areas and be off limits to all unauthorised vehicles and personnel;
		• No crossing of the wetland features and their associated buffers should take place and the substrate conditions of the wetlands and downstream stream connectivity must be maintained;
		• At areas where road crossings have been designed, these roads should cross wetland or river features at the narrowest point and at a 90-degree angle with suitable drainage designed into the relevant bridge crossing;
		• Wherever possible, restrict construction activities to the drier months to avoid sedimentation of the wetlands and the aquatic resources further downstream;
		• No material will be dumped or stockpiled within any rivers, tributaries or drainage lines in the vicinity of the proposed footprint area.
		• No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas and their associated buffer zones. All vehicles must remain on demarcated roads and within the construction footprint;
		• All vehicles must be regularly inspected for leaks;
		• Re-fuelling must take place on a sealed surface area away from wetlands to prevent ingress of hydrocarbons into topsoil;
		• All spills will be immediately cleaned up and treated accordingly; and
		• Appropriate sanitary facilities must be provided for the duration of the construction activities and all waste must be removed to an appropriate waste facility.	

	• Loss of wetland habitat; • Potential habitat fragmentation; • Increased erosion potential;	• Environmental Practitioner to be present during the operational phase to prevent unnecessary clearing of extensive areas not part of the direct footprint area.	Medium

Aspect	Potential impacts	Mitigation type	Potential for residual risk

	• Potential impacts as a result of sedimentation;
	• Loss of water supply;
	• Impacts to natural flow regimes;
	• Potential loss of water quality further downstream
	• Loss of biodiversity;
	• Alterations to natural river channels; and
	• Alterations to water distribution and volume.
		• The edge of the non-directly impacted freshwater resources, and at least a 100m buffer or 1:100 floodline buffer, should be clearly demarcated in the field with wooden stakes painted white as no-go zones that will last for the duration of the operational phase.
		• All areas of increased ecological sensitivity should be designated as “No-Go” areas and be off limits to all unauthorised vehicles and personnel;
		• Freshwater resource monitoring must be carried out during the operational phase by a wetland specialist to ensure no unnecessary impact to the freshwater resources present; and if so that a remedy is put in place as soon as possible.
		• Ensure a soil management programme is implemented and maintained to minimise erosion and sedimentation;
		• All erosion noted within the operational footprint should be remedied immediately and included as part of an ongoing rehabilitation plan;
		• Ensure that no incision and canalisation of the wetland features present takes place;
		• Erosion berms should be installed on roadways and downstream of stockpiles and waste rock dumps to prevent gully formation and siltation of the freshwater resources. The following points should serve to guide the placement of erosion berms:
		  ◦ Where the track has a slope of less than 2%, berms every 50m should be installed;
		  ◦ Where the track slopes between 2% and 10%, berms every 25m should be installed;
		  ◦ Where the track slopes between 10%-15%, berms every 20m should be installed; and
		  ◦ Where the track has a slope greater than 15%, berms every 10m should be installed.	

	• Increased potential for erosion, sedimentation and deposition impacts; • Loss of water quality; and • Loss of habitat and biodiversity.	• Actively re-vegetate disturbed areas immediately after construction; • Implement and maintain an alien vegetation management programme; • Install vegetation covers on all topsoil stockpiles; • If it is absolutely unavoidable that any of the wetland areas present will be affected, disturbance must be minimised and suitably rehabilitated; • All soils compacted as a result of construction activities should be ripped/scarified (<300mm) and profiled; • No material will be dumped or stockpiled within any rivers, tributaries or drainage lines; • No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas or their buffer areas. All vehicles must remain on demarcated roads and within the operational footprint; • All vehicles must be regularly inspected for leaks; • Re-fuelling must take place on a sealed surface area away from wetlands to prevent ingress of hydrocarbons into topsoil; • All spills will be immediately cleaned up and treated accordingly; and • Appropriate sanitary facilities must be provided for the duration of the operational phase and all waste must be removed to an appropriate waste facility.	Medium

