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Environmental Authorisation for Proposed Additional Infrastructure at the Universal Coal Development III (Pty) Ltd, Ubuntu Colliery, Nkangala, Mpumalanga Province

Final Scoping Report

Prepared for:

Universal Coal Development III (Proprietary) Limited

Project Number:

UCD6097

DMRE Reference number:

MP 30/5/1/1/2/10027 EM

January 2021



This document has been prepared by Digby Wells Environmental.

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Project Name:	Environmental Authorisation for Proposed Additional Infrastructure at the Universal Coal Development III (Pty) Ltd, Ubuntu Colliery, Nkangala, Mpumalanga Province
Project Code:	UCD6097

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EXECUTIVE SUMMARY

Introduction

Universal Coal Development III (Pty) Ltd (hereafter Universal Coal) secured a mining right (MP 30/5/1/1/2/10027 MR) for the formerly known Brakfontein Colliery in 2017. The Environmental Management Plan (EMP) was also approved at the same time. Subsequently, the Colliery name was amended in January 2019 to reflect the name change of the mine to Ubuntu Colliery. This application focuses on the inclusion of additional infrastructure not previously considered in the original applications.

Project applicant

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

Name of Applicant:	Universal Coal Development III (Proprietary) Limited		
Registration number (if any):	2008/009596/07		
Trading name (if any):	N/A		
Responsible person: (E.g. CEO, Director, etc.)	Environmental Officer		
Contact person:	Peter Ntsoane		
Physical address:	Universal Coal Head Office, 467 Fehrsen Street, Brooklyn, Pretoria, 0181		
Postal address:	PO Box 2423, Brooklyn Square		
Postal code:	0075	Cellphone:	066 479 5698
Telephone:	012 460 0805	Fax:	086 263 1365
Email:	p.ntsoane@universalcoal.com		

Environmental consultants

Digby Wells Environmental (Digby Wells) has been appointed by Universal Coal 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); and
- 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

Project overview

The activities originally approved for the Ubuntu Colliery did not include any processing infrastructure on site but to transfer the coal to Kangala Colliery for further processing (including crushing, screening and washing). This has subsequently proven to not be a feasible approach and crushing and screening is now taking place in the approved pit area with a mobile crushing and screening plant.

Further to onsite crushing and screening, additional infrastructure is required and is the subject of this application. The infrastructure is proposed to be within the approved Ubuntu Colliery Mining Right. The additional infrastructure includes, but not limited to, a district road diversion, stormwater diversion berm, workshop and water and sanitation infrastructure.

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.

Approach and methodology for the Public Participation

The COVID-19 Regulations, (Directions Regarding Measures to Address, Prevent and Combat the Spread of Covid-19 Relating to National Environmental Management Permits and Licences (GN R 650 of 5 June 2020)) as well as the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R 982 of 4 December 2014 as amended by GN R326 of 7 April 2017) (EIA Regulations, 2014), as amended promulgated under the NEMA, have been considered for this application process and Public Participation. The Public Participation Process (PPP) is central to the investigation of environmental and social impacts. Stakeholders who are affected by the proposed Project will be 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.

The following activities were undertaken to announce the Project and initiate the Scoping Phase:

- A Background Information Document (BID) was distributed via email to stakeholders on 5 November 2020;
- A newspaper advertisement was placed in the Streeknuus on 5 November 2020;
- An announcement letter including a registration form were distributed to identified I&APs via email on 5 November 2020;
- Site notices were placed around the site at prominent places on 5 November 2020; and
- The Draft Scoping Report was made available to I&APs through a data free website allowing access to download with no cost to the I&AP. The electronic copy could also be accessed and downloaded from the Digby Wells website - www.digbywells.com (Public Documents). The Public Review period will run from 6 November 2020 to 7 December 2020.

Project alternatives

The alternatives considered include the routing of the proposed diversion of the district road D2546 and the no-go alternative (the option of not proceeding with the Project).

Environmental baseline

The following baseline specialist studies were updated and included in the Scoping Report:

- Hydrology;
- Hydrogeology;
- Heritage;
- Groundwater;
- Freshwater Ecosystems (Wetland and Aquatic Biodiversity);
- Soils, Land Use and Capability; and
- Public Participation Process.

The Project Area is situated in the Witbank Coalfield within the Ecga Group of the Karoo Supergroup. While rich in coal seams below the surface, the land use at the surface is dominated by agriculture due to the presence of large areas being occupied by high potential soil. The Wilge River lies adjacent to the Project and is in a Moderately Modified state. Aquatic environments are negatively impacted by mining and agricultural activities such as roads, canalization, water abstraction/increased flows, irrigation, exotic vegetation, vegetation removal, erosion and sedimentation.

Potential impacts of the additional infrastructure on the baseline environment have been identified and can be summarised as follows:

- Surface and groundwater quality deterioration;
- Increased surface water runoff;
- Terrestrial and aquatic habitat disturbance, loss and/or fragmentation;
- Soil erosion and compaction; and
- Disturbance and destruction of heritage resources.

Closure, rehabilitation, visual and traffic impact studies shall be undertaken and included in the EIA Phase.

Conclusion

Universal Coal requires the approval in terms of the NEMA for the inclusion of additional infrastructure at the existing Ubuntu Colliery. 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. 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. Registered I&APs will be informed throughout the process.

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LIST OF APPENDICES

Appendix A: Approvals for the Ubuntu Colliery

Appendix B: EAP's CV and Qualifications

Appendix C: Public Participation Materials

1. Introduction

Universal Coal Development III (Pty) Ltd (hereafter Universal Coal) secured a mining right (MP 30/5/1/1/2/10027 MR) for the formerly known Brakfontein Colliery in 2017. The Environmental Management Plan (EMP) was also approved at the same time. Subsequently, the Colliery name was amended in January 2019 to reflect the name change of the mine to Ubuntu Colliery. The following approvals (Attached as Appendix A) exist for the Ubuntu Colliery:

- Mining Right and EMP issued by the Mpumalanga Department of Mineral Resources and Energy with reference number MP 30/5/1/1/2/10027 MR;
- The name change of the colliery from Brakfontein Colliery to Ubuntu Colliery on 29 January 2019; and
- Water Use License (WUL) issued by the Department of Water and Sanitation on 22 February 2019 with license number 03/B20E/ABCGIJ/4751.

This application focuses on the inclusion of additional infrastructure not previously considered in the original applications (i.e. Current EMP). This infrastructure triggers Listed Activities contemplated under the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) and thus the need for prior Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

This Scoping Report has been compiled in support of the NEMA application and will also form the basis for the EIA and the Environmental Management Programme (EMP) report.

Note: *The Ubuntu Colliery holds a Mining Right and EMP approved for mining. The subject of this report and application is only for the additional infrastructure.*

2. Project Applicant

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

2.1. Details of the Applicant

The details of the Project Applicant are provided in Table 2-1.

Table 2-1: Contact details of the Applicant

Name of Applicant:	Universal Coal Development III (Proprietary) Limited (Ubuntu Colliery)
Registration number (if any):	2008/009596/07
Trading name (if any):	N/A
Responsible person: (E.g. CEO, Director, etc.)	Environmental Officer

Contact person:	Peter Ntsoane		
Physical address:	Universal Coal Energy Holdings South Africa (Pty) Ltd, Head Office 467 Fehrsen Street Brooklyn Pretoria 0181		
Postal address:	PO Box 2423 Brooklyn Square		
Postal code:	0075	Cellphone:	066 479 5698
Telephone:	012 460 0805	Fax:	086 263 1365
Email:	p.ntsoane@universalcoal.com		

2.2. Item 2(a): Details of EAP

The details of the Environmental Assessment Practitioner (EAP) are provided in Table 2-2.

Table 2-2: Contact details of the EAP

Contact person:	Njabulo Mzilikazi
Company:	Digby Wells and Associates (South Africa) (Pty) Ltd
Contact person	Xan Taylor
Physical address:	48 Grosvenor Road, Turnberry Office Park, Digby Wells House, Bryan
Telephone:	011 789 9495
Email:	xan.taylor@digbywells.com

The declaration of independence and the Curriculum Vitae (indicating the experience with environmental impact assessment and relevant application processes) of the EAP is attached as Appendix B.

2.2.1. Qualifications of the EAP

Ms Xan Taylor holds the following degrees/diplomas:

- BA Honours Environmental Management – University of South Africa (2013)
- BA English and Psychology – University of South Africa (2009)

2.2.2. EAP Experience

Xan Taylor started working as a Consultant in 2012 and joined Digby Wells in 2015. She has eight years' experience. The majority of Xan's experience pertains to the mining sector applying for applications governed by the NEMA for both the 2010 and 2014 Regulations

thereunder, the MPRDA, the NWA, as well as international legislation; International Finance Corporation Performance Standards and World Bank Guidelines. Her experience comprises managing integrated mining applications: compiling application forms, Basic Assessment reports, Scoping reports, Environmental Impact Assessment reports, Environmental Management Programmes, international Environmental and Social Impact Assessments, NEMA Regulation 29 and Regulation 31 Amendment reports, Section 102 Amendment reports, exemption applications, Appeal processes, and auditing.

3. Item 2(b): Description of the Property

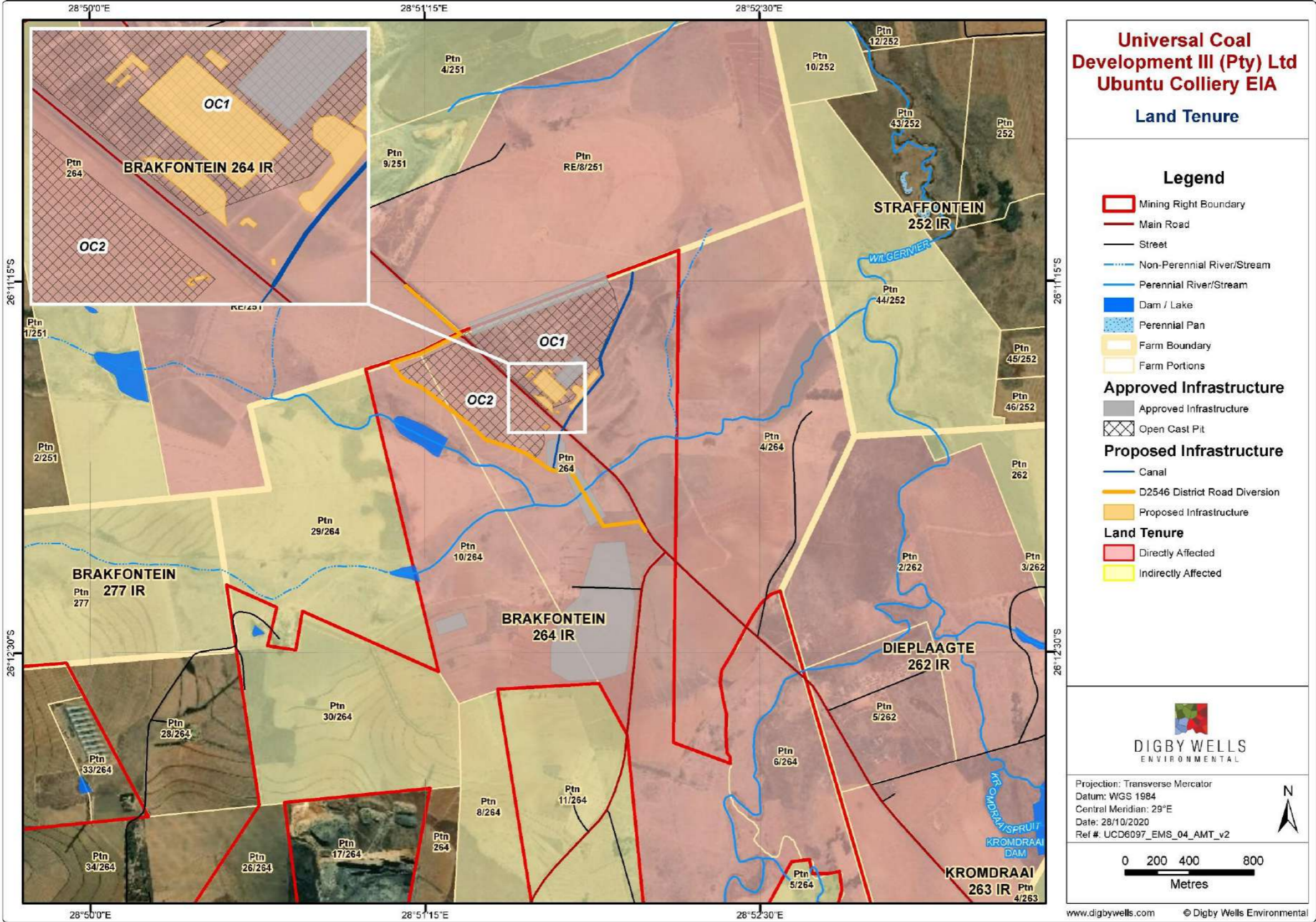
Ubuntu Colliery is located within the Western margins of the Witbank Coalfields within the jurisdiction of the Victor Khanye Local and Nkangala District Municipalities in the Mpumalanga Province. The site is located approximately 16 km north-east of Delmas town, 14 km and 17 km north of Devon and Leandra respectively. Table 3-1 provides further details of the Farms affected by the additional infrastructure pertaining to this application, and Figure 4-1 presents the land tenure.

Table 3-1: Project locality details

Farm Name:	Farm Name	Farm Portion
	Brakfontein 264 IR/RE	0
	Brakfontein 264 IR	10
Application Area (Ha):	52.621 ha	
Magisterial District:	Nkangala District Municipality	
Distance and direction from nearest town:	16km north-east of Delmas	
21 digit Surveyor General Code for each farm portion:	T0IR00000000026400000 T0IR00000000026400010	

4. Item 2(c) Locality Map

The regional, local and infrastructure settings of the Project are shown on Figure 4-2 to Figure 4-3 respectively.



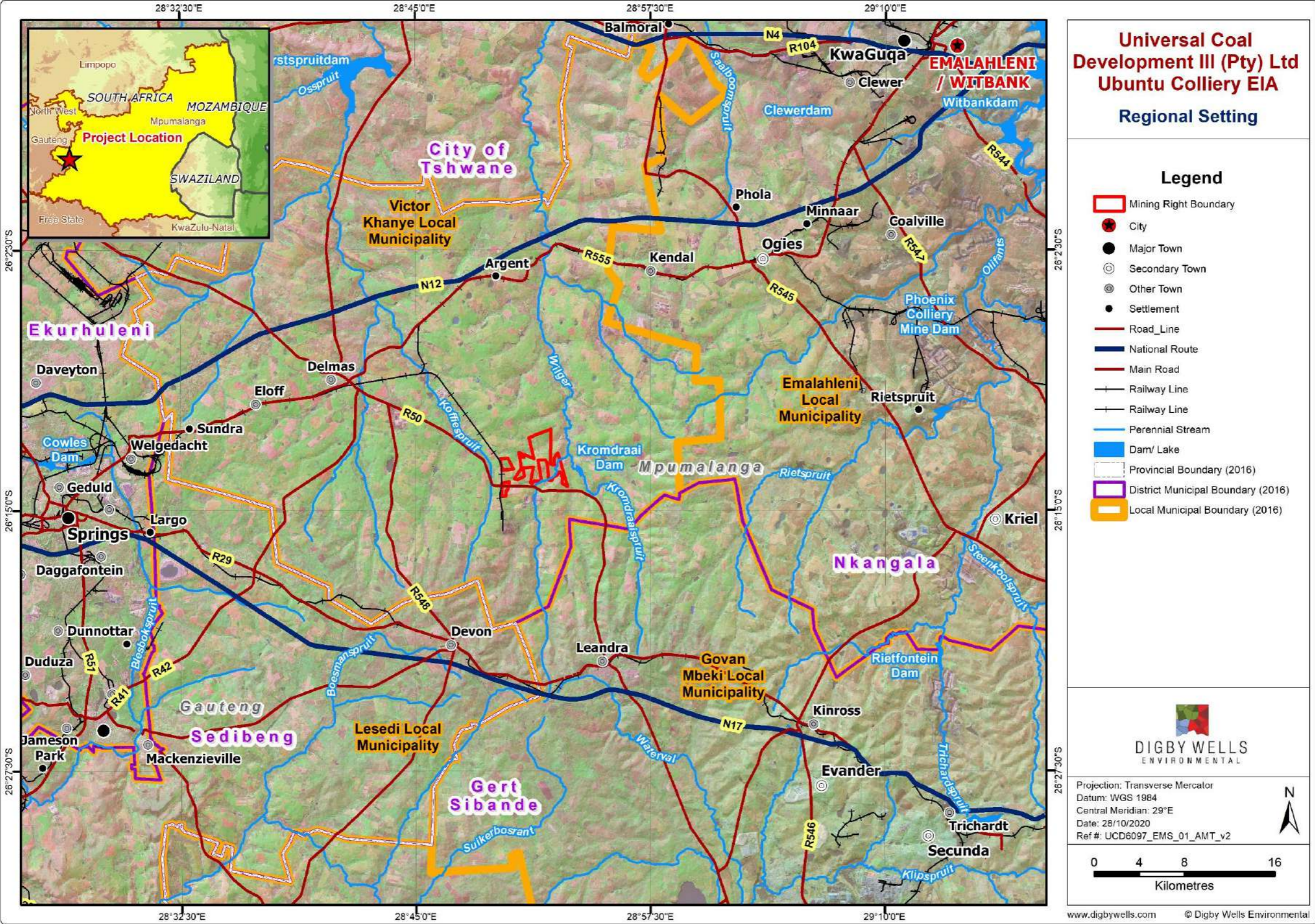


Figure 4-2: Regional Setting Map

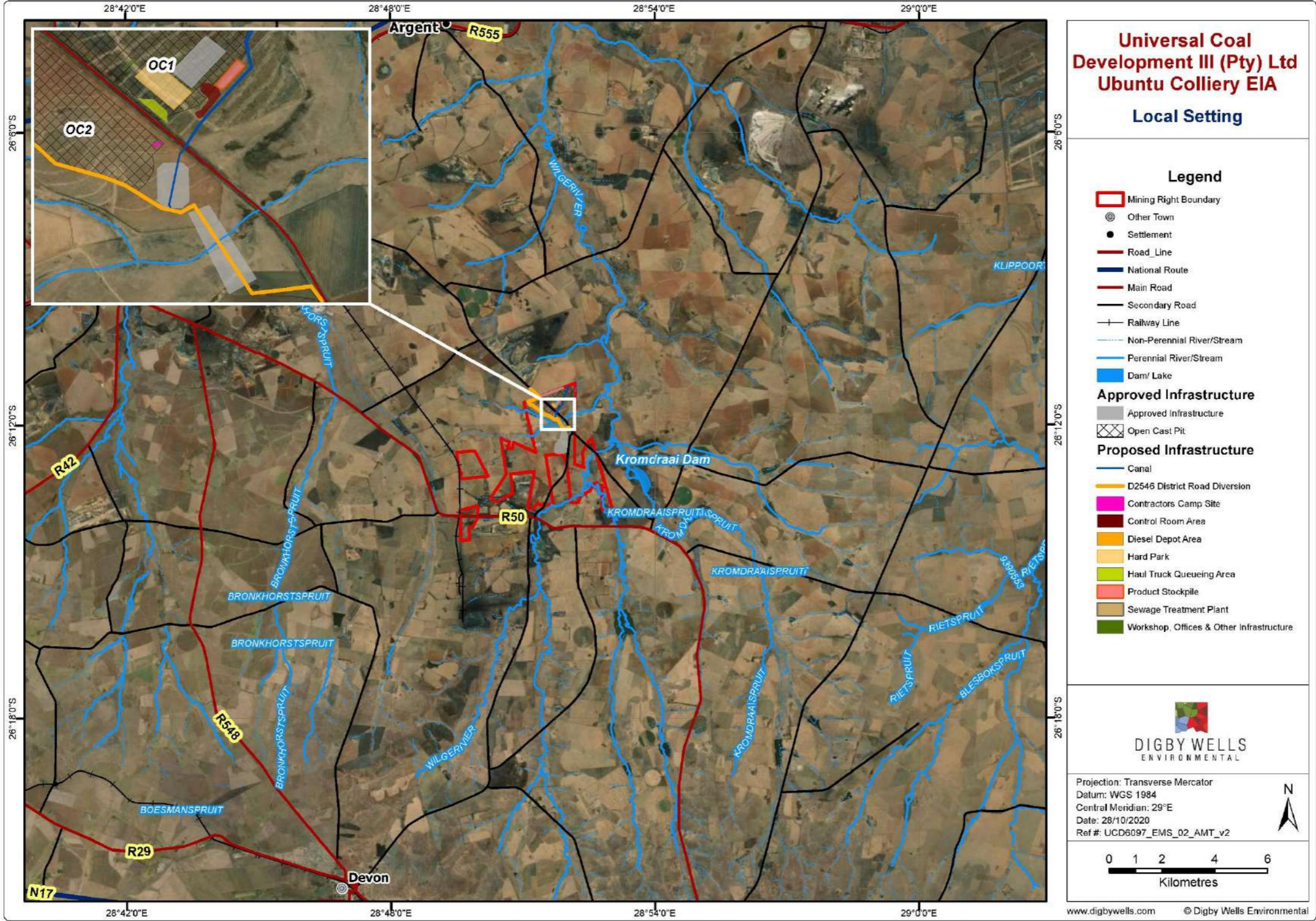


Figure 4-3: Local Setting of the Ubuntu Colliery

5. Item 2(d): Description of the scope of the proposed overall activity

Ubuntu Colliery is an operational mine. The purpose of this application is to authorise the establishment of additional infrastructure within the Mining Right Boundary. Section 5.1 provides a summary of the approved infrastructure, while Section 5.2 provides a description of what is required to be authorised in this application process, Section 5.3 provides a project activities, and lastly, the Listed and Specified activities are further discussed in Section 5.4 of this report.

5.1. Approved Infrastructure

The authorised infrastructure (as per the approved EMP) includes the following:

- Parking and offices;
- Weighbridge;
- Run of Mine (RoM) pads;
- Pollution Control Dams (PCDs);
- Opencast mining;
- Culvert;
- Mine equipment workshop and stores; and
- Wash bay facility.

The original approval did not involve any processing infrastructure on site but to transfer the coal to Kangala Colliery for further processing (including crushing, screening and washing). This has subsequently proven to not be a practical solution and crushing, and screening is now taking place in the approved pit area with a mobile crushing and screening plant.

5.2. New Infrastructure (The Project)

Further to on-site crushing and screening, the following new infrastructure requires environmental authorisation:

- | | |
|---------------------------------------|-------------------------------------|
| • Guard house and access control gate | • LDV and main access road |
| • Control room | • Heavy duty truck access road |
| • Toilet facilities | • Storm water diversion berm/trench |
| • Haulage truck queueing area | • Access control and boom gate |
| • Hard park area | • Topsoil safety berm |
| • Brake test ramp area | • Lab office |
| • Diesel depot area | • Sewage Treatment Plant (STP) |

- Product stockpile
- Perimeter fencing
- Crushing facilities and stockpile area
- Diversion of D2546 District road
- Contractors camp site
- Water Treatment Plant (WTP)
- 45 000 litre silo tank

The following should be further noted pertaining to the above infrastructure:

- The new infrastructure shall be established on environmentally authorised land;
- The WTP will treat borehole water sourced from areas in the project footprint. The treated water will be for domestic use. The daily throughput of the WTP will be 12m³ p/day; and
- The specific designs for the diversion of district road D2546 will be confirmed. It is proposed to have a reserve of 30 m and length of 2,5 km.

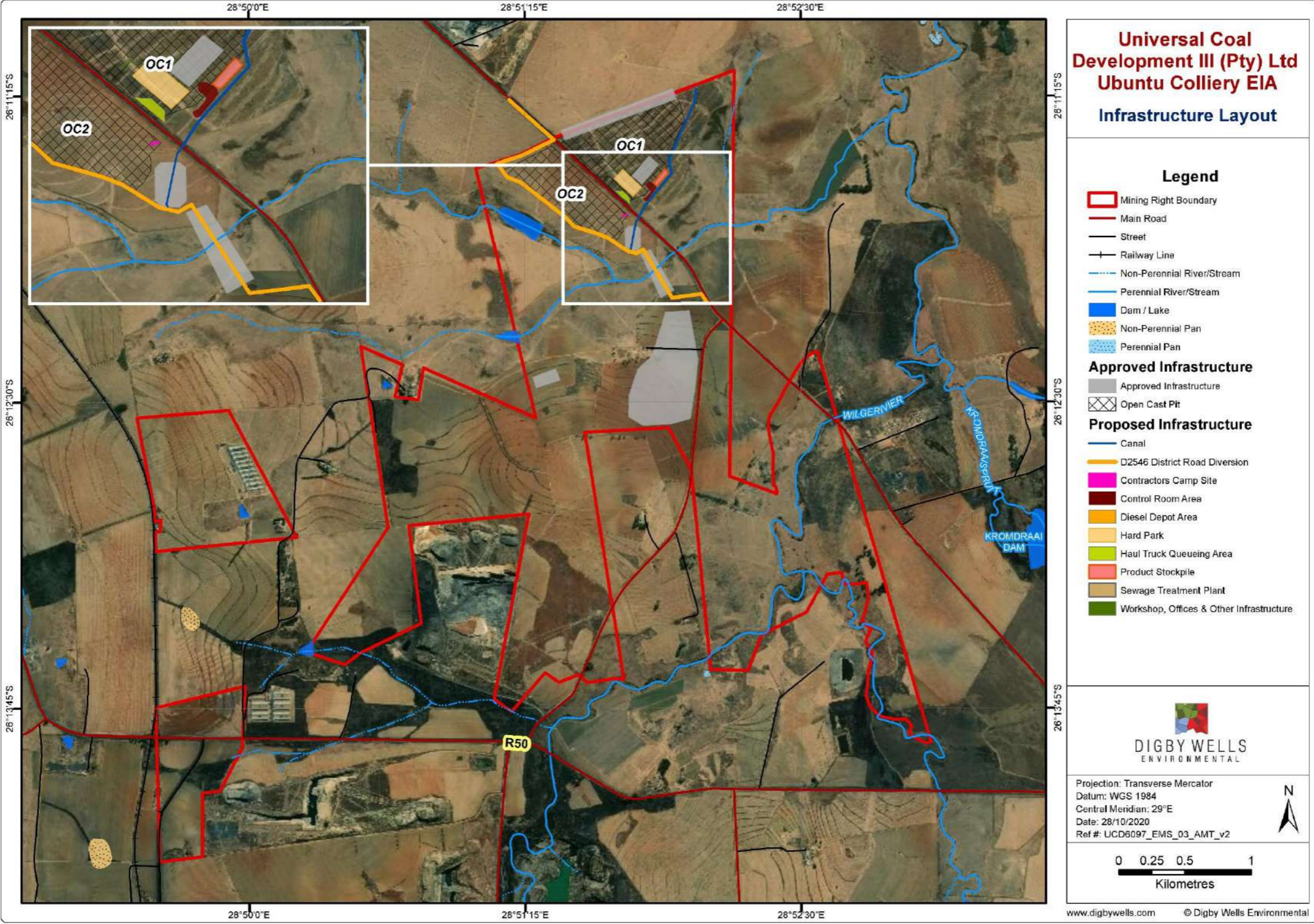


Figure 5-1: Proposed additional Infrastructure at Ubuntu Colliery

5.3. Project Activities

The construction, operation and decommissioning phases of the Project shall comprise of the activities in Table 5-1. These Project activities will be used for the impact assessment.

Table 5-1: Project Activities

Phase	Activity
Construction	Surface preparation for infrastructure
	Construction of surface infrastructure
Operational	Operation and maintenance of infrastructure
	Use and maintenance of haul roads (incl. transportation of coal to washing plant)
Decommissioning	Demolition and removal of all infrastructure (incl. transportation off site)
	Rehabilitation (spreading of soil, re-vegetation and profiling/contouring)
	Installation of post-closure water management infrastructure

5.4. Listed and Specified Activities

In terms of gazetted legislation, the Project activities shall trigger the Listed Activities contained in Table 5-2. The table provides inclusions and exclusions for reference.

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				
Sewage treatment plant	35m ³ /day	Not listed		-
Establishment of additional infrastructure including guard house and access control gate, LDV and main access road, control room, heavy duty truck access road, toilet facilities, haulage truck queueing area, access control and boom gate, hard park area, topsoil safety berm, brake test ramp area, lab office, diesel depot area, sewage treatment plant, product stockpile, contractors camp site, perimeter fencing, water treatment plant, crushing facilities and product stockpile area, 45 000 litre silo tank	To be confirmed during Scoping EIA	Not listed	-	-

Name of Activity	Areal extent of the activity	Listed Activity	Applicable Listing Notice	Waste Management Authorisation
Stormwater diversion berm/trench <i>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—</i> <i>(i) with an internal diameter of 0,36 metres or more;</i>	Diameter is greater than 0.36m.	X- 9 (i)	GN R 983	-
Water treatment plant	50m ² Daily throughput: 12m ³	Not listed	-	-
Listing Notice 2				
Road diversion and access and haul roads 27. <i>The development of a road—</i> <i>(i)</i> <i>(ii)</i> <i>(iii) with a reserve wider than 30 metres; or</i> <i>(iv) catering for more than one lane of traffic in both directions;</i> <i>but excluding a road—</i> <i>(a) for which an environmental authorisation</i>	Length: 2.5 km Width: 7 m Road reserve: 32 m	X – 27 (iii)	GN R 984 under NEMA	-

Name of Activity	Areal extent of the activity	Listed Activity	Applicable Listing Notice	Waste Management Authorisation
<i>was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010, in which case activity 24 in Listing Notice 1 of 2014 applies; (b) which is 1 kilometre or shorter; or (c) where the entire road falls within an urban area.</i>				
Water Use Licence <i>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</i>	Inclusive of all water and sewage management infrastructure on site. To be confirmed during the EIA Phase.	X- 6	GN R 984 under NEMA	-

6. Item 2(e): Policy and legislative context

From an environmental and social perspective, the proposed Project is required to comply with all the obligations in terms of the provisions of the NEMA and MPRDA. The additional legislative guidelines directing the project are outlined in further detail in Table 6-1 below.

Table 6-1: Policy and Legislative Context

Applicable legislation and guidelines used to compile the report	Reference where applied
<p><u>The Constitution of the Republic of South Africa, 1996</u></p> <p>Under Section 24 of the Constitution of the Republic of South Africa, 1996 (the Constitution) it is clearly stated that:</p> <p><i>Everyone has the right to</i></p> <p><i>(a) an environment that is not harmful to their health or well-being; and</i></p> <p><i>(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures—that -</i></p> <p><i>(i) Prevent pollution and ecological degradation;</i></p> <p><i>(ii) Promote conservation; and</i></p> <p><i>(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</i></p>	<p>Digby Wells 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 enshrined in the Constitution.</p>
<p><u>National Environmental Management Act, 1998 (Act No. 107 of 1998) and EIA Regulations, 2014 (as amended)</u></p> <p>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 have to be adhered to, to inform decision making for issues affecting the environment.</p> <p>Section 24 (1)(a) and (b) of NEMA state that:</p> <p><i>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.</i></p>	<p>Activities associated with the 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.</p>

Applicable legislation and guidelines used to compile the report	Reference where applied
<p>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.</p>	
<p><u>Mineral and Petroleum Resource Development Act, 2002 (Act No. 28 of 2002) (MPRDA)</u></p> <p>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.</p>	<p>The Applicant is the holder of a Mining Right which was granted in 2017 to mine on the Portions 6, 8, 9, 10, 20, 26, 30 and the Remaining Extent of the Farm Brakfontein 264 IR.</p> <p>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.</p>
<p><u>National Water Act, 1998 (Act No. 36 of 1998) (NWA)</u></p> <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> 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 	<p>A Water Use Licence was granted by the Department of Water and Sanitation (DWS) to Ubuntu Colliery (licence number 03/B20E/ABCGIJ/4751. It is assumed new Water Uses are required to be licenced, however, a Water Use Licence Application will be investigated at a later stage and does not form part of this project. .</p>

Applicable legislation and guidelines used to compile the report	Reference where applied
<p>watercourse. Furthermore, person(s) may not dispose of any substance that may cause water pollution;</p> <ul style="list-style-type: none"> • 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. 	
<p><u>National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)</u></p> <p>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.</p> <p>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 also 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.</p>	<p>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.</p>
<p><u>National Dust Control Regulation 2013</u></p> <p>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</p>	<p>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</p>

Applicable legislation and guidelines used to compile the report	Reference where applied
<p>omitted. Another notable observation was the reduction of the permissible frequency of exceedance from three to two incidences within a year. The standard actually adopted a more stringent approach than previously and would require dedicated mitigation plans now that it is in force.</p>	<p>mitigation will be included in the EMP as part of the EIA Phase.</p>
<p><u>National Noise Control Regulations, R.154 of 1992 (the Noise Regulations) promulgated in terms of Section 25 of the Environmental Conservation Act, 1989 (Act No. 73 of 1989)</u></p> <p>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.</p> <p>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 “<i>disturbs or impairs or may disturb or impair the convenience or peace of any person</i>”).</p> <p>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 make reference 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.</p> <p>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 particular development.</p>	<p>A Noise Impact Assessment, including modelling, impacts and proposed mitigation measures will be undertaken for the EIA Phase.</p>
<p><u>The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)</u></p> <p>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.</p>	<p>For the Scoping Phase, a Notice of Intent to Develop (NID) was submitted to SAHRA. A Heritage</p>

Applicable legislation and guidelines used to compile the report	Reference where applied
<p>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).</p>	<p>Impact Assessment and Palaeontological Impact Assessment will form part of the EIA Phase.</p>
<p><u>GN R 1147 (Financial Provisioning Regulations), 2015</u></p> <p>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.</p>	<p>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.</p> <p>This will be finalised and included in the EIA.</p>
<p><u>GN R 527 (MPRDA Regulations), 2004</u></p> <p>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.</p>	<p>Possible mitigation measures have been provided in Section Table 11-1 of this report. The EMP will be compiled as part of the EIA.</p>
<p><u>Climate Change Bill, 2018 GN R 580</u></p> <p><i>To build the Republic's effective climate change response and the long term, just transition to a climate resilient and lower carbon economy and society in the context of an environmentally sustainable development framework; and to provide for matters connected therewith.</i></p>	<p>Although not promulgated, Ubuntu Colliery must adhere to national climate change legislation in terms of South Africa's goals and commitments in terms of the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement.</p>

7. Item 2(f): Need and desirability of the proposed activities

Ubuntu Colliery is an established coal mine. The additional infrastructure requiring authorisation as part of this Application is to optimise the operation, as well as to allow the continuation of mining.

8. Item 2(g): Description of the process followed to reach the proposed preferred site

Considering the application pertains to the additional infrastructure requirements at an operational mine, the alternatives are limited to the infrastructures being applied for. The placement of the majority of the infrastructure was determined by the amount of space remaining within the Mining Right boundary and to reduce the expansion footprint as far as possible to this boundary footprint.

8.1. Roads and access routes

A road diversion is required by Universal Coal for the continuation of mining due to the proximity of the approved open pits to the existing district road, known as D2546. The approved mining area includes two open pits, OC1 and OC2, which flank either side of the D2546 route. Due to the proximity of mining and the extent of blasting, this road will need to be realigned before mining can proceed. The preferred alternative for routing has been considered and developed in the planning phase of this project and therefore this application can depend on established information.

There are two options for the road alignment which are shown in Figure 8-1. The two options follow the same routing until the starting point of the culvert. Ubuntu Colliery has an approved/licenced culvert which can be utilised in the road realignment, or the routing can avoid a river crossing and join the existing D2546. The latter alternative has been presented in light of the heritage baseline studies identifying heritage resources in the culvert crossing area. Section 10.8 presents these findings.

8.2. No-go alternative

Should the additional infrastructure not be established, the status quo shall remain. The opencast mining that is approved would require alternatives to be considered in terms of operational infrastructure. Because the additional infrastructure proposed includes on-site crushing and screening, if it does not go ahead, crushing and screening would need to be undertaken off-site. The coal resources in the location of the road would not be exploited and the Life of Mine would be reduced. These have economic implications for the Ubuntu Colliery in that less coal can be exploited from the area and less revenue and employment opportunities for the Ubuntu Colliery.

The no-go alternative also implies that all potentially negative environmental impacts associated with the new infrastructure will be avoided.

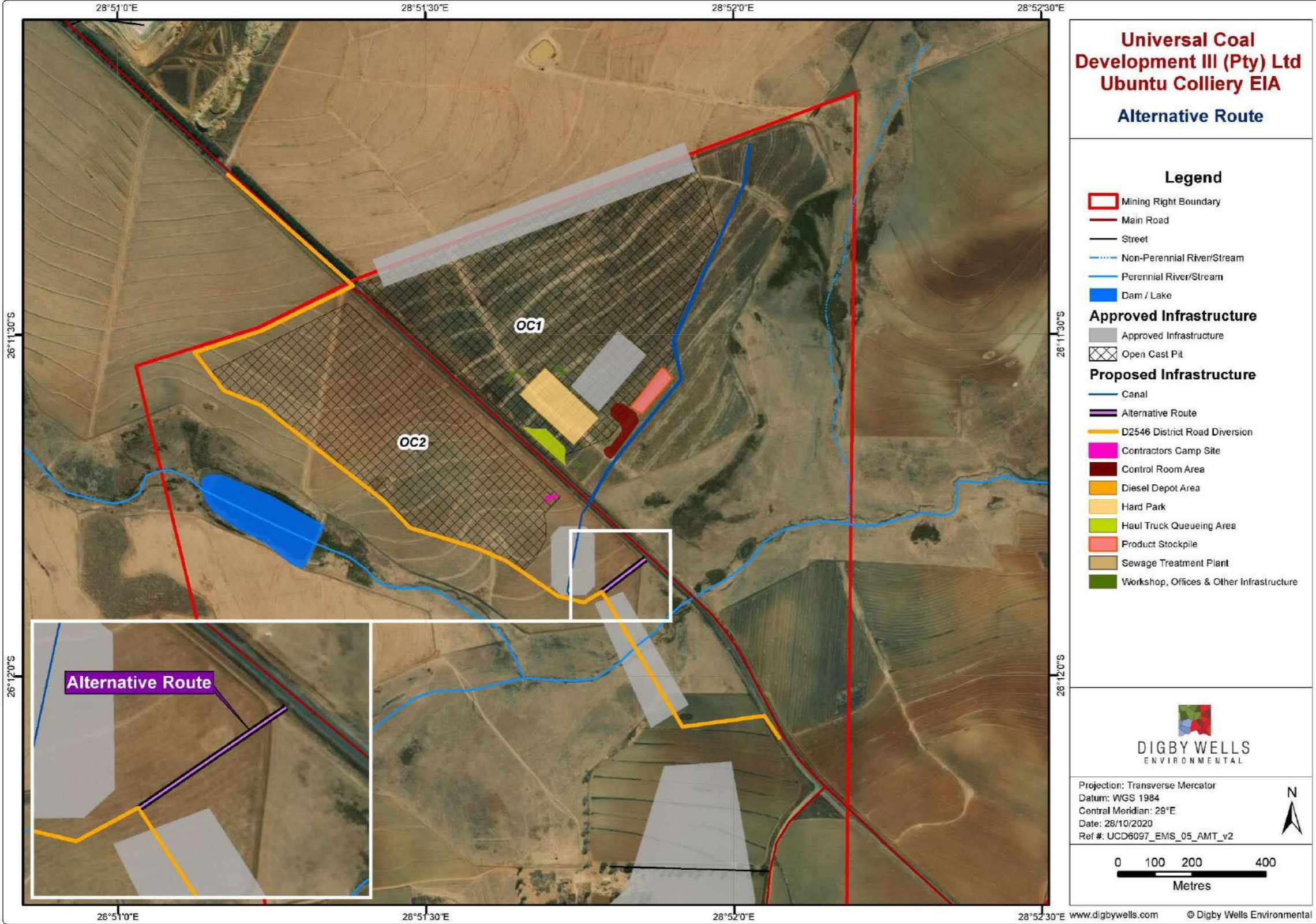


Figure 8-1: Road Diversion Alternative Route for D2546

9. 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. For a detailed description of the PPP activities undertaken to date, refer to Appendix C.

Table 9-1: Comments and Responses Received During Scoping Phase

Date of Receipt	Method	Contributor	Organization/Community	Comment	Response
18-Nov-20	Telephone correspondence	Victor	Farm resident (Brakfontein 264 IR Portions 26 and 34)	Indicated that he did not have time for meetings at that moment.	Noted.
18-Nov-20	Telephone correspondence	Koos Uys	Previous Farm owner of Brakfontein 264 IR Portions 9 and 26	Indicated that he would not attend any meetings and expressed that he should not be contacted again.	Noted.
25-Nov-20	Registration and Comment form received by Email correspondence	Frans Venter	Brakfontein Farm 264 IR Portion 4,29 &30	A dam exists downstream that is used for irrigation. What will be the effect on quality and runoff water?	During the EIA Phase, the Surface Water Impact Assessment will consider the impact on surface water quality and quantity that may be caused as a result of the proposed project. The preliminary water quality impacts identified during the Scoping Phase relate to spillages and leaks of fuels, oils and other potentially hazardous chemicals and sedimentation of downstream

					<p>watercourses. Mitigation measures will be proposed to mitigate these risks, including the implementation of a stormwater management plan during the EIA Phase. The stormwater management plan to be compiled will ensure that all dirty water and runoff that is generated within the mine is contained as per the government regulations on the stormwater management in mines. Furthermore, ongoing water quality monitoring will be undertaken to assess any potential impacts on water quality as a result of the proposed project. With regards to water quantity, the Scoping Phase surface water assessment estimated approximately less than 0.09% loss of the runoff-contributing catchment area in proportion to the total catchment area. This is not anticipated to result in significant reduction in the water quantity reporting downstream. On this basis, the project is not likely to have significant impacts on the downstream dam.</p>
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				Is concerned that farming activities (maize and cattle) will be affected by the mine activities and will be non-profitable.	Universal Coal have obtained ownership of the farm portions on which they will develop the infrastructure. The farm owner, Frans Venter has been compensated for the land. Additionally, farming activities will be allowed to continue on portions that will not have commenced with the establishment of the infrastructure until such a time that the construction begins. After which these need to cease.
				Indicated that there are environmental, social and heritage features located on farm Brakfontein, Portion 10 and 0	The Heritage Baseline Assessment investigated the Project Area for heritage resources and found a burial ground on Portion 4 of Brakfontein Farm 264. The additional infrastructure proposed as part of this project will not affect Portions 10 and 0.
				Blasting must also be controlled and managed appropriately	Blasting will be undertaken as per the Mine Health and Safety Regulations GN R93 of 15 January 1997 promulgated under Section 98 of the

					Mine Health and Safety Act, 1996 (Act No. 29 of 1996).
				Requests clarity and more information on the road diversion of D2546 road.	The designs for the road will be finalised during the EIA Phase. The existing road will be decommissioned for the portion where it goes through the mining area and diverted around the pit to allow traffic to flow around the mine.
04-Dec-20	Telephone correspondence	Ward Councillor Sikhukhune 7	Victor Khanye Local Municipality	<p><i>Digby Wells contacted the Local Municipality to request information pertaining to contact details of the relevant Ward Councillor to inform them of the project and to further assist in setting up meetings with the community. Digby Wells was informed that Councillor Sikhukhune is the relevant councillor and thus informed and engaged with him regarding the project. All information material was sent by email correspondence. The Ward Councillor verbally agreed to arrange a meeting with the affected community of which Digby Wells would also attend.</i></p> <p><i>However, the Ward Councillor invited the Savannah community (which is not directly affected by the proposed project) to the focus group meeting on 4 December 2020. The name change of the Mine Colliery (from Brakfontein Colliery to Ubuntu Colliery) caused the misunderstanding of which invitations were already sent to</i></p>	

				<p><i>Savannah community. The meeting with the Savannah community was cancelled the same day (4 December 2020).</i></p>
			<p>Attempts by the Ward Councillor to invite the affected community, namely Brakfontein community to a focus group meeting on 5 December were made and were unsuccessful as the Community did not recognise the Ward Councillor.</p> <p>The Ward Councillor then informed Digby Wells that it would not be safe for them to attend the meeting and thus it was cancelled. The Ward Councillor was of the opinion that the environment was not safe</p>	<p>Comment noted. Digby Wells will undertake further public consultations with the relevant communities to obtain their inputs during the EIA phase and will update the CRR accordingly. All public consultations will be arranged via the mine social team in order to align all communication channels between the Mine and the affected communities.</p>

				and thus requested postponement of the meeting.	
				It should be noted that some of the members from the Brakfontein community who were consulted by the Ward Councillor expressed concern and thus were reluctant to speak to the Ward Councillor as they believed he was not representing the interest of the affected community and thus no meeting was held to date.	

10. The environmental attributes associated with the sites

This section provides a summary of the baseline environment affected by the proposed project activities, type of current land uses, environmental features, and current land use, based on the infield observations and assessments undertaken by the relevant specialists. Furthermore, this baseline environment section consists of the 2012 specialist studies undertaken by Digby Wells and updated in July 2020 in the context of the new infrastructure proposed (Project Area).

10.1. Climate and rainfall

The Project Area is characterized by a climate that is typical of that of the Mpumalanga climatic zone characterized by warm, rainy summers and dry winters with sharp frost (South African Weather Bureau, 1986). Delmas, which is approximately 16 km away from the proposed Project Area, is generally warm and temperate with an average annual temperature of approximately 15.7°C (Climate-data.org). The climate here is classified as Subtropical highland (Cwb) by the Köppen-Geiger system (Köppen & Geiger, 1936). The mean annual rainfall is approximately 688 mm with the bulk of precipitation being experienced as showers and thunderstorms which fall mainly from October to March. Maximum rain falls occur in November, December and January. Rainstorms are often intense (up to 242 mm can occur in one day) with severe lightning and strong winds, sometimes accompanied by hail. Annual average maximum, minimum and mean temperatures for the Project Area are shown in Figure 10-1.

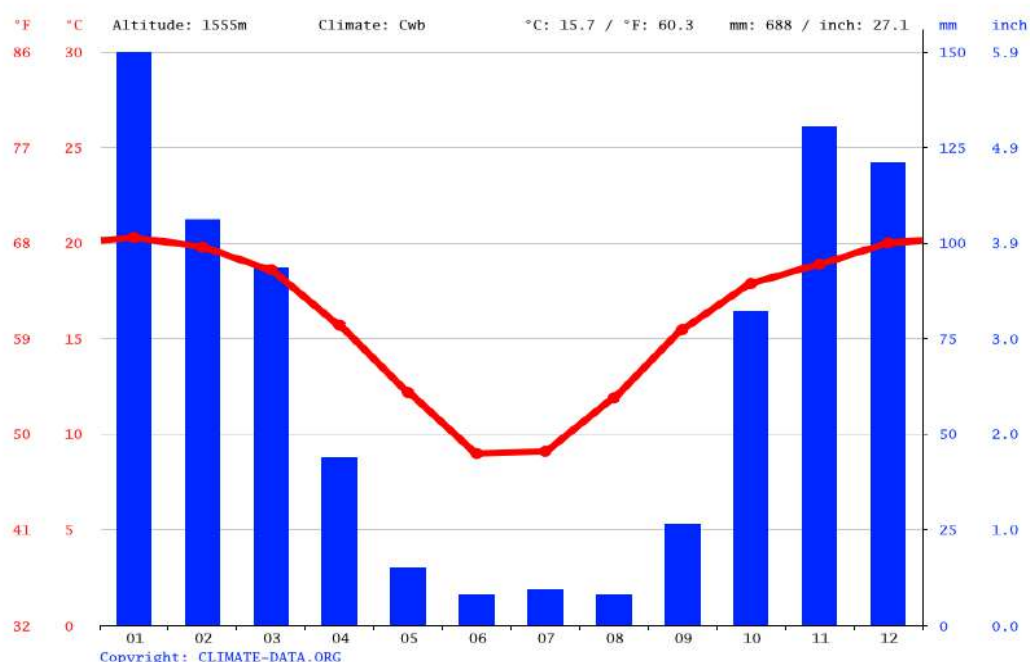


Figure 10-1: Annual Climate Trends in Delmas (Source: Climate-data.org)

10.2. Topography

The topography of the Project Area, as depicted in Figure 10-2, ranges from high elevations on the western side of the Project Area to low lying areas in the north, east and south. The area can be described as very uneven slopes with moderate to high undulating grasslands and small depressions scattered throughout the landscape. The elevation of the Project Area ranges from 1 540 to 1 580 metres above mean sea level (m.a.m.s.l.) which equates to a range of 40 m between the lowest and highest points of elevation within the Project Area. The difference in elevation between these points gives rise to a slope percentage of between 0 and 5.5 (at isolated steeper areas). The average slope percentage for the entire Project Area is approximately 2.5.