Aspect	Potential impacts	Mitigation type	Potential for residual risk

	• Fragmentation of the freshwater resources as a result of road crossings;
	• Contamination of freshwater resources;
	• Impacts to water quality as a result of spills;
	• Compaction of soils;
	• Loss of habitat and biodiversity;
	• Increased potential for sheet runoff from paved/cleared surfaces;
	• Increased potential for erosion.
		• Ensure that no incision and canalisation of the wetland features present takes place;
		• Erosion berms should be installed on roadways and downstream of stockpiles and waste rock dumps to prevent gully formation and siltation of the freshwater resources. The following points should serve to guide the placement of erosion berms:
		  • Where the track has a slope of less than 2%, berms every 50m should be installed;
		  • Where the track slopes between 2% and 10%, berms every 25m should be installed;
		  • Where the track slopes between 10%-15%, berms every 20m should be installed; and
		  • Where the track has a slope greater than 15%, berms every 10m should be installed.
		• All erosion observed within the operational footprint should be remedied immediately and included as part of an ongoing rehabilitation plan;
		• All soils compacted as a result of operational activities should be ripped/scarified (<300mm) and profiled;
		• The edge of the freshwater resources, and at least a 100m buffer or 1:100 floodline buffer, should be clearly demarcated in the field with wooden stakes painted white as no-go zones that will last for the duration of the construction phase.
		• Allow only essential personnel within the buffer areas for all freshwater features identified;
		• All areas of increased ecological sensitivity should be designated as “No-Go” areas and be off limits to all unauthorised vehicles and personnel;
		• No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas and their associated buffer areas. All vehicles must remain on demarcated roads and within the operational footprint;
		• All vehicles must be regularly inspected for leaks;
		• Re-fuelling must take place on a sealed surface area away from wetlands to prevent ingress of hydrocarbons into topsoil; and
		• All spills should be immediately cleaned up and treated accordingly.
			Medium

	• Erosion and sedimentation;
	• Impacts to the water quality of the groundwater, local and downstream resources;
	• Potential loss of water supply from adjacent soils;
	• Surface water runoff, ultimately resulting in a loss of catchment yield;
	• Dewatering activities are likely to result in the loss of water supply to the freshwater systems present and in turn, moisture stress to the surrounding riparian and wetland vegetation;
		• Ensure a soil management programme is implemented and maintained to minimise erosion and sedimentation;
		• The edge of the non-directly impacted freshwater resources, and at least a 100m buffer or 1:100 floodline buffer, should be clearly demarcated in the field with wooden stakes painted white as no-go zones that will last for the duration of the operational phase. The pit areas should not extend into freshwater areas and buffer zones;
		• Erosion berms should be installed downgradient of the pit areas to prevent gully formation and siltation of the freshwater resources. The following points should serve to guide the placement of erosion berms:
		  • Where the track has slope of less than 2%, berms every 50m should be installed;
		  • Where the track slopes between 2% and 10%, berms every 25m should be installed;
		  • Where the track slopes between 10%-15%, berms every 20m should be installed; and
			High