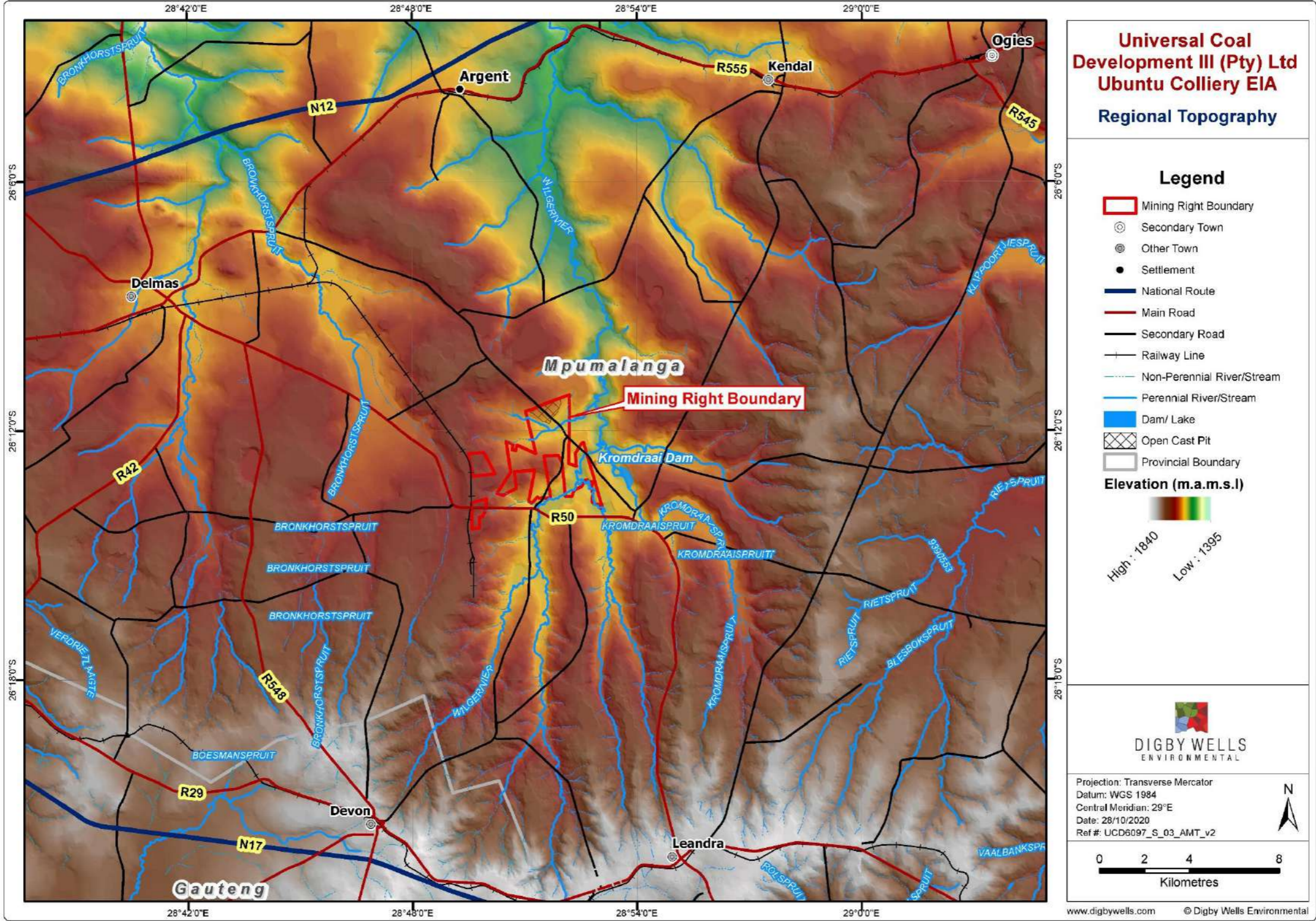


Figure 10-2 Topography of Ubuntu Colliery

10.3. Geology

The Project Area is located on the western extent of the Witbank Coalfield, located within the Ecca Group of the Karoo Supergroup.

The Pre-Karoo geology underlying the Witbank Coalfield comprises of the Transvaal Supergroup lithologies and Rooiberg Group felsite. Within the Project Area, dolomite of the Malmani Subgroup (Transvaal Supergroup) was intersected below the Karoo Supergroup sequence. The Malmani Subgroup carbonate sequence developed under a tidal range of paleo-environments ranging from supra-tidal through intertidal to sub-tidal which results in a variety in chert content, intercalated shales and erosional surfaces (Johnson et al, 2006).

The coal containing Vryheid Formation was deposited directly on the uneven pre-Karoo and Dwyka Group lithologies resulting in variations in thickness of the deposit and pinching out of the formation against paleo-highs. The Dwyka Group sedimentary rocks were deposited in glacial environments and comprise predominantly of tillite. The Vryheid Formation was deposited during deltaic to fluvial events with general upward coarsening cycles comprising of shales, siltstones and sandstones. Northern sequences of the Vryheid Formation contain very coarse-grained sandstone deposited by fluvial events. Coal swamps formed in sheltered environments created by the pre-Karoo topography and glacial deposits (Johnson et al, 2006).

The Karoo Supergroup contains extensive dolerite intrusions, which represent the shallow feeder system for the flood basalt eruptions and occur as interconnected networks of dykes and sills (Duncan and Marsh, 2006). These intrusions are important geological structures for diverting and impeding groundwater flow. Sediments in contact with the intrusions become altered by contact metamorphism and are significant for their water bearing properties. A surface geology map is shown as Figure 10-3.

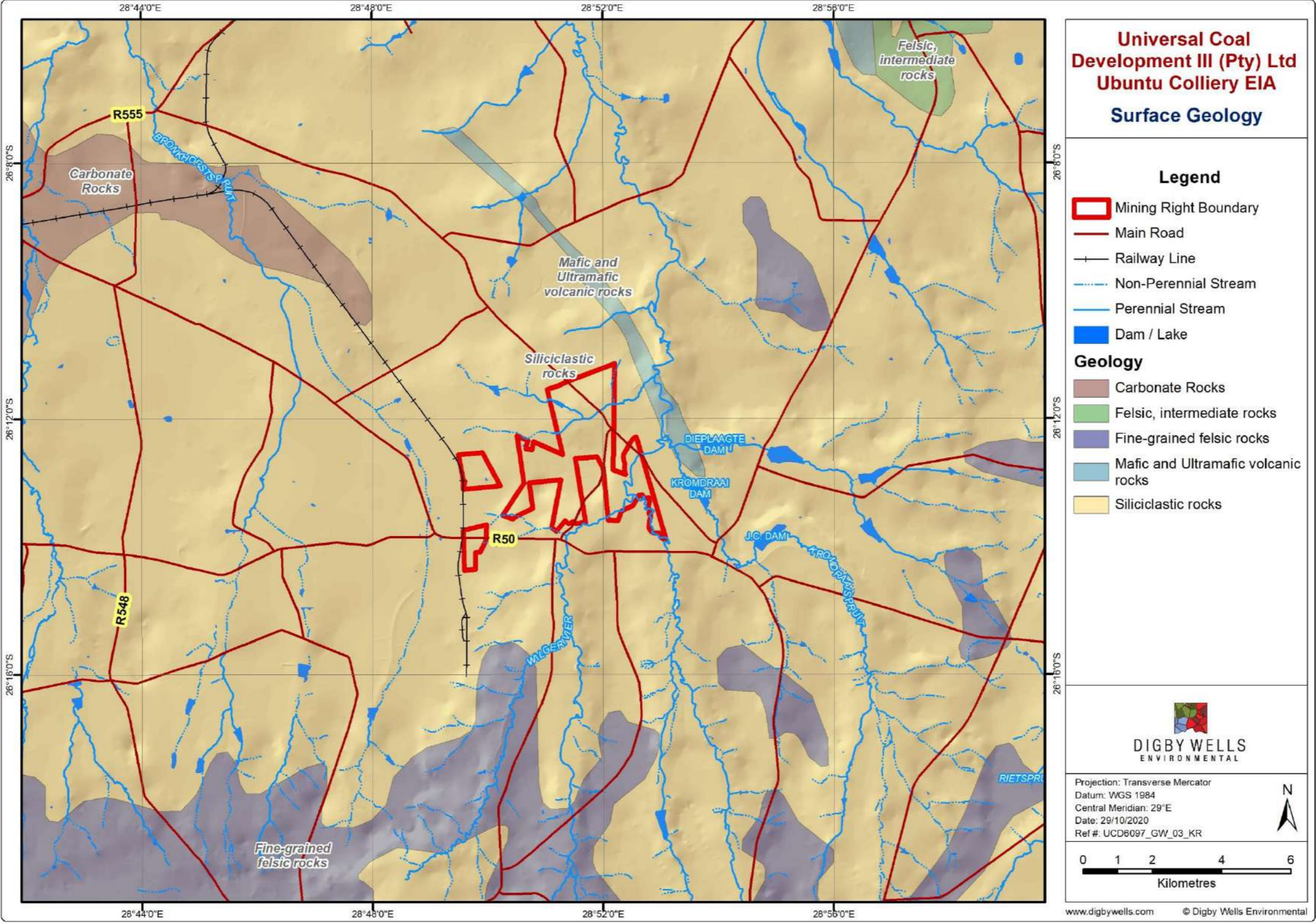


Figure 10-3: Surface Geology

10.4. Soils, Land Capability and Land Use

This section provides the baseline environment regarding soils, land use, land capability and land type related to the proposed Project.

10.4.1. Land Use

The current land use of the Project Area was identified using aerial imagery during the desktop assessment and was verified during an on-site inspection. The land use was described as (Figure 10-4) cultivation, grassland, waterbodies and wetlands.

The predominant present land use in the Brakfontein region is arable crop production due to the presence of large areas being occupied by high potential soil. Plan 1 contains the land use information. Current land use is estimated at 81% of the available land being used for arable farming and 19% of the total available farmland is un-used due to shallow soils and wetland areas. The area is well serviced by tar roads as well as farm roads.

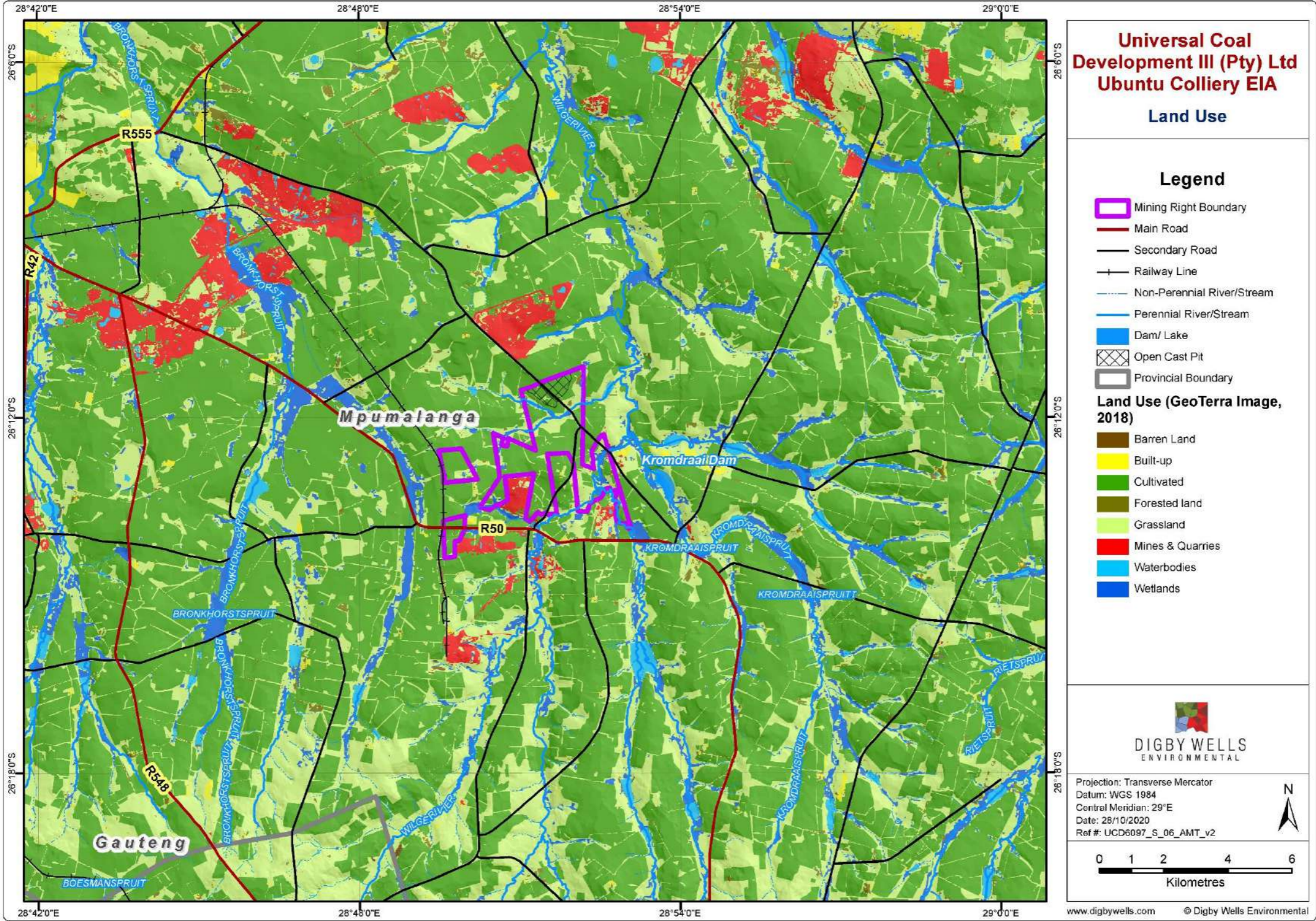


Figure 10-4: Land Use Map for Ubuntu Colliery Project Area

10.4.2. Land Capability

The land capability was determined by assessing a combination of soil type, terrain and climate features. Land capability is defined as the most intensive long-term sustainable use of land under rain-fed conditions (Soil Conservation Service: U.S. Department of Agriculture, 1973; Schoeman, et al., 2000). The dominant land capability class in the Project Area were **Class II** (Arable Land – Intensive Cultivation) (Figure 10-5). A detailed breakdown for the class is given below (Soil Conservation Service: U.S. Department of Agriculture, 1973) (Table 10-1).

Table 10-1: Land Capability Classification of Ubuntu Colliery

Class	Classification	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.

Class II land capability has some limitations which requires careful conservation practices and soil management, to prevent soil deterioration as well as improving the air-water balance when soils are cultivated. Class II has little limitations regarding cultivation, pastures, range land, woodland or wildlife and the practices are easy to apply. The soils need more management practices than that of Class I soils and may require special soil-conserving cropping system, tillage methods and water control devices.

Deep soils on gentle to moderately steep slopes in the class are subject to erosion and may need management practices such as terracing, contour tillage, water-control devices, crop rotation, stable mulching, fertilizers, lime and strip cropping. The combination of management practices will depend on the climate, soil characteristics, slope and farming system.

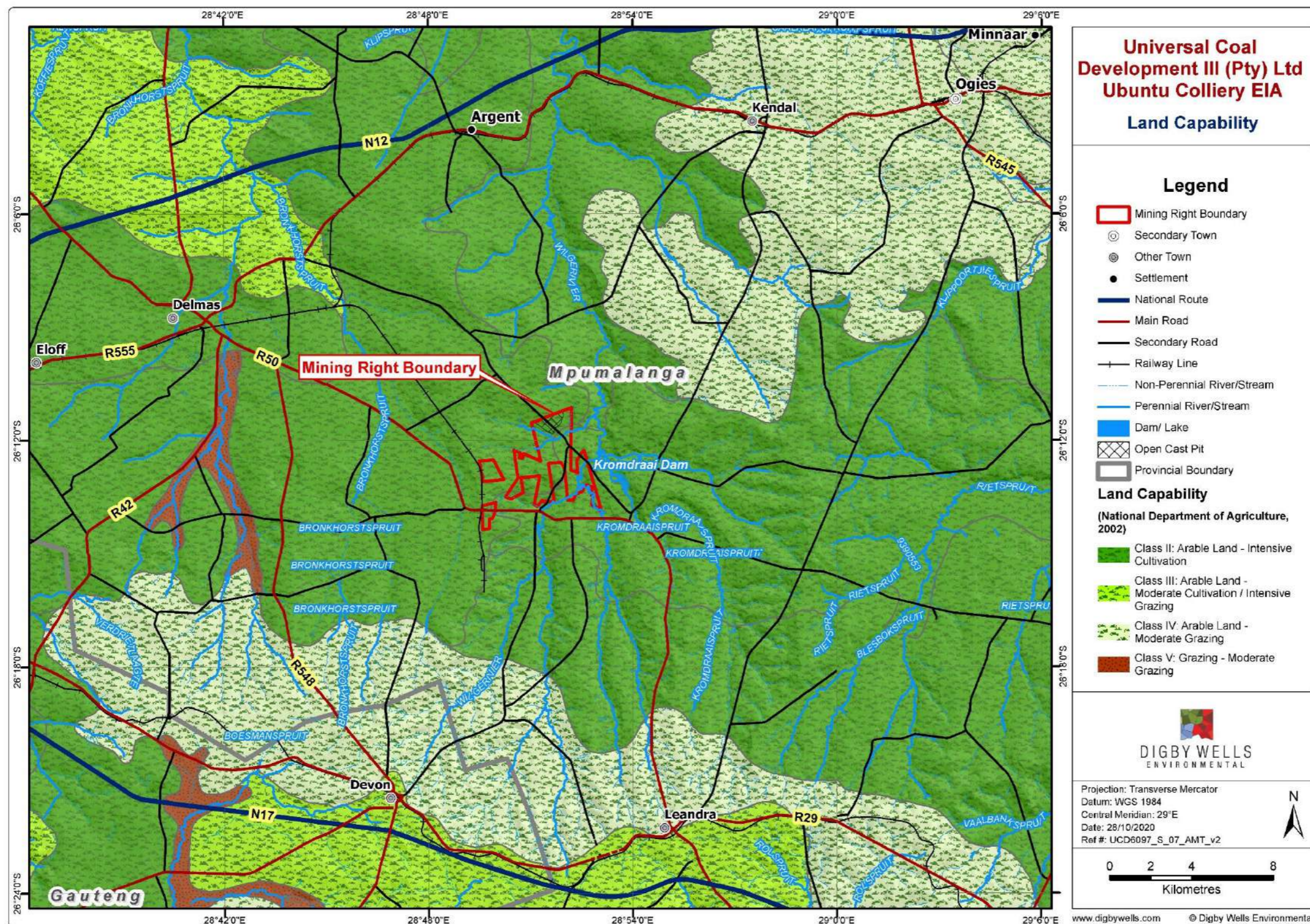


Figure 10-5: Land Capability Map for Ubuntu Colliery

10.4.2.1. Land Type and Soil Forms

Existing Land Type and soil data was used to obtain generalised soil patterns and terrain types for the Project Area. Land Type data exists in the form of published 1:250 000 maps. These maps indicate delineated areas of similar climate and pedosystems which includes areas of uniform terrain and soil patterns (Land Type Survey Staff, 1972 - 2006).

Baseline data suggested that the land types for the Project Area are predominantly of the **Ab9** and **Bb3** types. The main land types and dominant soil forms are briefly described below in Table 10-2 as per the Land Type Survey Staff (1972 - 2006).

Table 10-2: Land Type and Dominant Soil Forms

Land Type	Soil Forms	Geology	Characteristics
Ab9	<ul style="list-style-type: none"> • Cartref • Clovelly • Dundee • Fernwood • Glenrosa • Hutton • Inanda • Katspruit • Kranskop • Magwa • Mispah • Nomanci • Oakleaf 	Sandstone of the Natal Group, with isolated occurrences of dolerite.	<ul style="list-style-type: none"> • According to the Land Type Data (1972 - 2006), 85% of the landscape is dominated by crest and mid slope landscape positions; • 65% of the dominant soils occurring in these landscape positions are deep red well drained red and yellow soils occurring in these upper landscape positions; • The soils are predominantly sandy and are apedal (non-structured) in both the A and B horizons; • Rooting depth can be limited by a clay layer underneath the yellow soils or parent rock occurring below the B soil horizon; • The A horizon is likely to contain 12-20% clay due to the influence of the dominant sandstone parent material; • The texture represents a sandy loamy textured soil; • Foot slope and valley bottom positions occupy only 15% of the landscape; • Soils present in these landscape positions are dominated by high clay content soils; and • The clay content in the A horizon can be in the order of 50-70%.
Bb3	<ul style="list-style-type: none"> • Arcadia • Avalon • Estcourt 	<ul style="list-style-type: none"> • Shale, sandstone, clay, 	<ul style="list-style-type: none"> • Similar to Land Type Ab9, 90% of this land type consists of crest and mid slope landscape positions;

Land Type	Soil Forms	Geology	Characteristics
	<ul style="list-style-type: none"> • Hutton • Glencoe • Katspruit • Kroonstad • Mispah • Longlands • Rensburg • Swartland • Valsrivier • Westleigh • Willowbrook 	<ul style="list-style-type: none"> • conglomerate, limestone and marl of the Ecca Group; • Shale and tillite of the Dwyka Formation; • Karoo Sequence; • Dolerite; • Occasional Ventersdorp lava, Witwatersrand quartzite and slate; and • Dolomite. 	<ul style="list-style-type: none"> • The dominant soils present in crest and mid slope positions are red and to a lesser extent yellow well drained soils; • The influence of parent rock (sandstone parent material) influenced the formation of very sandy non structured (apedal) soil; • The clay content in the A horizon is in the order of 8 – 12%. Soil texture is expected to represent a sandy loam soil; • Smaller areas in the foot slope and valley bottom positions of both the land types present in the Ubuntu Colliery Project Area might contain waterlogged high clay content soils; • These soils owing to their position in the landscape are seasonally or permanently wet; • Where lateral drainage is forced by slope steepness and the presence of underlying impermeable layers on these landscape positions, soils containing an E horizon (evidence of lateral drainage) can occur; and • The occurrence of the G and E subsoil horizons in this landscape, prove that seasonally wet conditions prevail.

These land types indicate the underlying geology consists mainly of sandstone, siltstone and shale. The Ab Land Type is dominated by 30% crest and 55% mid-slope terrain unit positions in the landscape. Other positions in the landscape are foot-slope and valley bottom positions occupying 10% and 5% of the landscape positions respectively. The Bb Land Type is also dominated by similar landscape positions (Land Type Survey Staff, 1972 - 2006).

10.5. Terrestrial and freshwater ecosystems

The freshwater ecosystem baseline considered for this section includes desktop assessments of wetlands and aquatic ecology.

10.5.1. Terrestrial and freshwater Ecoregions

Ecoregions are regions characterized by a relative similarity in the type of ecosystems and ecosystem components, i.e. biotic and abiotic, aquatic and terrestrial. The Project Area consists of the Highveld Ecoregion (Level II Ecoregion 11.02), and the Southern Temperate Highveld Freshwater Ecoregion according to Darwall *et al.* (2009). It is characterized by plains with a moderate to low relief and soils that are mostly coarse, sandy and shallow. Consequently, the drainage density is mostly low, but medium in some areas. There are various grassland vegetation types (with moist types present towards the east and drier types towards the west and south). Table 10-3 provides a summary of the main attributes of the Highveld Ecoregion (Kleynhans & Hill, 1999; Kleynhans, Thirion, & Moolman, 2005).

Table 10-3: Main Attributes of the Highveld Ecoregion

Main Attributes	Highveld Ecoregion
Terrain morphology: Broad division (dominant types in bold) (Primary)	Plains; Low Relief; Plains; Moderate Relief; Lowlands; Hills and Mountains; Moderate and High Relief; Open Hills; Lowlands; Mountains; Moderate to high Relief Closed Hills. Mountains; Moderate and High Relief.
Vegetation types (dominant types in bold) (Primary)	Mixed Bushveld (limited); Rocky Highveld Grassland; Dry Sandy Highveld Grassland; Dry Clay Highveld Grassland; Moist Cool Highveld Grassland; Moist Cold Highveld Grassland; North Eastern Mountain Grassland; Moist Sandy Highveld Grassland; Wet Cold Highveld Grassland (limited); Moist Clay Highveld Grassland; Patches Afromontane Forest (very limited).
Altitude (metres above mean sea level (m.a.m.s.l.)) (modifying)	1 100 to 2 100, 2 100 to 2 300 (very limited)
Mean Annual Precipitation (MAP) (millimetre (mm)) (Secondary)	400 to 1 000
Coefficient of Variation (% of annual precipitation)	<20 to 35
Rainfall concentration index	45 to 65
Rainfall seasonality	Early to late summer
Mean annual temp. (Degree Celsius (°C))	12 to 20
Mean daily max. temp. (°C): February	20 to 32
Mean daily max. temp. (°C): July	14 to 22
Mean daily min. temp. (°C): February	10 to 18
Mean daily min temp. (°C): July	-2 to 4

Main Attributes	Highveld Ecoregion
Median annual simulated runoff (mm) for quaternary catchment	5 to >250

10.5.2. Regional vegetation

The Project Area falls within the Eastern Highveld Grassland type (Mucina & Rutherford, 2012), as illustrated in Figure 10-6. The Grassland Biome (Mucina & Rutherford, 2012) is one of the nine South African plant Biomes and the second most bio-diverse biome in South Africa. The Grassland Biome is situated primarily on the central plateau of South Africa, and the inland areas of Kwa-Zulu-Natal and the Eastern Cape Provinces. This biome is rich in flora and fauna diversity but is under threat due to rapid urbanisation and expansion of mining and industrial activities.

The Eastern Highveld Grassland is characterised by slightly to moderately undulating plains, including some low hills and pan depressions (Mucina & Rutherford, 2012). It is considered “Endangered” on the National List of Threatened Terrestrial Ecosystems (Mucina & Rutherford, 2012), with only a small fraction being conserved in state owned and private reserves. The vegetation of the landscape is short, dense grassland dominated by the usual highveld grass composition (*Aristida*, *Digitaria*, *Eragrostis*, *Themeda*, *Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Senegalia caffra*, *Celtis africana*, *Diospyros lycioides* subsp. *lycioides*, *Parinari capensis*, *Protea caffra*, *P. welwitschii* and *Searsia magalismontanum*) (Mucina & Rutherford, 2012).

Table 10-4: Plant Species Characteristic of the Eastern Highveld Grasslands

Plant Form	Species
Graminoids	<i>Aristida aequiglumis</i> , <i>A. congesta</i> , <i>A. junciformis</i> subsp. <i>galpinii</i> , <i>Brachiaria serrata</i> , <i>Cynodon dactylon</i> , <i>Digitaria monodactyla</i> , <i>D. tricholaenoides</i> , <i>Elionurus muticus</i> , <i>Eragrostis chloromelas</i> , <i>E. capensis</i> , <i>E. curvula</i> , <i>E. gummiflua</i> , <i>E. patentissima</i> , <i>E. plana</i> , <i>E. racemosa</i> , <i>E. sclerantha</i> , <i>Heteropogon contortus</i> , <i>Loudetia simplex</i> , <i>Microchloa caffra</i> , <i>Monocymbium cerasiiforme</i> , <i>Setaria sphacelata</i> , <i>Sporobolus africanus</i> , <i>S. pectinatus</i> , <i>Themeda triandra</i> , <i>Trachypogon spicatus</i> , <i>Tristachya leucothrix</i> , <i>T. rehmannii</i> , <i>Alloteropsis semialata</i> subsp. <i>eckloniana</i> , <i>Andropogon appendiculatus</i> , <i>A. schirensis</i> , <i>Bewisia biflora</i> , <i>Ctenium concinnum</i> , <i>Diheteropogon amplexans</i> , <i>Harpochloa falx</i> , <i>Panicum natalense</i> , <i>Rendlia altera</i> , <i>Schizachyrium sanguineum</i> , <i>Setaria nigrirostris</i> , <i>Urelytrum agropyroides</i> .

Plant Form	Species
Herbs	<i>Berkheya setifera</i> , <i>Haplocarpha scaposa</i> , <i>Justicia anagalloides</i> , <i>Pelargonium luridum</i> , <i>Acalypha angustata</i> , <i>Chamaecrista mimosoides</i> , <i>Dicoma anomala</i> , <i>Euryops gilfillanii</i> , <i>E. transvaalensis</i> subsp. <i>setilobus</i> , <i>Helichrysum aureonitens</i> , <i>H. caespititium</i> , <i>H. callicomum</i> , <i>H. oreophilum</i> , <i>H. rugulosum</i> , <i>Ipomoea crassipes</i> , <i>Pentanisia prunelloides</i> subsp. <i>latifolia</i> , <i>Selago densiflora</i> , <i>Senecio coronatus</i> , <i>Hilliardiella oligocephala</i> , <i>Wahlenbergia undulata</i> .
Geophytic herbs	<i>Gladiolus crassifolius</i> , <i>Haemanthus humilis</i> subsp. <i>hirsutus</i> , <i>Hypoxis rigidula</i> var. <i>pilosissima</i> , <i>Ledebouria ovatifolia</i> .
Succulent Herbs	<i>Aloe ecklonis</i> .
Low Shrubs	<i>Anthospermum rigidum</i> subsp. <i>pumilum</i> , <i>Seriphium plumosum</i> .

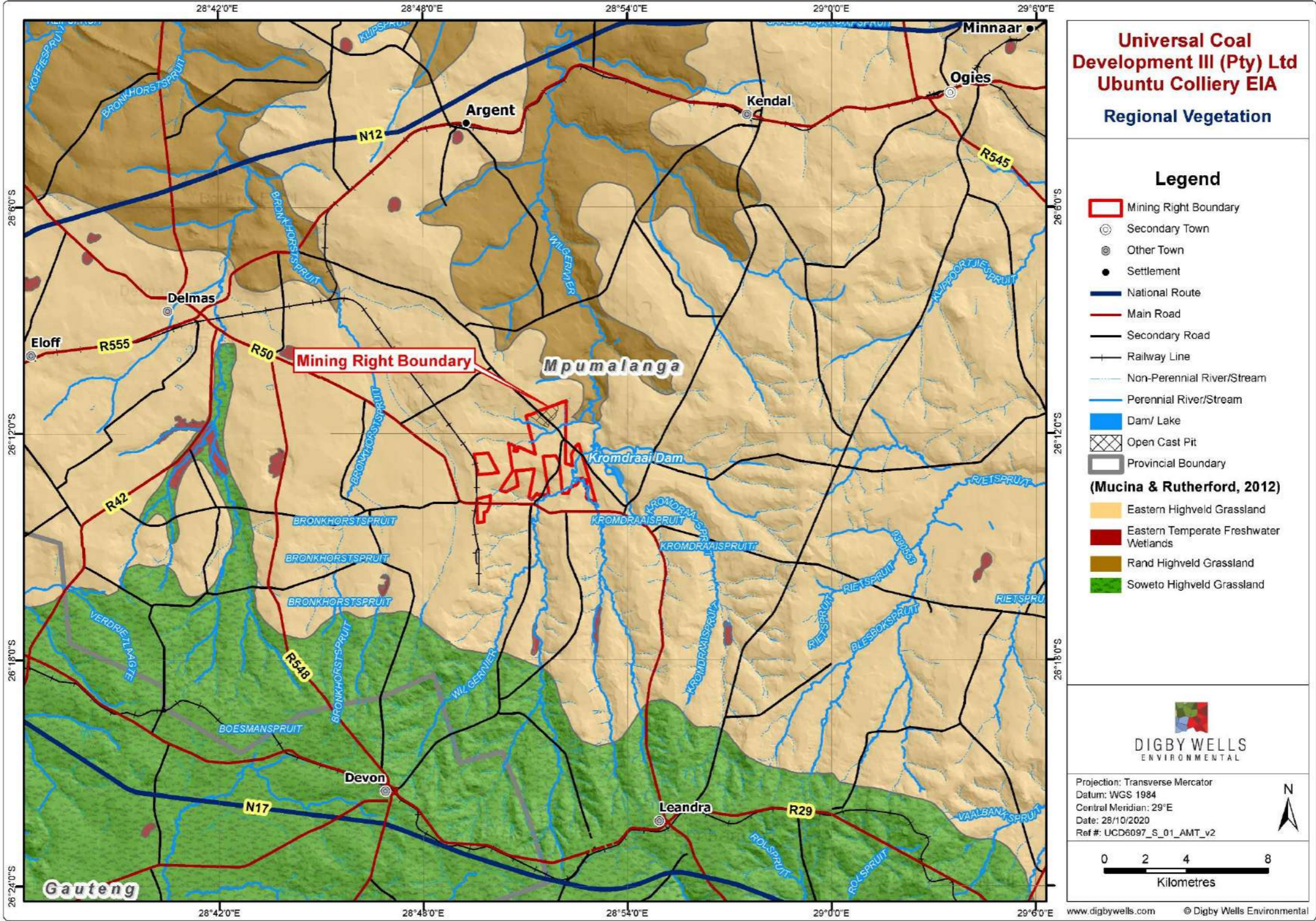


Figure 10-6: Regional Vegetation of Ubuntu Colliery

10.5.3. Desktop Present Ecological State, Importance and Sensitivity

The Wilge River and the Kromdraaispruit are the two main watercourses associated with the proposed Project Area. The Wilge River however lies adjacent to the Project location, whilst the Kromdraaispruit joins the Wilge River at a downstream point. Several unnamed tributaries adjacent to project location drain into the Wilge River. Table 10-5 outlines the desktop aquatic-related data obtained for the Wilge River B20E-01383 Sub-Quaternary Reach (SQR) (DWS, 2014). Figure 10-11 displays the potentially affected Quaternary Catchment, B20E.

Table 10-5: Desktop Aquatic Data Pertaining to the Wilge River

SQR Code/Aquatic Component	B20E-01383
Ecological Category	C
Category Description	Moderately Modified
Ecological Importance (EI)	High
Ecological Sensitivity (ES)	High

According to the desktop data obtained for the Wilge River B20E-01383 SQR (DWS, 2014), the reach appears to be in a Moderately Modified state (i.e. Ecological Category C). Mining, game reserves and agricultural land uses are present in the upper reaches of the Wilge River associated with the Project Area. According to the DWS (2014), impacts associated with mining and agricultural activities such as roads, low-water crossings, water abstraction/increased flows, irrigation, exotic vegetation, vegetation removal, erosion and sedimentation appear to be affecting the current aquatic ecology associated with the Wilge SQR (DWS, 2014).

Both Ecological Importance and Ecological Sensitivity of the Wilge River SQR has been classified as “High”. It is expected to contain approximately 30 macroinvertebrate taxa as well as nine indigenous fish species, all of which are Least Concern (LC) in terms of their IUCN conservation status.

10.5.4. National Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project provides a collated, nationally consistent information source of wetland and river ecosystems for incorporating freshwater ecosystem and biodiversity goals into planning and decision-making processes (Nel, et al., 2011). The spatial layers (Freshwater Ecological Priority Area (FEPAs)) include the nationally delineated wetland areas that are classified into Hydro-geomorphic (HGM) units and ranked in terms of their biodiversity importance. These layers were assessed to evaluate the importance of the wetlands.

Each of the wetlands within the inventory were ranked in terms of their biodiversity importance and as such, Wetland FEPAs were identified in an effort to achieve biodiversity targets (Driver, et al., 2011). Desktop-based modelled wetland conditions 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, were used for this ranking. Table 10-6 below indicates the criteria that were considered for the ranking of each of these wetland areas. Whilst being a valuable tool, it is important to note that the FEPAs were delineated and studied at a desktop and relatively low-resolution level. Thus, the wetlands delineated via the desktop investigations and site verification work done through this study may differ from the NFEPA data layers. The NFEPA assessment does, however, hold significance from a national perspective.

Table 10-6: NFEPA Wetland Classification Ranking Criteria (Nel et al., 2011)

Criteria	Rank
Wetlands that intersect with a Ramsar site.	1
<ul style="list-style-type: none"> Wetlands within 500 m of an International Union for Conservation of Nature (IUCN) threatened frog point locality; Wetlands within 500 m of a threatened water-bird point locality; Wetlands (excluding dams) with most of their area within a sub-quaternary catchment that has sightings or breeding areas for threatened Wattled Cranes, Grey Crowned Cranes and Blue Cranes; Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing wetlands of exceptional Biodiversity importance, with valid reasons documented; and Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing wetlands that are good, intact examples from which to choose. 	2
Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing wetlands of biodiversity importance, but with no valid reasons documented.	3

Criteria	Rank
Wetlands (excluding dams) in A or B condition AND associated with more than three other wetlands (both riverine and non-riverine wetlands were assessed for this criterion); and Wetlands in C condition AND associated with more than three other wetlands (both riverine and non-riverine wetlands were assessed for this criterion).	4
Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing Impacted Working for Wetland sites.	5
Any other wetland (excluding dams).	6

Based on the aforementioned criteria, the Project Area comprises of Floodplain and Channeled Valley Bottom NFEPA Wetlands. In terms of the riverine ecosystems, there are no areas of potential concern within the sub-quaternary catchment associated with the proposed project. Figure 10-7 and Figure 10-8 illustrate these NFEPA wetlands and River FEPAs respectively in relation to the Project Area.

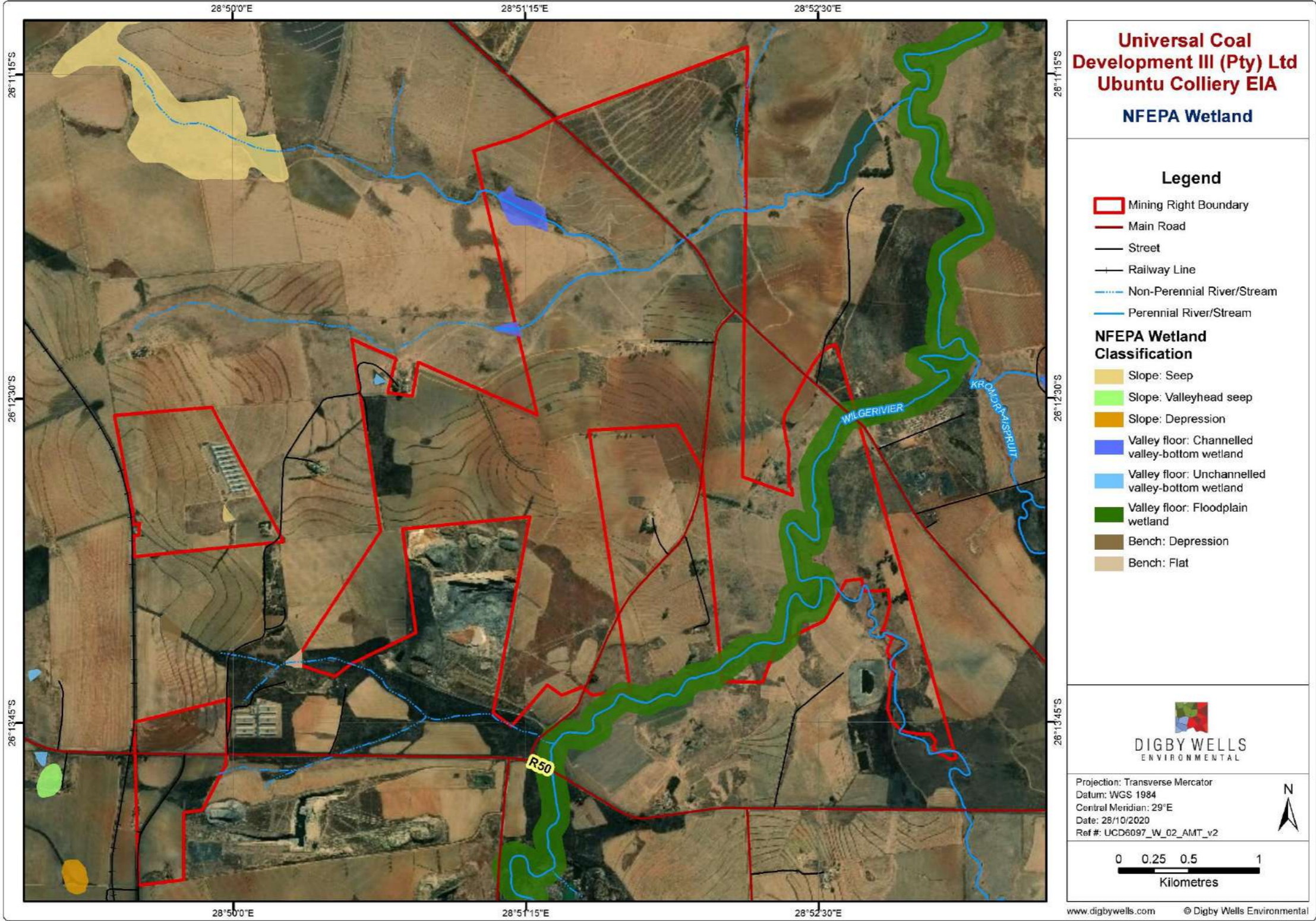
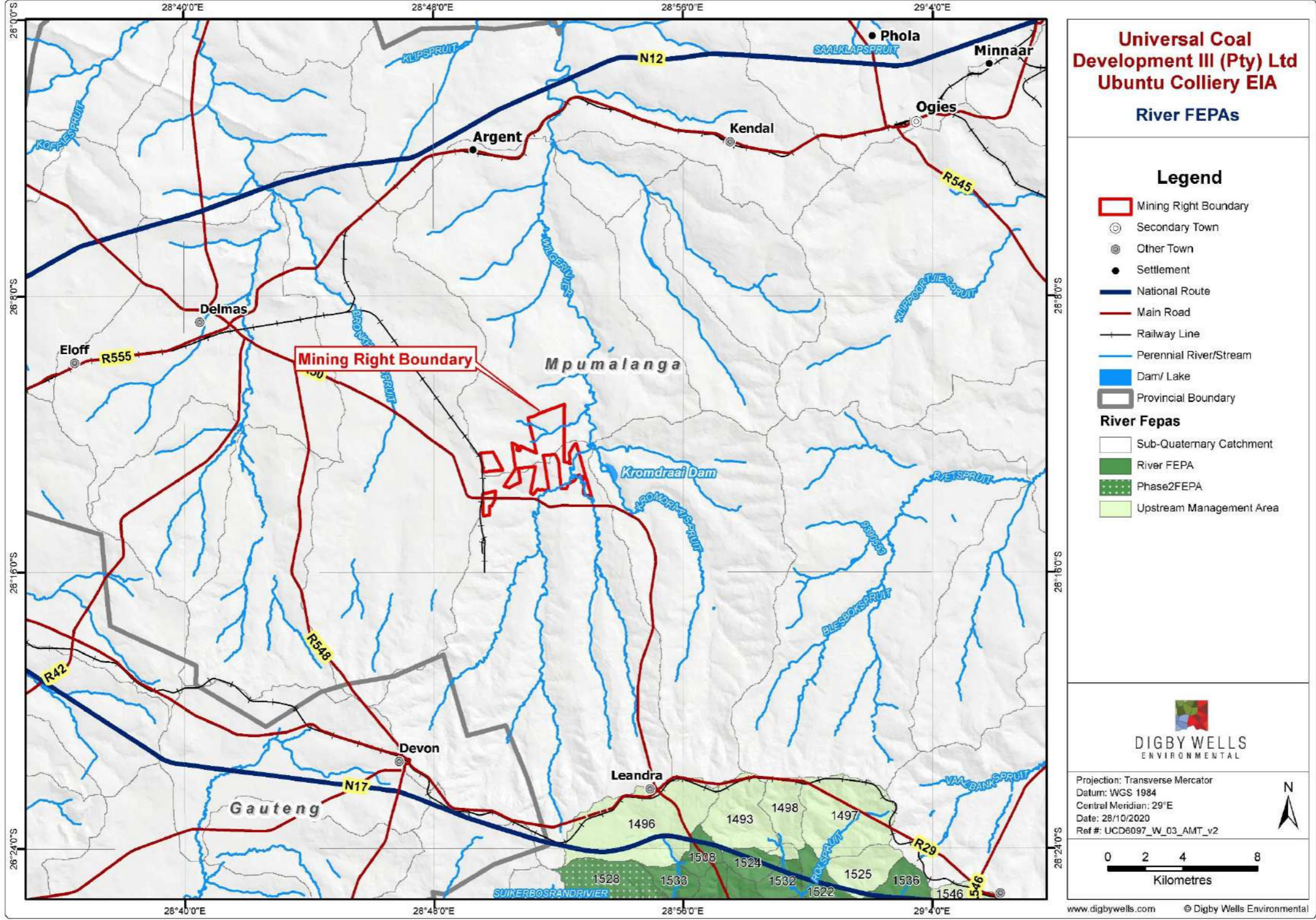


Figure 10-7: NFEPA Wetlands of Ubuntu Colliery



10.5.5. Mining and Biodiversity Guidelines

The Mining and Biodiversity Guideline was developed collaboratively by South African National Biodiversity Institute (SANBI), the DEA, the Department of Mineral Resources (DMR), the Chamber of Mines (The Minerals Council South Africa) and the South African Mining and Biodiversity Forum (2013).

The purpose of the guideline was to provide the mining sector with a manual to integrate biodiversity into the planning process thereby encouraging informed decision-making around mining development and environmental authorisations.

The aim of the guideline is to explain the value for mining companies to consider biodiversity management throughout the planning process. The guideline highlights the importance of biodiversity in managing the social, economic and environmental risks of the proposed mining Project.

The country has been mapped into biodiversity priority areas including four categories each with associated risks and implications (Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, & South African National Biodiversity Institute, 2013)

The Project Area is dominated by areas classified as 'Moderate Biodiversity Importance - Moderate Risk for Mining' (Figure 10-9).

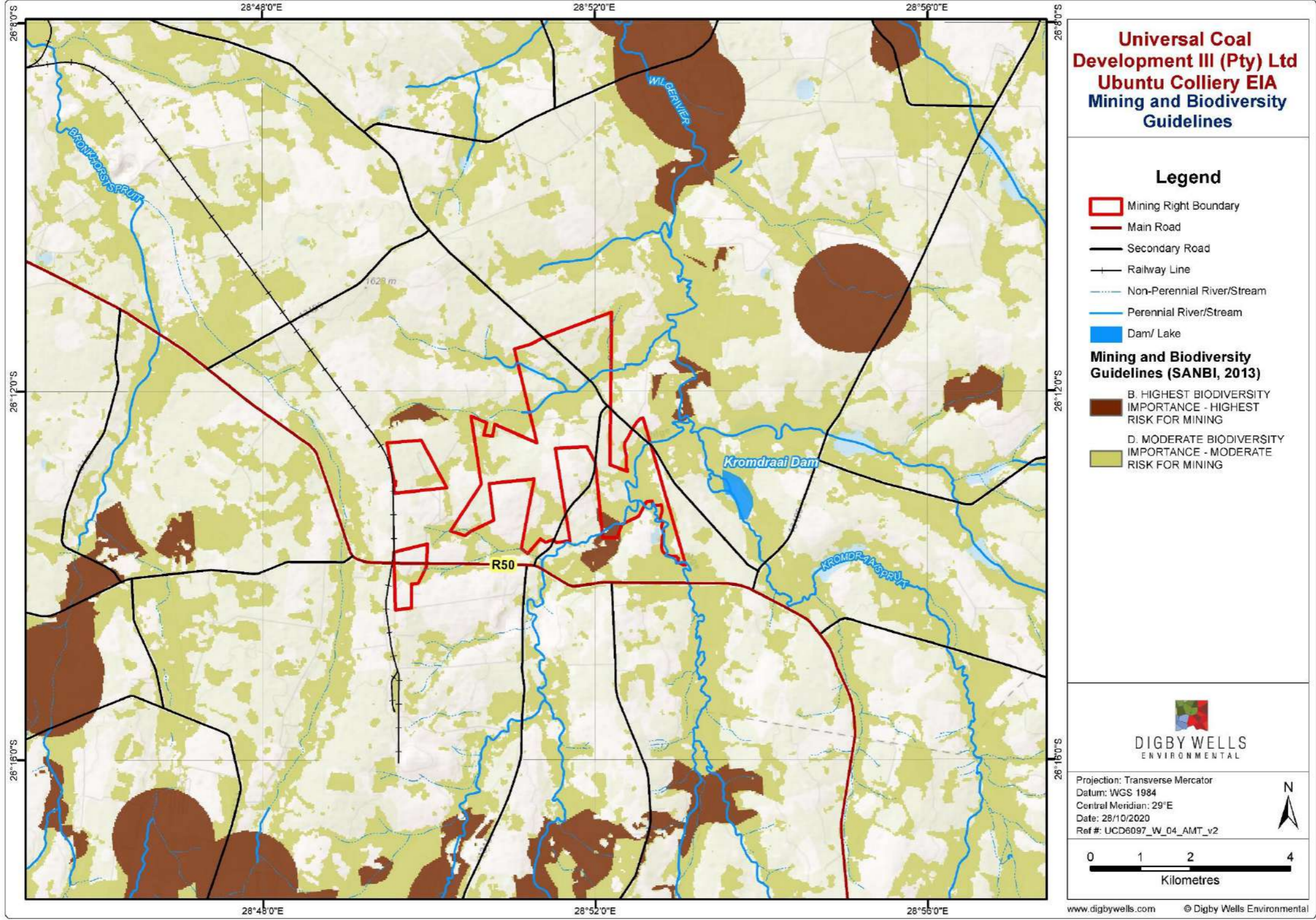


Figure 10-9 Mining and Biodiversity Guideline of Ubuntu Colliery

10.5.6. Mpumalanga Biodiversity Sector Plan

The Mpumalanga Biodiversity Sector Plan (MBSP) is a spatial tool that forms part of the national biodiversity planning tools and initiatives that are provided for national legislation and policy. The MBSP was published in 2014 by the Mpumalanga Tourism and Parks Agency (MTPA) and comprises a set of maps of biodiversity priority areas accompanied by contextual information and land-use guidelines for use in land-use and development planning, environmental assessment and regulation, and natural resource management. Strategically the MBSP enables the province to:

- Implement the NEM:BA, 2004 provincially, and comply with requirements of the National Biodiversity Framework, 2009 (NBF) and certain international conventions;
- Identify those areas of highest biodiversity that need to be considered in provincial planning initiatives; and
- Address threat of climate change (ecosystem-based adaptation).