Aspect	Potential impacts	Mitigation type	Potential for residual risk
	• Disturbed soils may give rise to the spread and proliferation of alien and invasive species	• Where the track has slope greater than 15%, berms every 10m should be installed. • Concurrent rehabilitation is recommended, and pit areas should be backfilled and suitably rehabilitated on an ongoing basis for the life of the proposed operation; • Allow only essential personnel within the buffer areas for all freshwater features identified; • All areas of increased ecological sensitivity should be designated as “No-Go” areas and be off limits to all unauthorised vehicles and personnel; • No material will be dumped or stockpiled within any rivers, tributaries or drainage lines in the vicinity of the proposed pit footprint areas. • No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas and their associated buffer zones. All vehicles must remain on demarcated roads and within the construction footprint; • All vehicles must be regularly inspected for leaks; • Re-fuelling must take place on a sealed surface area away from wetlands to prevent ingress of hydrocarbons into topsoil; • All spills should be immediately cleaned up and treated accordingly; and • Appropriate sanitary facilities must be provided for the duration of the operational activities and all waste must be removed to an appropriate waste facility.	
	• Erosion onset; • Sedimentation; and • Establishment of alien plants.	• The edge of the non-directly impacted freshwater resources, and at least a 100m buffer or 1:100 floodline buffer, should be clearly demarcated in the field with wooden stakes painted white as no-go zones that will last for the duration of the decommissioning phase; • All areas of increased ecological sensitivity should be designated as “No-Go” areas and be off limits to all unauthorised vehicles and personnel; • Actively re-vegetate disturbed areas immediately after decommissioning; • Implement and maintain an alien vegetation management programme for the duration of the decommissioning phase and into closure; • All soils compacted as a result of mining activities should be ripped/scarified (<300mm), profiled and re-seeded with indigenous vegetation; • No material will be dumped within any rivers, tributaries or drainage lines; • No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas or their buffer areas. All vehicles must remain on demarcated roads; • All vehicles must be regularly inspected for leaks; • Re-fuelling must take place on a sealed surface area away from wetlands to prevent ingress of hydrocarbons into topsoil; • All spills should be immediately cleaned up and treated accordingly; and • Appropriate sanitary facilities must be provided for the duration of the decommissioning phase and all waste must be removed to an appropriate waste facility.	Medium
	• Improper infilling and profiling, resulting in the creation of preferential flow paths and thus increasing the potential for erosion;	• Ensure no incision and canalisation of the wetland features takes place; • Erosion berms should be installed downstream of areas to be re-profiled and contoured to prevent gully formation and siltation of the freshwater resources. The following points should serve to guide the placement of erosion berms:	Medium

Aspect	Potential impacts	Mitigation type	Potential for residual risk
	• Improper rehabilitation of compacted soils, resulting in poor vegetation cover; and • Increased potential for the spread and establishment of alien and invasive species.	• Where the track has a slope of less than 2%, berms every 50m should be installed; • Where the track slopes between 2% and 10%, berms every 25m should be installed; • Where the track slopes between 10%-15%, berms every 20m should be installed; and • Where the track has a slope greater than 15%, berms every 10m should be installed. • All erosion observed within the operational footprint should be remedied immediately and included as part of an ongoing rehabilitation plan; • All soils compacted as a result of operational activities should be ripped/scarified (<300mm) and profiled; • Active re-vegetation of exposed soils should take place to prevent the onset of erosion; • Implement and maintain an alien vegetation management programme for the duration of the rehabilitation phase and into closure; • No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas and their associated buffer areas. All vehicles must remain on demarcated roads and within the rehabilitation footprint; • All vehicles will be regularly inspected for leaks; • Re-fuelling must take place on a sealed surface area away from wetlands to prevent ingress of hydrocarbons into topsoil; and • All spills should be immediately cleaned up and treated accordingly.	
	• Loss of habitat integrity and ecosystem services such as toxicant removal and water for human use; • Loss of water quality to downstream freshwater resources; and • Loss of biodiversity and sensitive fauna and flora.	• If post-mining decant takes place within proximity to, or within riverine/wetland areas, this water should be treated prior to release into the environment. • Passive water treatment options should be considered as a priority, as this is more sustainable for the post-closure scenario.	High
Heritage	• Damage to or destruction of heritage resources generally protected under Sections 34, 35 and 36 of the NHRA (i.e. previously unidentified archaeological and fossiliferous material or burial grounds and graves respectively)	• Reactive – mitigate impacts.	• Medium
	• BGG-001 is located in the proposed opencast pit footprint. The establishment of this pit will result in destruction of the resource.	• Proactive - avoid	• Low to High Risk
	• HST-001 is located in the proposed opencast pit footprint. The establishment	• Proactive - avoid	• Low to High Risk