The publication includes terrestrial and freshwater biodiversity areas that are mapped and classified in Protected Areas (PAs), Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) or Other Natural Areas (ONAs). The Project Area is mostly 'Highly Modified' with 'Other Natural Areas' (Figure 10-10)

Wetlands in the Mpumalanga Province have been extensively degraded and, in many cases, irreversibly modified and lost through a combination of inappropriate land-use practices, development, agriculture and mining. Wetlands represent ecosystems of high value for delivering, managing and storing good water quality for anthropological and animal use yet they are vulnerable to undesirable impacts. It is therefore in the interest of national water security that all wetlands are protected by law.

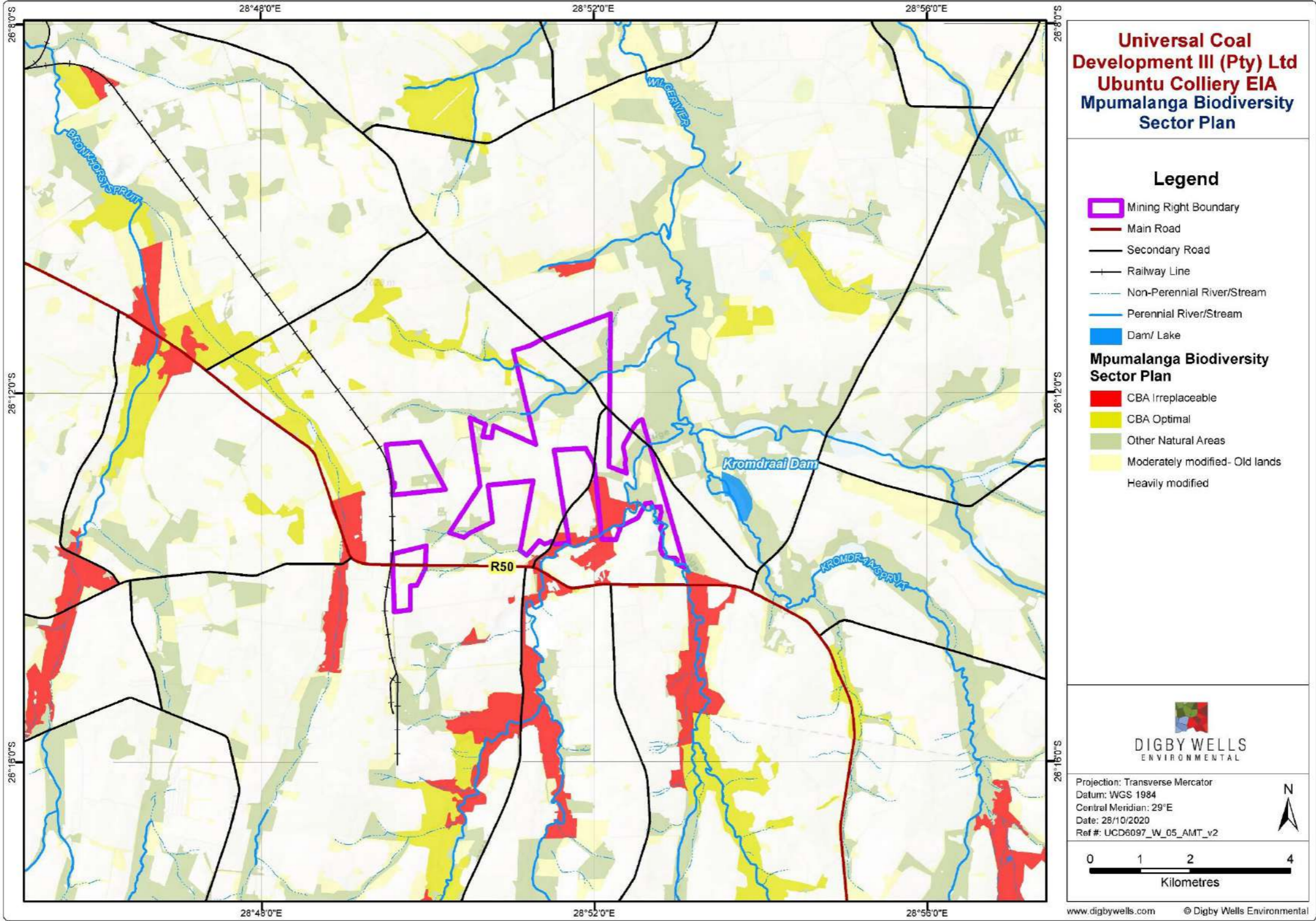


Figure 10-10: MBSP of Ubuntu Colliery

10.6. Hydrology (surface water)

The baseline regional hydrological setting is summarised in this section.

10.6.1. Hydrological setting

The proposed project site falls predominantly within quaternary catchment B20E while a small portion falls within quaternary catchment B20A of the Olifants Water Management Area (WMA 02) (Figure 10-11).

The Project Area is drained by several streams draining from the south to the north. On the south east of the study area are two tributaries, namely the Wilge River and the Kromdraaispruit. There are a number of other non-perennial streams and inland water features within the Project Area, including the Kromdraai Dam and Dieplaagte Dam. The Wilge River eventually drains to the Olifants River further downstream which then drain into the Limpopo River through Mozambique and into the Indian Ocean.

10.6.2. Water quality

Water quality monitoring has been on going at Ubuntu Colliery. Existing water quality data and reports were provided by Universal Coal. The data was assessed, interpreted and presented to enable the understanding of water quality status for the rivers within and around the Project Area. The surface water quality within the Ubuntu Colliery was benchmarked against the WUL Limits for the Ubuntu Colliery as stipulated in the WUL issued by the DWS with Licence No.: 03/B20E/ABCGIJ/4751 on 22 February 2019 (Table 10-7).

Table 10-7: Ubuntu Colliery WUL Limits for Surface Water Quality

Variable	Limits
pH	6.4 – 9.0
Electrical Conductivity (EC) in mS/m	100
Sulphate (SO ₄) in mg/l	250 – 400
Chloride (Cl) in mg/l	73
Sodium (Na) in mg/l	140
Magnesium (Mg) in mg/l	45
Calcium (Ca) in mg/l	54
Fluoride (F) in mg/l	0.52
Nitrate (NO ₃) in mg/l	7.9
Total Alkalinity (CaCO ₃) mg/l	295

Water quality data for the third quarter of 2019 (i.e. July to September 2019) was reviewed from the surface and groundwater report that was compiled by Digby Wells Environmental (2019). Additionally, the quarterly water quality report compiled by EcoSolve Consulting at the beginning of year 2020 (i.e. January to July 2020) was reviewed as part of the baseline water quality update. The monitoring network within Ubuntu Colliery comprises of 8 surface water quality monitoring points. The monitoring sites were selected in consideration of the proposed mine plan with an objective to intersect both surface and groundwater prior to (upstream) and moving away from a pollution source (downstream). Table 10-8 presents the coordinates of the surface water monitoring points.

Table 10-8: Surface Water Monitoring Sites Coordinates

Sample Name	Latitude	Longitude	Description of localities
UCBSW2	-26.18335	28.94139	Sampled as UCBSW2, bridge within a wetland area. A low flow was observed
UCBSW3	-26.18359	29.06861	At the Dam
UCBSW4	-26.18343	29.03306	Downstream of dam which is situated just outside the northern part of the Ubuntu Colliery Mine
UCBSW8	-26.18350	28.93556	Downstream outside the Ubuntu Colliery Mine boundary on Wilge River. This was observed as a cattle watering point with flowing water
UCBSW10	-26.20009	28.98861	On Wilge River upstream area.
UCBSW11	-26.20019	28.93222	On Kromdraai tributary with flowing water joining Wilge River
UCBSW12	-26.22562	28.836984	Not sampled-ground water pumped to this sampling point for use at nearby chicken farm
UCBSW15	-26.20008	28.86139	Wetland near proposed strip pit mine design, stagnant water was observed

During this baseline water quality investigation, the following was noted about the water quality within Ubuntu Colliery:

- pH was mostly within the WUL Limits, except an exceedance at UCBSW8 in October 2020;
- EC was exceeded at sites UCBSW15, UCBSW11 and UCBSW2, with fluctuations within and beyond the WUL Limits throughout the monitoring period;
- Some exceedances were observed in the Ca, Mg and Na. Some exceedances in Calcium were observed at sites UCBSW11, UCBSW15 and UCBSW10 between December 2018 and November 2019. Magnesium was elevated beyond the WUL

Limits at multiple sites, including sites UCBSW2, UCBSW4, UCBSW8, UCBSW10 and UCBSW11 between April and July 2020. Sodium exceedances were observed within site UCBSW2 between June and July 2020;

- Chlorides were exceeded at sites UCBSW2 and UCBSW11 and fluctuated within and beyond the WUL Limits throughout the monitoring period;
- Sulphate was generally within the WUL Limits and was only exceeded at site UCBSW15 in November and December 2018;
- Nitrate was generally within the WUL Limits for most of the monitoring period until exceedances were observed in UCBSW2 in May 2020;
- Fluoride generally fluctuates within and beyond the WUL Limits across all the monitoring sites, with the greatest concentrations being observed at UCBSW15, followed by UCBSW2;
- Total alkalinity was mostly within the WUL for all points for most of the monitoring points, except at site UCBSW11, where total alkalinity is commonly elevated beyond the WUL Limit.

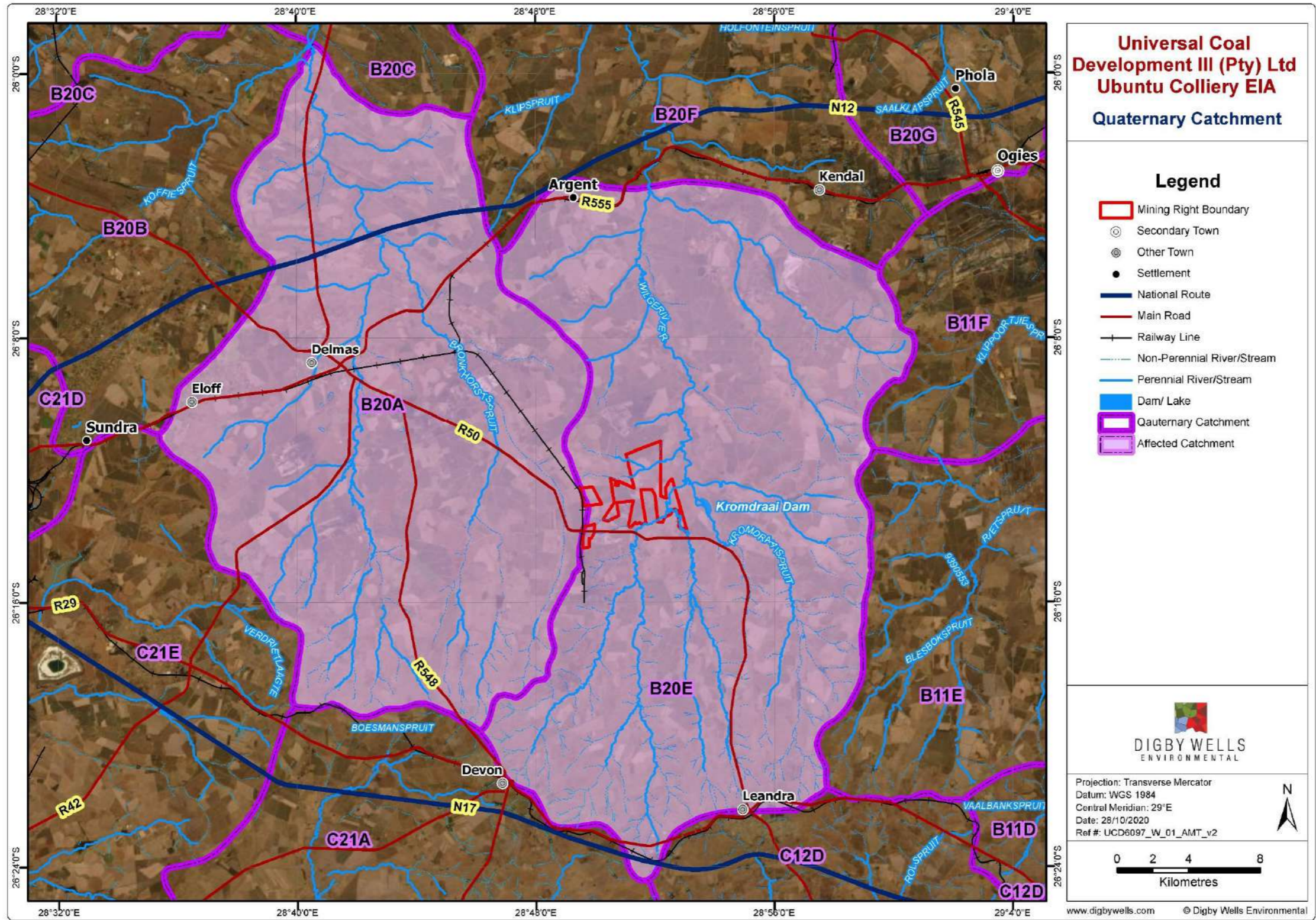


Figure 10-11: Quaternary Catchment for the Ubuntu Colliery Study Area

10.7. Groundwater

The baseline regional hydrological setting is summarised in this section.

10.7.1. Aquifers

The aquifers situated within the Project Area are conceptualised to consist of four units, namely the shallow weathered aquifer, the intermediate fractured aquifer, the Dwyka tillite aquifer and the Malmani dolomite aquifer.

10.7.1.1. Shallow Weathered Aquifer

The weathered material in the shallow weathered aquifer consists mostly of decomposed and highly weathered coarse-grained sandstones, with shales and siltstone.

The sustainability of the shallow weathered aquifer is dependent on seasonal recharge from rainfall. The rainwater infiltrates the soil and a portion of it eventually reaches the saturated zone (effective recharge).

From the five boreholes drilled around the Project Area the weathered aquifer ranges from 6 to 12 metres below ground level (mbgl), averaging at 9 mbgl. The aquifer transmissivity of the weathered material is estimated between 0.5 and 1.5 m²/day (Hodgson and Krantz, 1998).

10.7.1.2. Fractured Aquifer

The fractured aquifer consists of un-weathered sequences of sandstone, siltstone, shale, carbonaceous shale and coal. The pores within these sediments are too well cemented to allow any significant permeation of water. Groundwater movement therefore predominantly occurs along secondary structures such as fractures, cracks and joints within the sediments. However, not all secondary structures within the fractured aquifer are water-bearing. Of all un-weathered sediments in the fractured aquifer, the coal seam often has the highest hydraulic conductivity.

10.7.1.3. Dwyka Tillite

The Dwyka tillite forms a hydraulic barrier between the overlying mining activities and the basement aquifer, due to its low hydraulic conductivity. The aquifer permeability of the Dwyka tillite is estimated to be between 0.0002 and 0.0148 m/d (Hodgson and Krantz, 1998). The thickness of this unit varies from 0.5 to 30 m thick averaging at 8 m.

10.7.1.4. Malmani Dolomite Aquifer

The basement aquifer comprises of Malmani dolomites, characterised as part of the chert bearing to chert poor chemically derived sediments of the Chuniespoort Group. The Chuniespoort Group dolomites represent the most important aquifer in South Africa due to the high storage and permeability characteristics of the rock type. The continuity of the dolomite aquifer is interrupted by vertical to sub-vertical geological structures such as dykes which create low permeability to impermeable compartmental barriers.

Dolomitic areas can have high recharge and significant groundwater flow characteristics (Hodgson and Krantz, 1998; and Barnard, 2000). Unlike most other formations, the groundwater gradient in dolomitic aquifers does not necessarily follow topography. More often than not, it occurs as a nearly horizontal surface indicative of a low hydraulic gradient and permeable formations (Barnard, 2000).

10.7.2. Current Groundwater Conditions

The current groundwater conditions are defined based on the Ecosolve Consulting (2020) monitoring report. These conditions are defined in terms of groundwater quality and groundwater levels. The groundwater monitoring locations are presented in Figure 10-12.

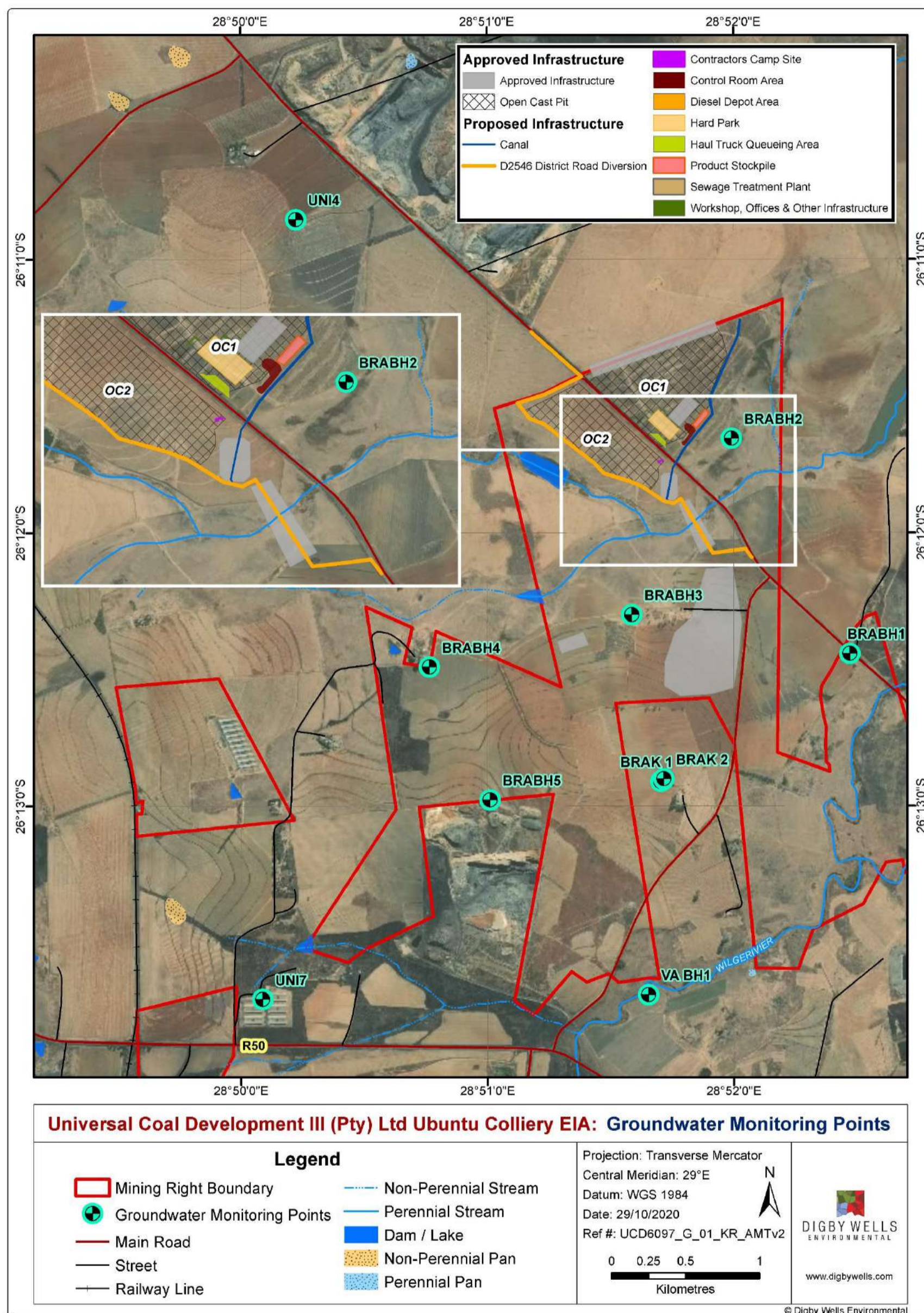


Figure 10-12: Groundwater Monitoring Locations

10.7.2.1. Groundwater Quality

Groundwater quality was benchmarked against the approved standards stipulated in the approved WUL (License number 03/B20E/ABCGIJ/4751) given in Table 10-9.

Table 10-9: WUL Standards for Groundwater Quality

Variables	Groundwater Quality Objectives
pH	6.4 – 9.0
Electrical Conductivity in mS/m (EC)	150
Total Alkalinity in mg/L	260
Chloride (Cl) in mg/L	200
Fluoride (F) in mg/L	1.56
Sulphate (SO ₄) in mg/L	250 – 400
Nitrate (NO ₃) in mg/L	10
Calcium (Ca) in mg/L	150
Magnesium (Mg) in mg/L	45
Sodium (Na) in mg/L	200
Potassium (K) in mg/L	140
Total Suspended Solids (TDS) in mg/L	545
Ortho-Phosphate (PO ₄ ³⁻) in mg/L	0.128
Iron (Fe)	0.2
Manganese (Mn)	0.11

Water quality for the Project Area is found to be within the WUL standards (Table 10-9) at all groundwater monitoring locations (Figure 10-12), except for VABH01 in which a bicarbonate concentration of 269 mg/L slightly exceeds the WUL standard (260 mg/L). The slight exceedance is not an environmental concern, additionally, the pH is found neutral for all monitoring locations. The water quality trends for all monitoring sites are observed to be stable. Reference can be made to the Ecosolve Consulting (2020) report for in-depth details.

Groundwater is characterized according to the Piper, Durov, Scholler and Sodium Adsorption Ration (S.A.R) diagrams.

According to the Piper diagram (Figure 10-13) the groundwater found in all the monitoring locations sit within the upper left portion of the diagram, and this groundwater is classified as calcium-chloride water.

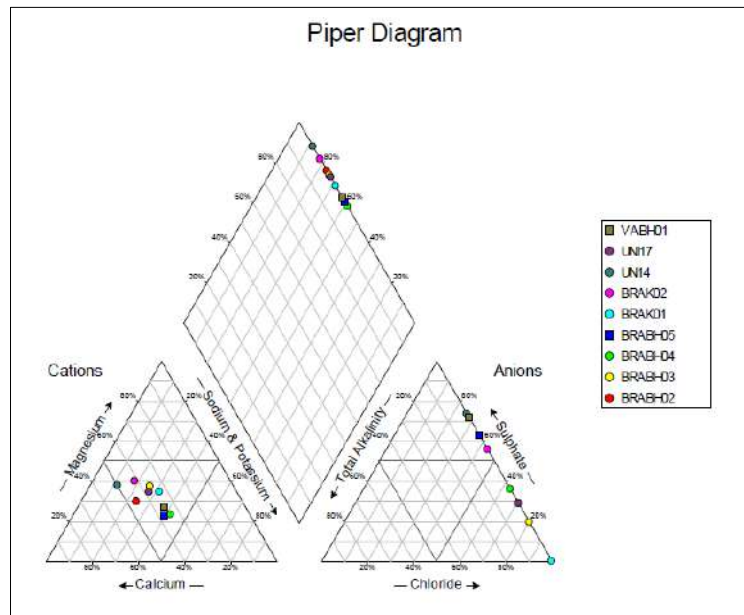


Figure 10-13: Piper Diagram

According to the Durov diagram (Figure 10-14) the groundwater found at the Project Area is dominant in chloride congruent with the Piper Diagram interpretation, additionally a dominance in calcium/magnesium and bicarbonate is observed.

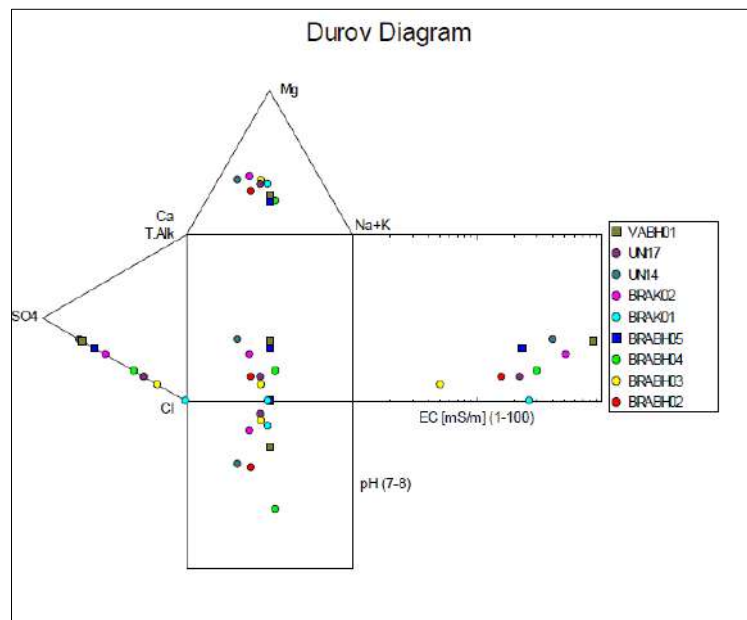


Figure 10-14: Durov Diagram

The SAR diagram is used to determine if water is suitable for irrigation uses. Water with SAR values of 18 and above will result in an excess of sodium in the soil. Water with SAR values of 10 and below is safe and suitable for irrigation. According to the S.A.R diagram (Figure 10-15), the groundwater samples have SAR values that are below 10 which is safe and suitable for irrigation.

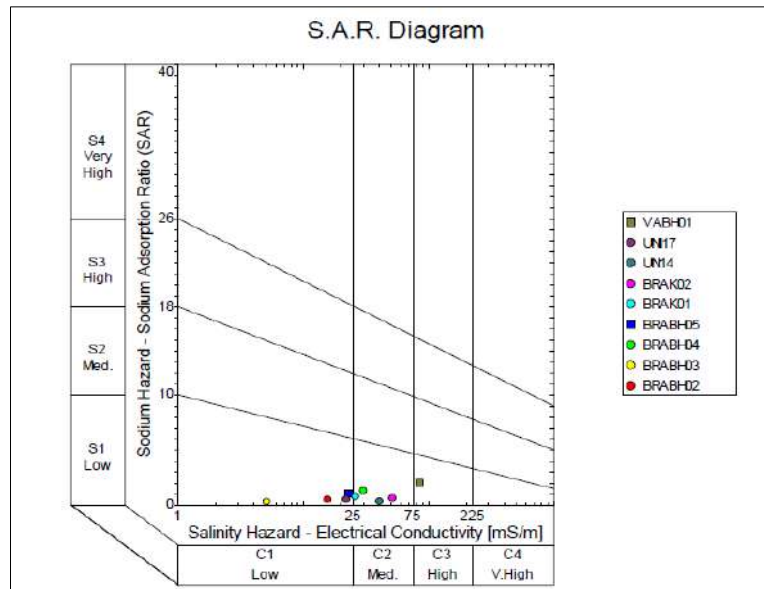


Figure 10-15: S.A.R Diagram

10.7.2.2. Groundwater Levels

The groundwater level depth ranges between 2.24 mbgl at UN17 and 47.97 mbgl at BRAK2. It is observed that the hydraulic head is higher in the southwest and lower in the northeast and the groundwater flow direction is thus derived to generally be from south-west to north-west. The flow direction of the groundwater in the study area correlates with the surface topography as depicted in Figure 10-16. Localised depression of the hydraulic head is due to groundwater abstractions for agricultural irrigations purposes.

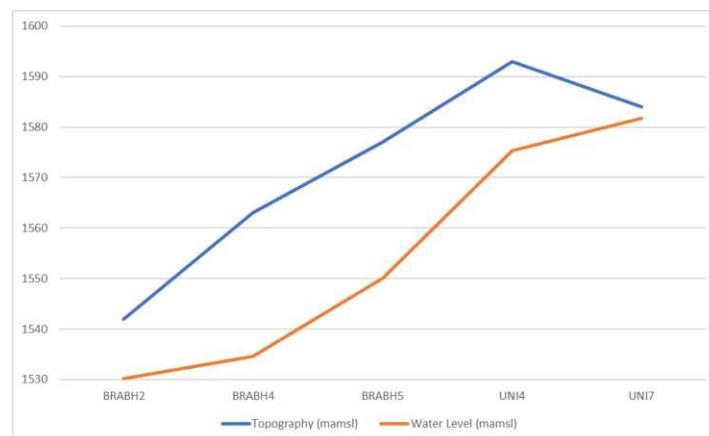


Figure 10-16: Correlation between Groundwater Level and Topography

10.8. Heritage

Digby Wells undertook a pre-disturbance survey of the Mining Right Area during June 2012 in support of the Heritage Resources Management (HRM) process¹ (Higgitt & Nel, 2012). The HRM process was undertaken as a component of the previous EIA process. Table 10-10 presents a summary of the heritage resources identified during the pre-disturbance survey.

Table 10-10: Heritage Resources identified within the MR Area

Heritage Resource	Description
H001	A farm complex including historical and more modern components. The complex is occupied and utilised. The complex includes a residence, workshops, sheds and cemented stonewalled cattle enclosures. A segment of stonewalling with wagon wheels is present on the perimeter of the <i>werf</i> , which may indicate an old entrance to the complex.
H002	A burial ground including 43 individual graves, orientated east-west and in at least four rows. Of these graves, eleven had headstones and nine had dressings. The headstones were either granite or cement and the dressings were cement. The graves with legible headstones belong to the Mokoena and Mbotou families and legible dates range from 1971 to 1985. The burial ground is not fenced.
H003	A burial ground including 14 individual graves. Dressings present in the burial ground include cement headstones, stone and brick borders, cement and granite dressings with granite headstones. The graves with legible headstones belong to the Mahlangu and Masielala families and legible dates range from 1989 to 2000. The burial ground is not fenced.
H004	An ash midden surrounded by dense grass cover. The midden includes burnt bone and fragments of glazed ceramics.
H005	A burial ground including 62 individual graves. Of these graves, 40 have headstones comprising granite, stone and cement. The graves with legible headstones belong to the Mahamba, Mashela, Mazibu, Mokwena, Mthethwa, Ntuli, Sibiya, Skaosa and Tsele families. Legible dates range from 1949 to 2000. The burial ground is not fenced.
H006	A dilapidated mud brick structure, measuring approximately 6 m by 3 m. Traces of blue plaster were observed on the walls of the structure. There were additional mud brick structures present at this point and two middens were identified next to the main structure. Green glass fragments, modern bricks, fragments of glazed ceramics, burnt bone, batteries and a rubber shoe were present in the middens. This site might represent a historic or past labour cottage and may be associated with H005, which is located 100 m away.

¹ Case ID 479, accessible at: <https://sahris.sahra.org.za/cases/eia-brakfontein-thermal-coal-mine>

Heritage Resource	Description
H007	Two cylindrical brick towers, approximately 8 m high. These towers are capped with cement and there is no visible entrance or opening. A foundation and some remaining walls are adjacent to the towers.
H008	A burial ground including 11 individual graves. Of these graves, five have headstones comprising granite and cement graves. Seven of the graves are shaped as caskets, which have been placed side by side. Six of these graves are smaller and the one is larger. The graves with legible headstones belong to the Hartzenburg, Kotze and Vorster families. Legible dates range from 1932 to 1978. The burial ground is fenced off.
H009	Remains of a small structure with two rooms. This may be a storage room or a pen for animals and it may be associated with H010 (approximately 100 m away). The structure does not have a roof and glass and metal remains were present.
H010	This site includes two adjacent structures. The larger structure is approximately 30 m by 15 m wide and includes an entrance hall and room to the left of the entrance. The smaller structure measured approximately 15 m by 10 m. These structures were constructed from modern bricks with cement plaster. An additional structure made from mud bricks with cement plaster was located near the entrance to the larger structure. The mud brick structure measured approximately 4 m by 3 m. Fragments of glass, metal and building rubble were present on this site.
H011	A structure measuring approximately 30 m by 20 m. The structure was built from stonewalling and a combination of daga and cement mortar and was divided into three rooms by thick mud walls. A brick and cement structure was located 10 m from the main structure. This may have been a water tower but there was no water tank present.
H012	A burial ground including an unknown number of individual graves (the grave was identified by a different specialist and was not recorded by the heritage specialist). Nine graves had cement headstones. The burial ground is not fenced and is associated with H011.

10.8.1. Results from the Pre-disturbance Survey

Shannon Hardwick undertook a more recent pre-disturbance survey of the site-specific study area on 08 and 09 July 2020. This survey focused on areas covered by proposed infrastructure not investigated in the previous surveys and was predominantly pedestrian, with vehicular travel amongst areas under investigation.

All surveys undertaken were non-intrusive (i.e. no sampling was undertaken) and the aim of the surveys was to:

- Visually record the current state of the cultural landscape; and

- Record a representative sample of the visible, tangible heritage resources present within the development footprint area, site-specific study area and greater study area.

During the pre-disturbance survey undertaken for the current HRM process, one additional heritage resource was identified. Table 10-11 includes a summary of this heritage resource and Figure 10-17 includes photographs. Figure 10-18 includes the results of the pre-disturbance survey.

Table 10-11: Heritage Resources identified within the MR Area

Heritage Resource	Description
H013	A burial ground including six visible individual graves. Of these graves, two have cement headstones. One of these headstones is no longer legible and the others are partially legible. The date is illegible. The other graves are marked by stone piles with upright stones serving as headstones. The burial ground is unfenced and is located in a void in an agricultural field.



Figure 10-17: Results of the Pre-disturbance Survey showing Newly Identified Heritage Resources

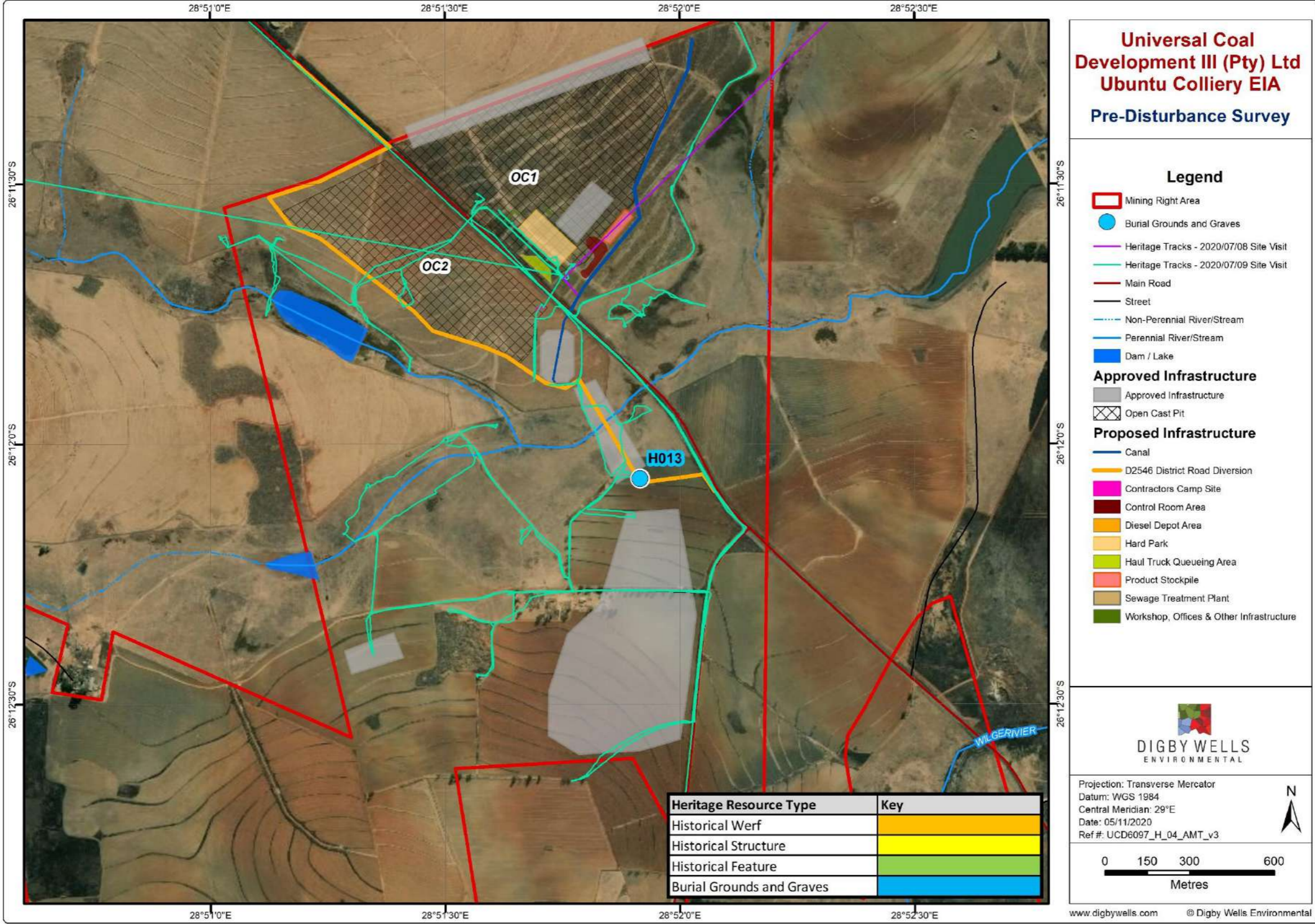


Figure 10-18: Results of the Pre-disturbance Survey

10.8.2. Constraints and Limitations

Digby Wells encountered constraints and limitations during the compilation of this report. Table 10-12 presents an overview of these limitations and the consequences.

Table 10-12: Constraints and Limitations

Description	Consequence
Whilst every attempt was made to obtain the latest available information, the reviewed literature does not represent an exhaustive list of information sources for the various study areas.	The cultural heritage baseline presented in this Scoping Report is considered accurate, but may not include new data or information which has not have been made available to the public.
Heritage resources that may have been identified through previously-completed heritage assessments within the Project area boundary were not verified during the heritage survey.	It is assumed the previously recorded heritage resources are accurate and true.
The pre-disturbance survey focused on the proposed infrastructure design footprints as received from Universal Coal at the time of the survey.	<ul style="list-style-type: none"> • Every effort was made to cover the extent of the study area. At the time of the survey, parts of the Ubuntu Colliery were operational and were either impacted due to the mine-related activities or could not be surveyed due to safety risks. • Some heritage resources may not have been identified.
Whilst every attempt was made to survey the extent of the site-specific study area, this report does not present an exhaustive list of identified heritage resources.	Previously unidentified heritage resources may be encountered. Should this occur, Universal Coal must alert the HRAs of the find and may need to enlist the services of a suitably qualified archaeologist or palaeontologist to advise them on the way forward.

Description	Consequence
Archaeological resources commonly occur at subsurface levels. These types of resources cannot be adequately recorded or documented by assessors without destructive and intrusive methodologies and without the correct permits issued in terms of Section 35 of the NHRA.	<ul style="list-style-type: none"> The reviewed literature, previously-completed heritage assessments and the results of the field survey are in themselves limited to surface observations. Subsurface tangible heritage may be exposed during Project activities. Should this occur, Universal Coal must alert the HRAs of the find and may need to enlist the services of a suitably qualified archaeologist to advise them on the way forward.

10.9. Air Quality

Ubuntu Colliery is located in an area with mechanised cash crops farming (i.e. maize), poultry farming and mining activities as the predominant land use types across the landscape, all within a 10 km radius from the mine. Also, widely scattered farmsteads can be observed on Google Earth Imagery® in the area (Google Earth Pro V.7.3 (October 3, 2020)).

The mine is located in an area where the elevation varies between 1 530 masl and 1 591 masl from east to west.

Figure 10-19 shows the Mining Right boundary with the Project Area zoomed in and historical dust monitoring points. These monitoring points were selected as sensitive receptors. According to the USEPA (2016), a sensitive receptor encompasses but is not limited to “hospitals, schools, daycare facilities, elderly housing, and convalescent facilities. The aforementioned are locations where the occupants are more susceptible to airborne pollutants” if exposed.

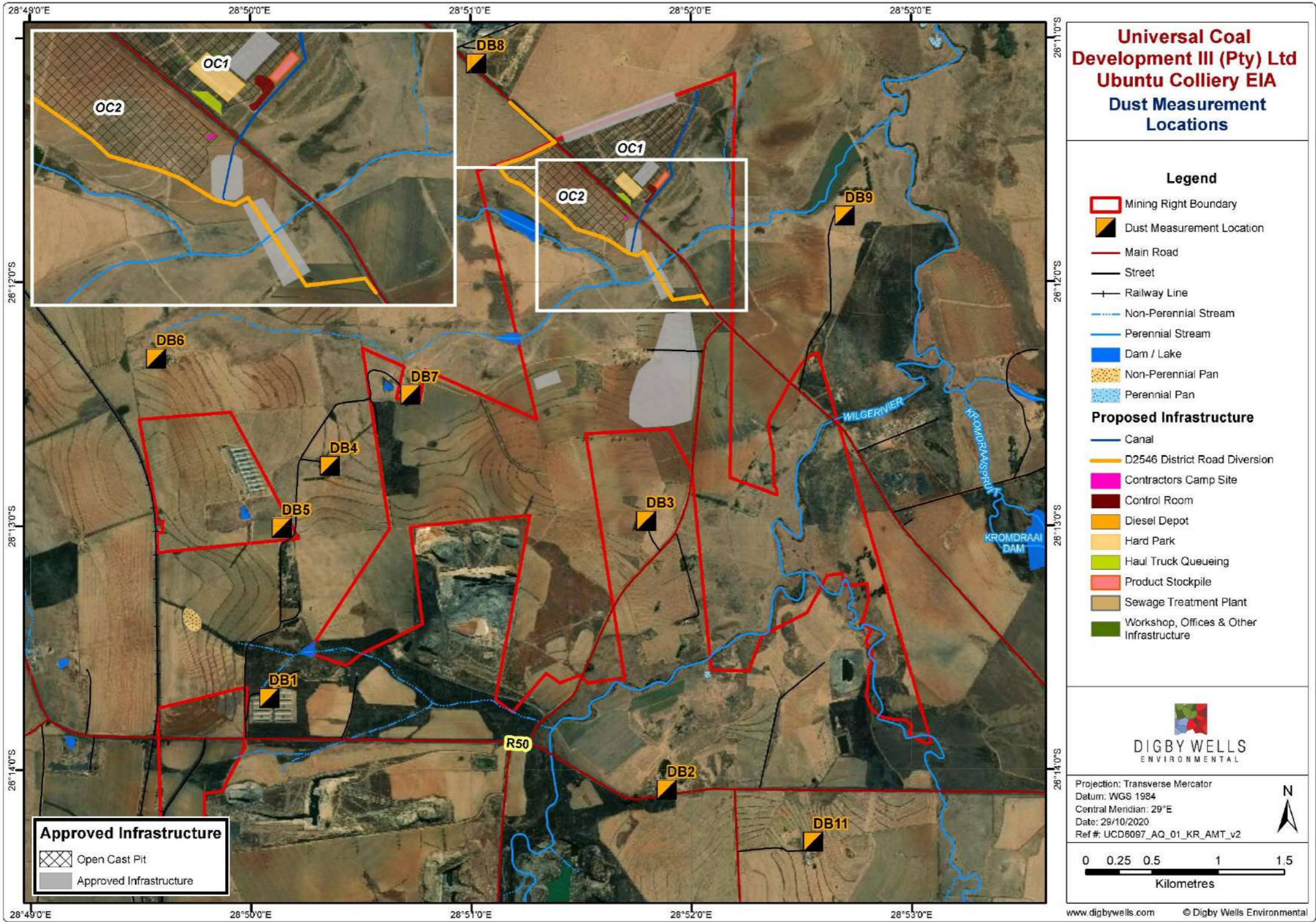


Figure 10-19: Dust Monitoring Sites of Ubuntu Colliery

10.9.1. Dustfall

Archived dust deposition data collected using the American Standard Test Method (ASTM) D1739 for the area was used to assess background scenarios. Data for seven months were obtained from the historical archive, from July 2012 to January 2013. The graph showing the results is depicted below (Figure 10-20). Since mining has not commenced, the monitoring sites were categorised as residential. Once mining commences, some monitoring locations will have to be recategorised as non-residential. The dustfall rates were compared with the South African *Dust Control Regulations*, which contains the standards (*Government Notice 827 and Gazette 36974*). Based on the results, the sites where exceedances of the residential limits were measured are discussed below in sequential order:

- DB2 (August): the dustfall measured at this site was in exceedance of the residential limit of 600 mg/m²/d (with **841** mg/m²/d). This was likely due to localised farming activities resulting in particulates being airborne, deposited and re-suspended; and
- The only other site with exceedances was DB7 (August), with dustfall rate of **779** mg/m²/d measured.

10.9.2. Fine Particulate Matter and Gasses

The real-time monitoring of fine critical pollutants, such as, fine particulate matter i.e. particulate matter with an aerodynamic diameter of less than 10 microns and less than 2.5 microns (PM₁₀ and PM_{2.5}), and gaseous pollutants such as sulphur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), and ozone (O₃) is yet to commence. Since these are regulated, it is envisaged that monitoring will commence in the near future to understand ambient levels before the commencement of mining.

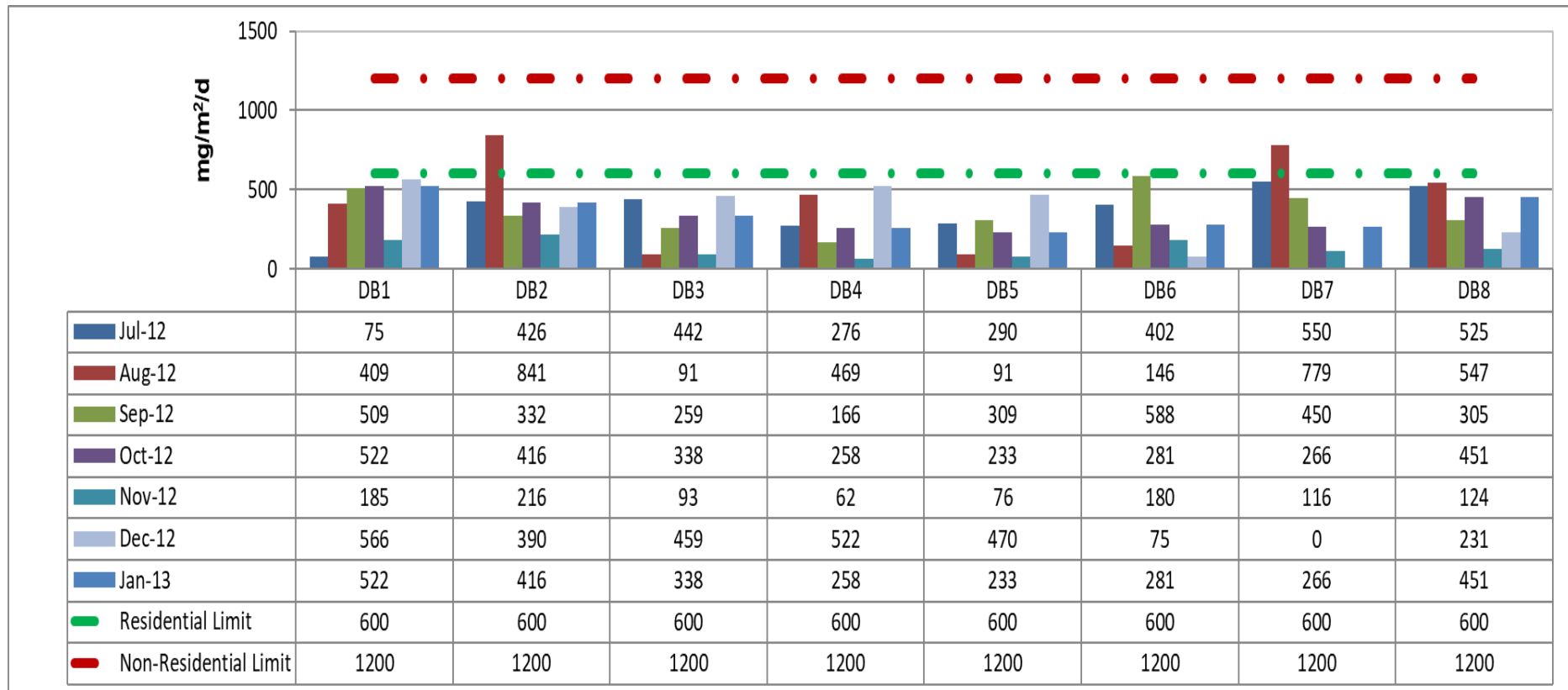


Figure 10-20: Dustfall Results (July 2012 to January 2013)

10.10. Noise

A desktop study using historical Google Earth® Imagery confirms that the soundscape of the Project area's may have changed from 2012 when noise measurements were conducted in the area. In 2012 the MR area was characterised by farming and road networks. Since, a new mining development has been established south west of the Mining Right boundary which will influence the soundscape. However, it is assumed this may not be too significant. Figure 10-21 shows the Project boundary, approved and proposed infrastructure locations and noise monitoring locations.