Aspect	Potential impacts	Mitigation type	Potential for residual risk
	of this pit will result in destruction of the resource.		
	• Th establishment of the pit may affect heritage resources afforded general protection under Sections 34, 35 and 36 of the NHRA (i.e. historical buildings, archaeological and palaeontological material and burial grounds and graves respectively)	• Proactive - avoid	• Medium Risk
Socio-Economic	• Local employment creation	• Implement measures to increase local employment opportunities	• Medium positive
	• Community health, safety and security • Population influx • Dust • Blasting • Traffic	• Influx Management Plan • Dust suppression measures • Blasting Management Plan • Traffic Management Plan	• Low negative
	• Loss of cultivated land impacting on crop yields and livelihoods (farmers and farm employees	• Minimize loss of agricultural land by consolidating infrastructure • Full and fair compensation for loss of land • Livelihood restoration measures	• Medium negative
	• Disruption of movement patterns	• Consider access routes as well as land-take when consolidating infrastructure • Establish appropriate crossing points	• Low negative
	• Multiplier effects on local and regional economy	• Increase local procurement, local employment, skills training as per SLP	• Medium positive
	• Sense of place	• Implement noise and dust management measures (other specialist studies) • Mine infrastructure to be located as far away from private infrastructure as possible	• Low negative
	• Community development	• Identify households and persons within affected communities through survey • Implement SLP commitments • Monitor and evaluate implementation of SLP	• Medium positive
	• Loss of employment and multiplier effects on local and regional economies	• Implement measures stipulated in SLP • Plan and implement community development projects to be sustainable beyond the life of the mine	• Low negative

13 Other information required by the competent authority

In accordance with the provisions of Regulation 23(3) of the EIA Regulations, 2014 (as amended)the EIA should include all information required as set out in Appendix 3 and in terms of Regulation 23(4) the EMP should contain all information required as set out in Appendix4. The Competent Authority has not requested any other information. The EIA report must include the following:

- Details of the EAP who prepared the report and the expertise of the EAP, including a curriculum vitae;
- A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale;
- A description of the scope of the proposed activity;
- A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;
- A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;
- A full public participation process including a CRR in the EIR;
- Impact Assessment, including methodology, of the necessary environmental aspects, including the nature, significance, extent, duration and probability of the impacts occurring, positive and negative impacts, including mitigation and monitoring measures;
- An assessment of the proposed alternatives;
- A complete EMPr;
- An impact statement from the EAP, specific information the Competent Authority may require, and conditions for approval; and
- An EAP oath regarding the correctness of information provided in the report.

13.1 Impact on the socio-economic conditions of any directly affected person

Potential negative and positive impacts may arise as a result of the proposed Project. The negative impacts are associated with population influx as job seekers move into the area. The population influx may result in increased demand on health, infrastructure, basic and emergency services, conflict and xenophobia between local residents and job seekers, increase in crime and social issues. The local communities may have unrealistic expectations for employment.

Positive impacts include the recruitment of local residents for employment, the increase in GDP for the region, skills transfer and upliftment of the local communities, and income generation.

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

A full Heritage Impact Assessment will be undertaken during the EIA Phase in compliance with Section 38 of the NHRA. Any resources identified on site will be recorded, labelled and the appropriate mitigations applied.

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

Section 24(4)(b)(i) of the NEMA (as amended), provides that an investigation must be undertaken of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity.

14 Undertaking regarding correctness of information

I, Xan Taylor, herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected parties has been correctly recorded in the report.

Signature of the EAP: 

Date: November 2020

15 Undertaking regarding level of agreement

I, Xan Taylor, herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

Signature of the EAP: 

Date: November 2020

Appendix A: CV and Qualifications of the EAP

Appendix B: Plans

DIGBY WELLS
ENVIRONMENTAL

Appendix C: Authorisations

DIGBY WELLS
ENVIRONMENTAL

Appendix D: Public Participation Chapter