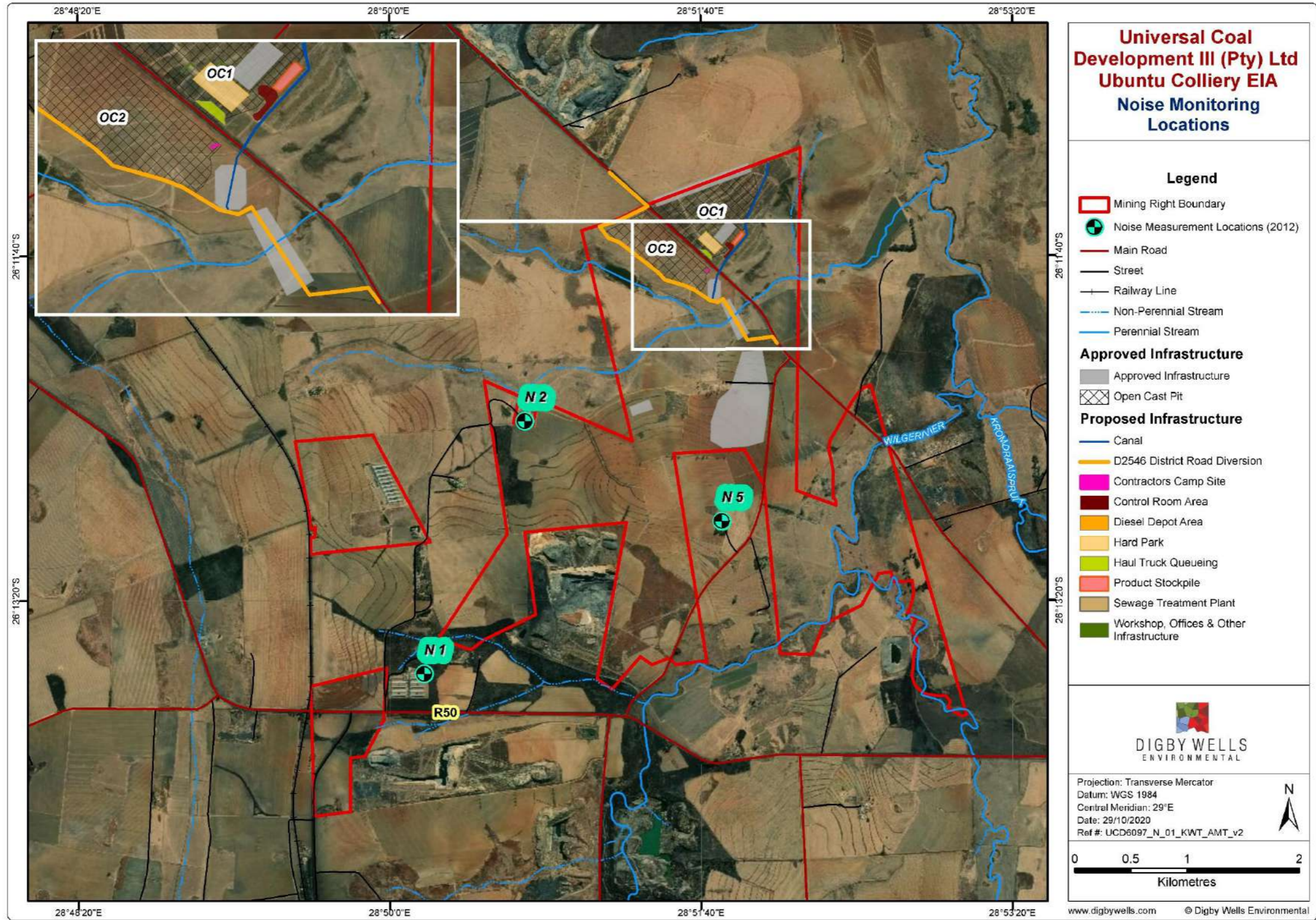


Figure 10-21: Noise Monitoring Locations at the Ubuntu Colliery

10.10.1. Existing Noise Soundscape in the Project Area

The approach followed in the data collection was aligned with the requirements of the noise control regulations as published under GN R.154 of 1992 in terms of Section 25 of the Environmental Conservation Act, 1989 (Act No. 73 of 1989) and the guidelines provided by SANS 10103:2008. According to the SANS 10103:2008, the sound pressure level is used as the measurement unit for noise levels. The acceptable rating levels according to SANS 10103:2008 for ambient noise in different districts (residential and non-residential) are presented in Table 10-13.

Table 10-13: Acceptable Rating Levels for Noise in Districts (SANS 10103, 2008)

Type of District	Equivalent continuous rating level ($L_{Req,T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$
RESIDENTIAL DISTRICTS						
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
NON-RESIDENTIAL DISTRICTS						
d) Urban districts with some workshops, with business premises, and with main roads	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50
NOTE 1 If the measurement or calculation time interval is considerably shorter than the reference time intervals, significant deviations from the values given in the table might result.						
NOTE 2 If the spectrum of the sound contains significant low frequency components, or when an unbalanced spectrum towards the low frequencies is suspected, special precautions should be taken and specialist advice should be obtained. In this case the indoor sound levels might significantly differ from the values given in columns 5 to 7						
NOTE 3 In districts where outdoor $L_{R,dn}$ exceeds 55 dBA, residential buildings (e.g. dormitories, hotel accommodation and residences) should preferably be treated acoustically to obtain indoor $L_{Req,T}$ values in line with those given in table 1.						

Type of District	Equivalent continuous rating level ($L_{Req,T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$
NOTE 4 For industrial districts, the $L_{R,dn}$ concept does not necessarily hold. For industries legitimately operating in an industrial district during the entire 24 h day/night cycle, $L_{Req,d} = L_{Req,n} = 70$ dBA can be considered as typical and normal.						
NOTE 5 The values given in columns 2 and 5 in this table are equivalent continuous rating levels and include corrections for tonal character, impulsiveness of the noise and the time of day.						
NOTE 6 The noise from individual noise sources produced, or caused to be produced, by humans within natural quiet spaces such as nature reserves, private game farms, national parks, wilderness areas and bird sanctuaries, should not exceed a maximum Weighted sound pressure level of 50 dBA at a distance of 15 m from each individual source—.						
A - The values given in columns 2 and 5 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness of the noise and the time of day.						
B - The values given in columns 3, 4, 6 and 7 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness.						
C – $L_{Req,T}$ is the equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$) during a specified time interval, plus specified adjustments for tonal character, impulsiveness of the sound and the time of day.						
D – dBA 'A-weighted' is a standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.						

Baseline noise measurements were taken at noise sensitive receivers in the Project area. The baseline assessment survey was undertaken to determine the ambient noise levels at the selected monitoring locations (residential dwellings i.e. farm-houses). The list of noise measurement locations can be seen in Table 10-14.

Table 10-14: Noise Measurement Locations

Site ID	Farm/location	Category of receiver	GPS coordinates
N1	Brakfontein 264 IR (portion 24)	Rural	26°13'41.27"S 28°50'11.07"E
N2	Brakfontein 264 IR (portion 29)	Rural	26°12'27.99"S 28°50'43.39"E
N5	Brakfontein 264 IR (portion 11)	Rural	26°12'57.01"S 28°51'46.65"E

A Cirrus, Optimus Green, precision integrating sound level meter was used for the measurements. The instrument was field calibrated with a Cirrus, sound level calibrator.

The results of the baseline measurements are presented in Table 10-15 below. In Table 10-15, the results, as well as the rating limits according to the SANS 10103:2008 guidelines, are presented side by side. The noise level time history graph per noise measurement location can be seen in Figure 10-22 to Figure 10-24.

Table 10-15: Results of the Baseline Noise Measurements

Sample ID	SANS 10103:2008 rating limit					
	Type of district	Period	Acceptable rating level dBA	L _{Aeq,T} dBA	Maximum/Minimum dBA	Date
N1	Rural	Daytime	45	45	77 / 35	02/07/2012
		Night time	35	47	70 / 37	02/07/2012
N2	Rural	Daytime	45	49	81 / 18	03/07/2012
		Night time	35	34	66 / 21	03/07/2012
N5	Rural	Daytime	45	51	102 / 29	06/07/2012
		Night time	35	53	91 / 29	06/07/2012
	Indicates current L _{Aeq,T} levels above either the daytime rating limit or the night time rating limit					

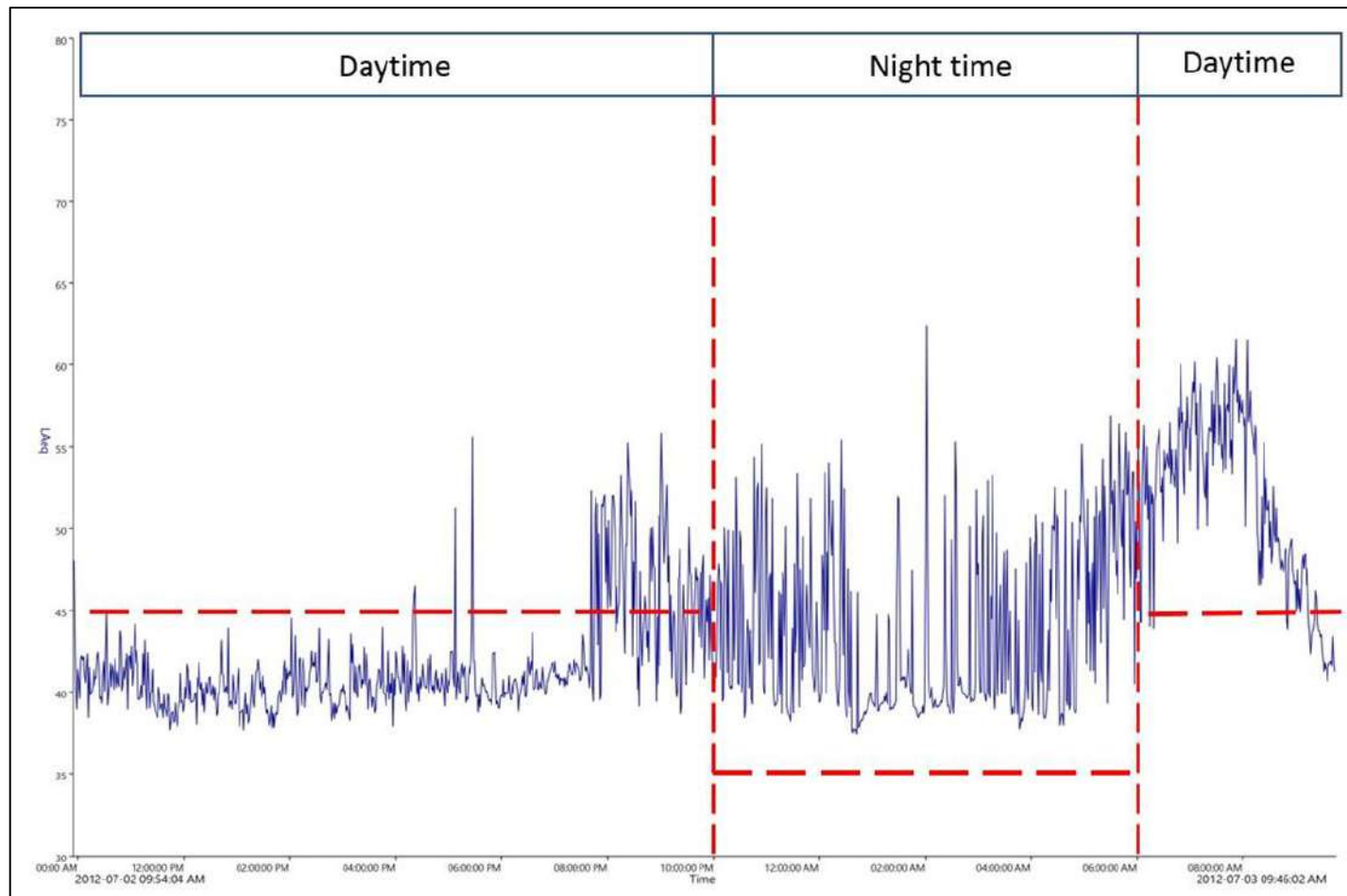


Figure 10-22: Noise Time Series Graph for N1

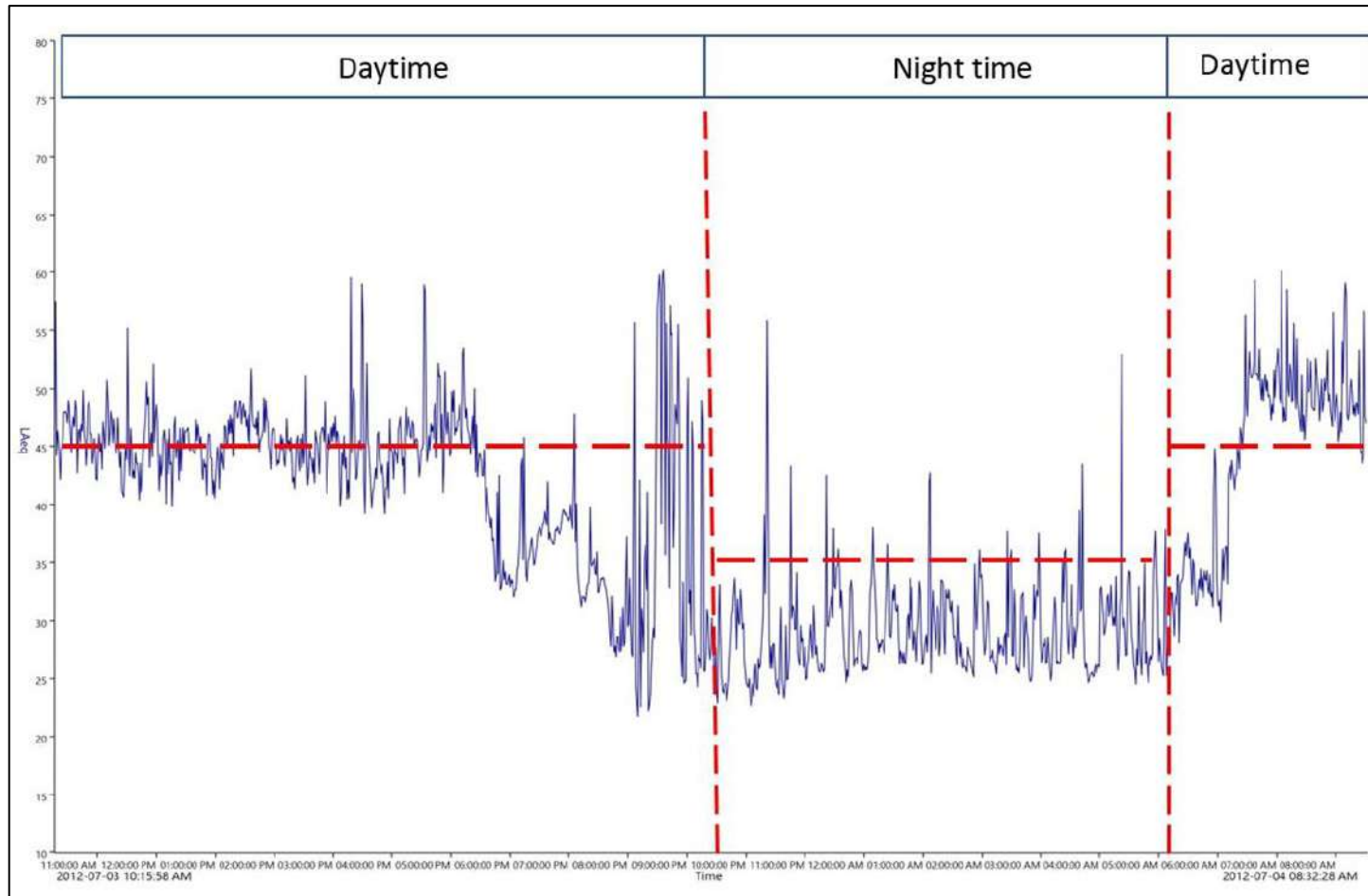


Figure 10-23: Noise Time Series Graph for N2

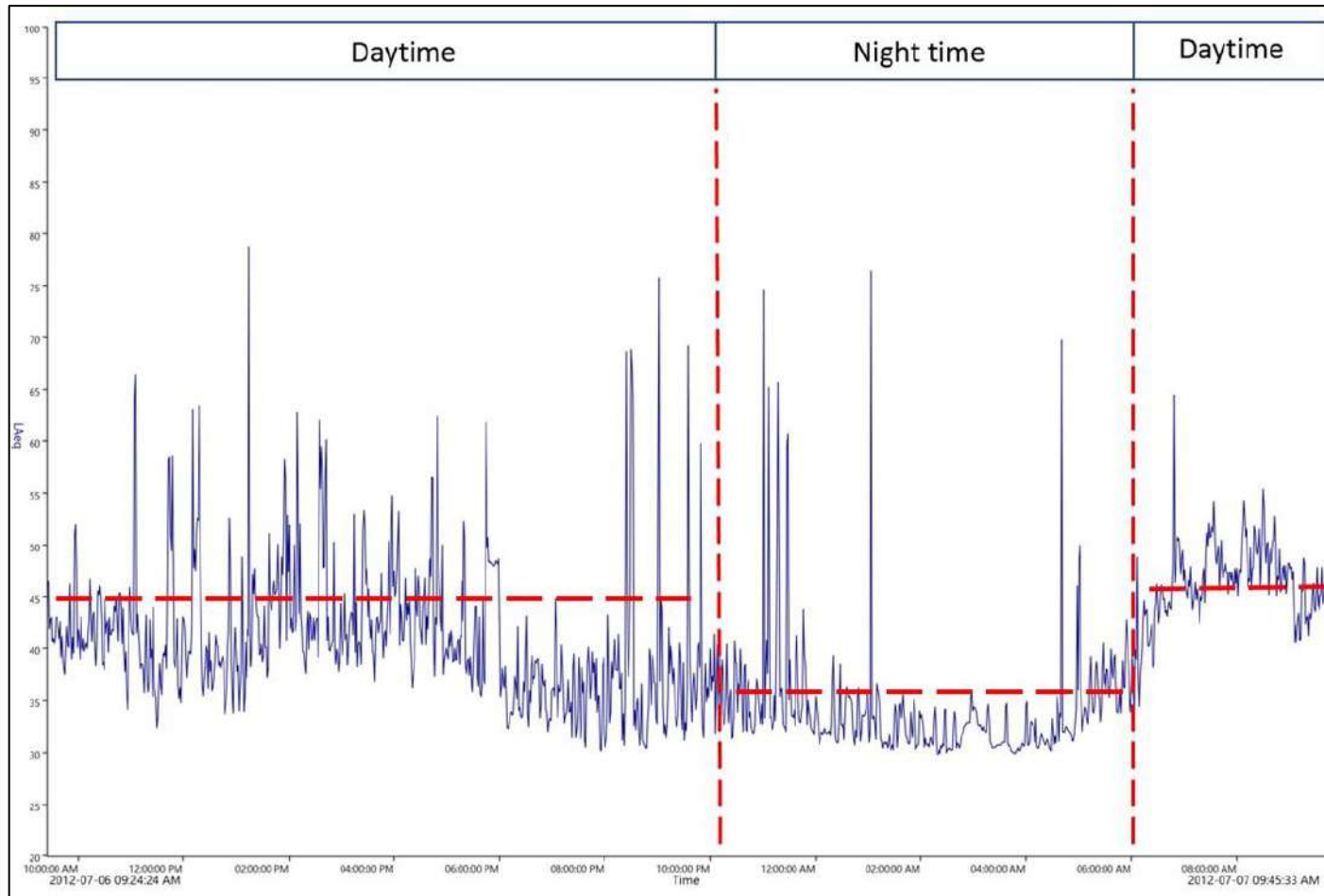


Figure 10-24: Noise Time Series Graph for N5

10.10.1.1. Day-Time Results

The average daytime ambient noise level is 48 dBA. The daytime noise levels at the different measurement locations indicate that the ambient daytime level at measurement points N2 and N5 were above the SANS guidelines maximum limit rating of 45 dBA allowable for outdoor ambient noise in rural districts. The main noise sources in the area during daytime are the audible and continuous mining activities to the north of the Project area, continuous birdsong, coupled with intermittent sound from domestic animals (dogs) and vehicular activity on the R50 road.

10.10.1.2. Night-Time Results

The average night-time ambient noise level is 45 dBA. The night-time noise levels at the different measurement locations indicate that the ambient night-time level at monitoring points N1 and N5 were above and N2 was below the SANS guidelines rating levels of 35 dBA allowable for outdoor ambient noise in rural districts. The main noise sources influencing the night-time sound levels at the various measurement locations were the continuous mining activities to the north of the Project area, coupled with intermittent noise from domestic animals (dogs) and vehicular activity on the R50 road.

A summary of the noise sources that were audible during the baseline survey, which were contributors to the background soundscape are depicted in Table 10-16.

Table 10-16: Noise Sources During Baseline Measurements

Noise source description			
Day	Noise Type	Night	Noise Type
Birdsong	Continuous	Domestic animals (dogs)	Intermittent
Domestic animals (dogs)	Intermittent	Mining activities to the north of measurement location N2	Continuous
Vehicular activity on the R50	Intermittent	Vehicular activity on the R50	Intermittent
Mining activities to the north of measurement location N2	Continuous	-	-

11. Item 2(j): Impacts identified

The potential impacts identified have been grouped according to the aspects of the environment. Refer to Table 11-1 for the preliminarily identified impacts per aspect of the Project Area and the proposed mitigation measures.

Table 11-1: Potential Impacts and Mitigation Measures

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
Soils	<ul style="list-style-type: none"> Site clearing, including the removal of vegetation and topsoil; Surface preparation for infrastructure; and 	<ul style="list-style-type: none"> Soil erosion caused by wind and water movement over the exposed soil surface, increasing sedimentation within the lower lying areas and loss of soil fertility; If heavy vehicles and machinery are not confined to the roads, widespread compaction may take place. However, it is unlikely that land capability will be significantly affected; and Changing the current land use of agriculture to mining. 	<ul style="list-style-type: none"> Control through design, management, maintenance and mitigation; and Remedy through concurrent rehabilitation and monitoring. 	<ul style="list-style-type: none"> Medium
	<ul style="list-style-type: none"> Stripping topsoil and soft overburden; and Loading, hauling and stockpiling. 	<ul style="list-style-type: none"> Topsoil stripped and stockpiled; Major disturbance to the functionality and productivity of the soil which may result in a loss of topsoil, erosion, organic material depletion in the topsoil; and Cultivated arable land suitable for crop cultivation will be reduced resulting in a change in land use. Normally this land use change is from arable agriculture to grazing due to a decrease in soil capability. 	<ul style="list-style-type: none"> Control through design, management, maintenance and mitigation; and Remedy through concurrent rehabilitation and monitoring. 	<ul style="list-style-type: none"> Very High
	<ul style="list-style-type: none"> Construction of surface infrastructure; Construction of mine related infrastructure including roads (excluding pits). 	<ul style="list-style-type: none"> Hydrocarbon leaks from vehicles and machinery or hazardous materials such as oil and fuel spills; Chemical soil pollution, loss of basal cover, organic matter and soil fertility, soil contamination. 	<ul style="list-style-type: none"> Control through design, management, maintenance and mitigation; and Remediate using commercially available emergency clean up kits. 	<ul style="list-style-type: none"> High

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
		<ul style="list-style-type: none"> Soil compaction, low vegetation growth, high runoff potential, increased erosion. 	<ul style="list-style-type: none"> Control through design, management, maintenance and mitigation; and Remedy through concurrent rehabilitation and monitoring. 	<ul style="list-style-type: none"> High
		<ul style="list-style-type: none"> Hazardous substance spillage from pipelines or waste storage: Soil Contamination. Loss of utilisable soil as a resource – erosion, contamination, compaction, loss of land capability and land use. 	<ul style="list-style-type: none"> Control through design, management, maintenance and mitigation; Remedy through concurrent rehabilitation and monitoring; and Remediate using commercially available emergency clean up kits. 	<ul style="list-style-type: none"> High
	<ul style="list-style-type: none"> Operation and maintenance of infrastructure 	<ul style="list-style-type: none"> Land capability of the soils will decrease as well as changing the land use from agricultural practices to mining activities. Should the area not be rehabilitated to pre-mining land capability after mining operations, the land capability may be reduced to wilderness. 	<ul style="list-style-type: none"> Control through design, management, maintenance and mitigation; Remedy through concurrent rehabilitation and monitoring; All erosion observed within the operational footprint should be remedied immediately and included as part of an ongoing rehabilitation plan; and All soils compacted as a result of operational activities should be ripped/scarified (<300 mm) and profiled. 	<ul style="list-style-type: none"> Medium
	<ul style="list-style-type: none"> Use and maintenance of haul roads (incl. transportation of coal to washing plant) 	<ul style="list-style-type: none"> Soil erosion and soil pollution may be encountered during the operational phase. Water runoff from roads and plant areas must be controlled in order to prevent soil erosion. Diesel and oil spills are common at mine sites due to the large volumes of diesel and oil consumed by construction vehicles. Pollution may however be localised. Stockpiled soil must be clearly demarcated and protected against erosion by establishing vegetation on the stockpiles 	<ul style="list-style-type: none"> Control through design, management, maintenance and mitigation; Remedy through concurrent rehabilitation and monitoring; Remediate using commercially available emergency clean up kits; Monitor the storm water diversion berm/trench, culvert and road. Ensure that no contaminants are entering the wetland from the road and that no erosion is taking place. If contamination/erosion is discovered, this must be remedied immediately; All spills should be immediately cleaned up and treated accordingly; Erosion berms should be installed downgradient of the pit areas to prevent gully formation and siltation of the wetland resources; Ensure a soil management programme is implemented and maintained to minimise erosion and sedimentation; Concurrent rehabilitation is recommended, and pit areas should be backfilled and suitably rehabilitated on an ongoing basis for the life of the proposed operation; All vehicles must be regularly inspected for leaks; 	<ul style="list-style-type: none"> High

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
			<ul style="list-style-type: none"> Re-fuelling must take place on a sealed surface area away from wetlands to prevent ingress of hydrocarbons into topsoil; and Allow only essential personnel within the buffer areas for all wetland features identified. 	
	<ul style="list-style-type: none"> Demolition and removal of all infrastructure (incl. transportation off site) 	<ul style="list-style-type: none"> Rehabilitation of the disturbed mined areas causes mechanical compaction and soil contamination. The impacts will be negative and mostly of a permanent nature. The disturbance of the soil layers will be a problem, even after the area has been rehabilitated. Recovery of the soil quality is dependent on the quality of rehabilitation. Fertility may be improved through soil amelioration, but soil depth and compaction are not easily alleviated. 	<ul style="list-style-type: none"> Actively re-vegetate disturbed areas immediately after decommissioning; No material will be dumped within any rivers, tributaries or drainage lines; All soils compacted as a result of mining activities should be ripped/scarified (<300 mm), profiled and re-seeded with indigenous vegetation; 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; and All spills should be immediately cleaned up and treated accordingly. 	<ul style="list-style-type: none"> Medium
	<ul style="list-style-type: none"> Rehabilitation (spreading of soil, re-vegetation and profiling/contouring) 		<ul style="list-style-type: none"> Ensure no erosion, incision and canalisation takes place; Erosion berms should be installed downstream of areas to be re-profiled and contoured to prevent gully formation; 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 rehabilitation activities should be ripped/scarified (<300 mm) and profiled; Active re-vegetation of exposed soils should take place to prevent the onset of erosion; 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 	<ul style="list-style-type: none"> Low

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
			<ul style="list-style-type: none"> All spills should be immediately cleaned up and treated accordingly. 	
	<ul style="list-style-type: none"> Installation of post-closure water management infrastructure 		<ul style="list-style-type: none"> If post-mining decant takes place the water should be treated prior to release into the environment; and Investigation into the water quality and the most appropriate treatment measures must be conducted. 	<ul style="list-style-type: none"> High
Freshwater Ecosystems	<ul style="list-style-type: none"> Surface preparation for infrastructure: Site clearing, including the removal of vegetation and topsoil. 	<ul style="list-style-type: none"> Habitat fragmentation; Spread of alien and invasive species; Soil disturbance and/or compaction; Increased incidence of erosion; Sedimentation from erosion; Change in hydrology; Potential water quality deterioration; and Disturbance to avifauna and other fauna utilising the freshwater resources thus resulting in an overall loss of biodiversity. 	<ul style="list-style-type: none"> Environmental Practitioner to be present during vegetation clearing to prevent unnecessary clearing of extensive areas not part of the direct footprint area; An alien and invasive plant species management programme must be implemented during the construction phase; The edge of the non-directly impacted wetland resources, and at least a 100 metre (m) 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; Wetland monitoring must be carried out during the construction phase by a wetland specialist to ensure no unnecessary impact to the wetland resources occur; and if so, that a solution is put in place as soon as possible; and Implement the Storm Water Management Plan. This must be in operation prior to the construction phase and wetland resources must be highlighted as sensitive receptors. 	<ul style="list-style-type: none"> High
	<ul style="list-style-type: none"> Surface preparation for infrastructure: Stripping topsoil and soft overburden; Loading, hauling and stockpiling. 	<ul style="list-style-type: none"> Increased potential for erosion, sedimentation and deposition impacts; Reduction in water quality; and Loss of habitat and biodiversity. 	<ul style="list-style-type: none"> Environmental Practitioner to be present during the operational phase to prevent unnecessary clearing of extensive areas not part of the direct footprint area; The edge of the non-directly impacted wetland resources, and at least a 100 m 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; Wetland monitoring must be carried out during the operational phase by a wetland specialist to ensure no unnecessary impact to the wetland 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; 	<ul style="list-style-type: none"> Medium

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
			<ul style="list-style-type: none"> All soils compacted as a result of construction activities should be ripped/scarified (<300 millimetre (mm)) and profiled; No material will be dumped or stockpiled within any rivers, tributaries or drainage lines; Disturbance must be minimised and suitably rehabilitated; 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 to prevent gully formation and siltation of the wetland resources; Actively re-vegetate disturbed areas immediately after construction; Implement and maintain an alien vegetation management programme; Vegetate all topsoil stockpiles; 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. 	
	<ul style="list-style-type: none"> Construction of surface infrastructure: Construction of mine related infrastructure including roads (excluding pits). 	<ul style="list-style-type: none"> Fragmentation of the wetland resources as a result of storm water diversion berm/trench; Loss of wetland habitat (soils and vegetation) due to both direct and indirect impacts; Potential loss of wetland ecosystems or part thereof; 	<ul style="list-style-type: none"> The clean and dirty water separation systems must be some of the first infrastructures constructed 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; All areas of increased ecological sensitivity should be designated as "No-Go" areas and be off limits to all unauthorised vehicles and personnel; No un-authorised crossing of the wetland features and their associated buffers should take place and the substrate conditions of 	<ul style="list-style-type: none"> Medium

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
		<ul style="list-style-type: none"> Impacts to natural flow regimes of riverine systems; Potential loss of water quality further downstream; and Loss of ecological services at the local and catchment scale. 	<p>the wetlands and downstream stream connectivity must be maintained;</p> <ul style="list-style-type: none"> The edge of the wetland resources, and at least a 100 m 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; 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; Restrict construction activities in and surrounding the wetlands to the drier months to avoid sedimentation of the wetlands and the aquatic resources further downstream; Rehabilitate the wetland areas surrounding the road diversion crossing immediately after construction; Indigenous wetland species should be utilized. Compile a planting plan to ensure effective rehabilitation; Actively re-vegetate disturbed areas immediately after construction; Vegetate topsoil stockpiles; Implement and maintain an alien vegetation management programme; Monitor the culverts to ensure they are working efficiently; Ensure a soil management programme is implemented and maintained to minimise erosion and sedimentation; Disturbance must be minimised and suitably rehabilitated; Ensure no incision and canalisation of the wetland features takes place; Erosion berms should be installed on roadways and downstream of stockpiles to prevent gully formation and siltation of the wetland resources; 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 (<300 mm) and profiled; Allow only essential personnel within the buffer areas for all freshwater features identified; 	

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
			<ul style="list-style-type: none"> 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. 	
	<ul style="list-style-type: none"> Operation and maintenance of infrastructure 	<ul style="list-style-type: none"> 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 wetland systems present and in turn, moisture stress to the surrounding riparian and wetland vegetation; Disturbed soils may give rise to the spread and proliferation of alien and invasive species; Contamination from PCDs; and Storm water diversion berm/trench, culvert and road. 	<ul style="list-style-type: none"> Monitor the storm water diversion berm/trench, culvert and road. Ensure that no contaminants are entering the wetland from the road and that no erosion is taking place. If contamination/erosion is discovered, this must be remedied immediately; All spills should be immediately cleaned up and treated accordingly; Erosion berms should be installed downgradient of the pit areas to prevent gully formation and siltation of the wetland resources; Berms to be vegetated to prevent siltation of wetland systems; Ensure a soil management programme is implemented and maintained to minimise erosion and sedimentation; Concurrent rehabilitation is recommended, and pit areas should be backfilled and suitably rehabilitated on an ongoing basis for the life of the proposed operation; 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; 	<ul style="list-style-type: none"> Very High

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
			<ul style="list-style-type: none"> Re-fuelling must take place on a sealed surface area away from wetlands to prevent ingress of hydrocarbons into topsoil; Allow only essential personnel within the buffer areas for all wetland features identified; 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. 	
	<ul style="list-style-type: none"> Use and maintenance of haul roads for the transportation of coal. 	<ul style="list-style-type: none"> 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; and Increased potential for erosion. 	<ul style="list-style-type: none"> Introduce wetland monitoring to ensure that no erosion, incision and canalisation of the wetland features present takes place; Erosion berms should be installed on roadways and downstream of stockpiles to prevent gully formation and siltation of the wetland resources; 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 (<300 mm) and profiled; The edge of the wetland resources, and at least a 100 m 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. Allow only essential personnel within the buffer areas for all wetland 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. 	<ul style="list-style-type: none"> Medium
	<ul style="list-style-type: none"> Demolition and removal of all infrastructure (incl. transportation off site) 	<ul style="list-style-type: none"> Erosion onset; Sedimentation; and 	<ul style="list-style-type: none"> Wetland monitoring must be carried out during the decommissioning phase to ensure no unnecessary impact to wetlands takes place; 	<ul style="list-style-type: none"> Medium

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
		<ul style="list-style-type: none"> Establishment of alien plants. 	<ul style="list-style-type: none"> 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; The edge of the non-directly impacted wetland resources, and at least a 100 m 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; No material will be dumped within any rivers, tributaries or drainage lines; All soils compacted as a result of mining activities should be ripped/scarified (<300 mm), profiled and re-seeded with indigenous vegetation; 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. 	
	<ul style="list-style-type: none"> Rehabilitation, including spreading of soil, re-vegetation and profiling or contouring 	<ul style="list-style-type: none"> Improper infilling and profiling, resulting in the creation of preferential flow paths and thus increasing the potential for erosion; Improper rehabilitation of compacted soils, resulting in poor vegetation cover; and 	<ul style="list-style-type: none"> Ensure no erosion, 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 wetland resources; All erosion observed within the operational footprint should be remedied immediately and included as part of an ongoing rehabilitation plan; 	<ul style="list-style-type: none"> Low

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
		<ul style="list-style-type: none"> Increased potential for the spread; and establishment of alien and invasive species. 	<ul style="list-style-type: none"> All soils compacted as a result of rehabilitation activities should be ripped/scarified (<300 mm) 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. 	
	<ul style="list-style-type: none"> Installation of post-closure water management infrastructure; Post-mining decant into freshwater resources 	<ul style="list-style-type: none"> Loss of habitat integrity and ecosystem services such as toxicant removal and water for human use; Soil and water contamination; Loss of water quality to downstream freshwater resources; and Loss of biodiversity and sensitive fauna and flora. 	<ul style="list-style-type: none"> If post-mining decant takes place within proximity to, or within wetland areas, this water should be treated prior to release into the environment; and Investigation into the water quality and the most appropriate treatment measures must be conducted. 	<ul style="list-style-type: none"> High
Surface Water	<ul style="list-style-type: none"> Surface preparation for infrastructure Construction of surface infrastructure 	<ul style="list-style-type: none"> Sedimentation and siltation of nearby watercourses; Downstream water users (irrigation, livestock watering and domestic uses) will be negatively affected from reduced water quality. 	<ul style="list-style-type: none"> Limit clearance and soil disturbance to the development footprint; Stormwater control including installation of drains, berms, silt fences and storage structures. 	<ul style="list-style-type: none"> Medium to low Low
	<ul style="list-style-type: none"> Operation and maintenance of infrastructure 	<ul style="list-style-type: none"> Contamination of surface water resources leading to deteriorated water quality; Reduction in water quantity reporting downstream as a 	<ul style="list-style-type: none"> Bunding hydrocarbon storage facilities; Use of spill kits and accredited vendors for waste disposal; and Training of personnel in proper hydrocarbon and chemical handling procedures. 	<ul style="list-style-type: none"> Low

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
	<ul style="list-style-type: none"> Use and maintenance of haul roads (incl. transportation of coal to washing plant) 	<ul style="list-style-type: none"> result of water retention in storage facilities. 		
	<ul style="list-style-type: none"> Demolition and removal of all infrastructure (incl. transportation off site) Rehabilitation (spreading of soil, re-vegetation and profiling/contouring) 	<ul style="list-style-type: none"> Sedimentation and siltation of nearby watercourses; Downstream water users (irrigation, livestock watering and domestic uses) will be negatively affected from reduced water quality. 	<ul style="list-style-type: none"> Limit clearance and soil disturbance to the development footprint; and Stormwater infrastructure should be decommissioned last to ensure that potentially contaminating runoff is contained during decommissioning. Furthermore, infrastructure containing residual contaminants should be emptied out prior to handling. 	<ul style="list-style-type: none"> Low
Groundwater	<ul style="list-style-type: none"> Site clearance and topsoil removal at the location of proposed infrastructural developments within the Project Area. 	<ul style="list-style-type: none"> Lowering of the water table, if the construction activities are going to take place below the water table. The lowest depth being 2,24 mbgl at UN17, however the average water levels on site are 19 mbgl therefore this impact is unlikely. 	<ul style="list-style-type: none"> Site clearance and topsoil removal activities should take place above the water table, which is observed to be highly likely. No impact on the groundwater is expected if the activities take place above the water table. 	<ul style="list-style-type: none"> Low
	<ul style="list-style-type: none"> Operation of the infrastructure that may pose an impact to the groundwater environment, namely: Diesel Depot Area, Sewage Treatment Plant, Product Stockpile, Water Treatment Plant, Crushing facilities and stockpile area. 	<ul style="list-style-type: none"> Deterioration of groundwater quality if the various potential sources infiltrate into the groundwater environment. 	<ul style="list-style-type: none"> Lining options for the Diesel Depot Area, STP, Product Stockpile, WTP, Crushing facilities and stockpile area should be investigated; and Hydrocarbons and hazardous materials must be stored in bunded areas; If a considerable amount of hydrocarbons or hazardous materials is accidentally spilled, the contaminated soil should be scraped off and disposed of at an acceptable dumping facility. The excavation should be backfilled with soil of good quality. 	<ul style="list-style-type: none"> Low
	<ul style="list-style-type: none"> Demolition and or removal of all infrastructure and rehabilitation of disturbed area. 	<ul style="list-style-type: none"> Removal of potential contamination sources reduces the risk to the receiving environment; therefore, no negative impacts are anticipating. 	<ul style="list-style-type: none"> No mitigation measures are required. 	<ul style="list-style-type: none"> Low
Heritage	<ul style="list-style-type: none"> Establishment of proposed infrastructure 	<ul style="list-style-type: none"> The establishment of the pit and surface infrastructure may affect heritage resources afforded general protection 	<ul style="list-style-type: none"> Proactive - avoid 	<ul style="list-style-type: none"> Medium

Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
		under Section 36 of the NHRA (i.e. burial grounds and graves)		
Air Quality	<ul style="list-style-type: none"> Operation and maintenance of infrastructure Use and maintenance of haul roads 	<ul style="list-style-type: none"> Reduction in the quality of ambient air due to dust generation and the release of gaseous pollutants from off-road machinery 	<ul style="list-style-type: none"> Minimise the area of disturbance; Where necessary, wetting agents, dust suppressants or binders will be applied to the exposed areas (including excavated material and open areas); Speed limits will be adhered to at all times. Mine vehicles to be fitted with a GPS that alerts management when a vehicle is going over the speed limit; and The drop heights when tipping materials will be minimised as far as practicable. 	<ul style="list-style-type: none"> High
	<ul style="list-style-type: none"> Storage, handling and treatment of hazardous products (including fuel, explosives, and oil) and waste 	<ul style="list-style-type: none"> Spilling and the release of gases via vaporisation 	<ul style="list-style-type: none"> Internal floating roofs and seal to minimize evaporation from a diesel storage tank; Vapour recovery – collects emissions from storage tanks and converts to liquid product; Containers containing explosives must be clearly labelled and stored away in controlled areas; and Secondary containment will be provided for all storage tanks for leaks. 	<ul style="list-style-type: none"> Low
	<ul style="list-style-type: none"> Demolition and removal of infrastructure 	<ul style="list-style-type: none"> Reduction in air quality due to dust generation 	<ul style="list-style-type: none"> The area of disturbance will be minimised; Where necessary, wetting agents, dust suppressants or binders will be applied to the exposed areas (including excavated material and open areas); Speed limits will be adhered to at all times; Demolition should be conducted in phases; and The drop heights when tipping cover materials will be minimised as far as practicable. 	<ul style="list-style-type: none"> Low
Noise	<ul style="list-style-type: none"> Surface preparation for infrastructure; and Construction of surface infrastructure. 	<ul style="list-style-type: none"> Noise emanating from machinery while conducting these activities can impact the surrounding sensitive receptors 	<ul style="list-style-type: none"> Noise control measures; Design measures; and Control through management and monitoring. 	<ul style="list-style-type: none"> Low
	<ul style="list-style-type: none"> Operation and maintenance of infrastructure; and 	<ul style="list-style-type: none"> Noise emanating from machinery while conducting 	<ul style="list-style-type: none"> Noise control measures; Design measures; and 	<ul style="list-style-type: none"> High



Aspect	Activities	Potential impacts	Mitigation type	Potential for residual risk
	<ul style="list-style-type: none">Use and maintenance of haul roads	these activities can impact the surrounding sensitive receptors	<ul style="list-style-type: none">Control, control through management and monitoring.	
	<ul style="list-style-type: none">Demolition and removal of all infrastructure	<ul style="list-style-type: none">Noise emanating from machinery while conducting these activities can impact the surrounding sensitive receptors.	<ul style="list-style-type: none">Noise control measures;Design measures; andControl, control through management and monitoring.	<ul style="list-style-type: none">Low

11.1. Item 2(g)(vi): 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.

11.1.1. Impact assessment methodology

To clarify the purpose and limitations of the impact assessment methodology, it is necessary to address 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 defensible methodology of rating the relative significance of impacts in a specific context.

11.1.2. Impact rating

The impact assessment methodology that will be 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

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts

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 and Table 11-3. 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 11-4).

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 11-2: Impact Assessment Parameter Ratings

Rating	Intensity/Replaceability		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.	<u>International</u> 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.	<u>National</u> 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/Replaceability		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.	<u>Province/ Region</u> 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.	<u>Municipal Area</u> 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/Replaceability		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.	<u>Local</u> 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.	<u>Limited</u> 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/Replaceability		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.	<u>Very limited/Isolated</u> 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 11-3: 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 11-4: 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. Item 2(g)(vii): The positive and negative impacts that the proposed activity and alternatives will have on the environment and the community that may be affected

The proposed additional infrastructure will allow for the continuation of mining and enable crushing and screening to occur on site. Ubuntu Colliery has a coal supply agreement with Eskom for the annual supply of 1.2Mt of domestic thermal coal. This poses benefits for the continuation of the Ubuntu Colliery, supplying the national grid with electricity as well as ensuring the socio-economic benefits for the community.

11.3. Item 2(g)(viii): The possible mitigation measures that could be applied and the level of risk

Possible mitigation measures will be established and assessed in the EIA Phase. This Scoping Phase has considered the types of mitigation that can be employed. The EIA Phase will assess whether the layout plan needs to be modified to limit, prevent and/or avoid potential negative environmental and social impacts. Where modifications are not required, mitigation measures will be provided. The proposed mitigation measures for the assumed risks (to be confirmed during the EIA Phase) are provided in Table 11-1.

11.4. Item 2(g)(ix): The outcome of the site selection matrix

As highlighted in Section 8.1, the district road re-alignment associated with this application includes two alternatives based on heritage specialist baseline assessments. The layout plan will also take into consideration the comments received from I&APs during the PPP as well as the findings of the specialist investigations as part of the EIA Phase.

11.5. Item 2(g)(x): Motivation where no alternative sites were considered

The preliminary alternatives considered during the Scoping Phase include the infrastructure layout and the “No-Go” alternative. Refer to Section 8 above.

11.6. Item 2(g)(xi): Statement motivating the preferred site

The new infrastructure is proposed to be established at the selected site because it lies within the Universal Coal Mining Right boundary and positioned on environmentally authorised land.

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. Refer to Section 12.3 for the Specialists Impact Assessment methodology proposed for the EIA Phase.

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 potential traffic 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. Item 2(h)(i): Description of alternatives to be considered including the option of not going ahead with the activity

The alternatives that will be assessed as part of the EIA are presented in Section 8 above including the “No-Go” alternative.

12.2. Item 2(h)(ii): 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 5.2, above, and the specifically affected environmental aspects which will also form part of the EIA Phase are contained in Section 11.3 below.

12.3. Item 2(h)(iii) and (iv): Description of aspects to be assessed by specialists and methodology to be employed

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;
- Wetland Delineation and Impact Assessment;
- Aquatic Ecology Impact Assessment;
- Air Quality Impact Assessment;
- Noise Impact Assessment;
- Heritage Impact Assessment;
- Palaeontological Impact Assessment;
- Rehabilitation; and
- Closure (Financial Provisioning).

12.3.1. Groundwater

The Groundwater Impact Assessment addresses the additional infrastructure with a brief textual description of the minimal impact expected to groundwater quality. Based on the existing groundwater report, the monitoring network is sufficient to identify potential impacts to the groundwater environment.

12.3.2. Surface Water

The management of water resources is legislated under the National Water Act, 1998 (Act No. 36 of 1998) (NWA) as amended in the Regulation GN R 704 which specifies the use of water in mining. In managing the surface water resources, the Department of Water and Sanitation (DWS) has promulgated a series of Best Practice Guidelines (BPGs) that guide the use of water in mining. These legislative frameworks are taken into account when considering the specialist surface water assessment. The surface water methodology will be undertaken in three phases including desktop scoping assessment, desktop EIA assessment and report compilation.

12.3.2.1. Desktop Assessment

The desktop assessment will include the following:

- A review of relevant literature and existing reports for Universal Coal, as well as an assessment of aerial imagery and survey data to verify the hydrological characteristics of the area; and
- Descriptions of the hydrological setting of the site in terms of the surface water features (rivers, pans and dams) and other hydrological characteristics such as topography, drainage patterns, surrounding surface water uses, catchment characteristics and climatic conditions (rainfall, runoff and evaporation).

12.3.2.2. Baseline Water Quality Update

Water quality data will be provided by Universal Coal. The data will be assessed, interpreted and presented to enable the understanding of baseline water quality for the area. This analysis is necessary to identify any changes that may occur in water quality that may be the result of mining and associated activities within the Ubuntu Colliery study area.

12.3.2.3. Impact Assessment

The detailed surface water impact assessment will include:

- Definition of potential surface water impacts that could result from the proposed project and its associated activities. Once the impacts are identified, a rating system that takes into account the intensity, duration, spatial scale and probability of impacts will be used to determine the significance of the identified impacts;
- Recommendation of mitigation measures to prevent and/or minimise identified potential surface water impacts over the life of project; and
- Development of a monitoring program that will be used as a tool to detect any surface water impacts and to ensure implementation of mitigation measures.

12.4. Land Use, Land Capability and Soil

This section describes the methodology that will be used in the compilation of the Soil, Land Use and Land Capability Impact Assessment Report, as indicated in Figure 12-1.

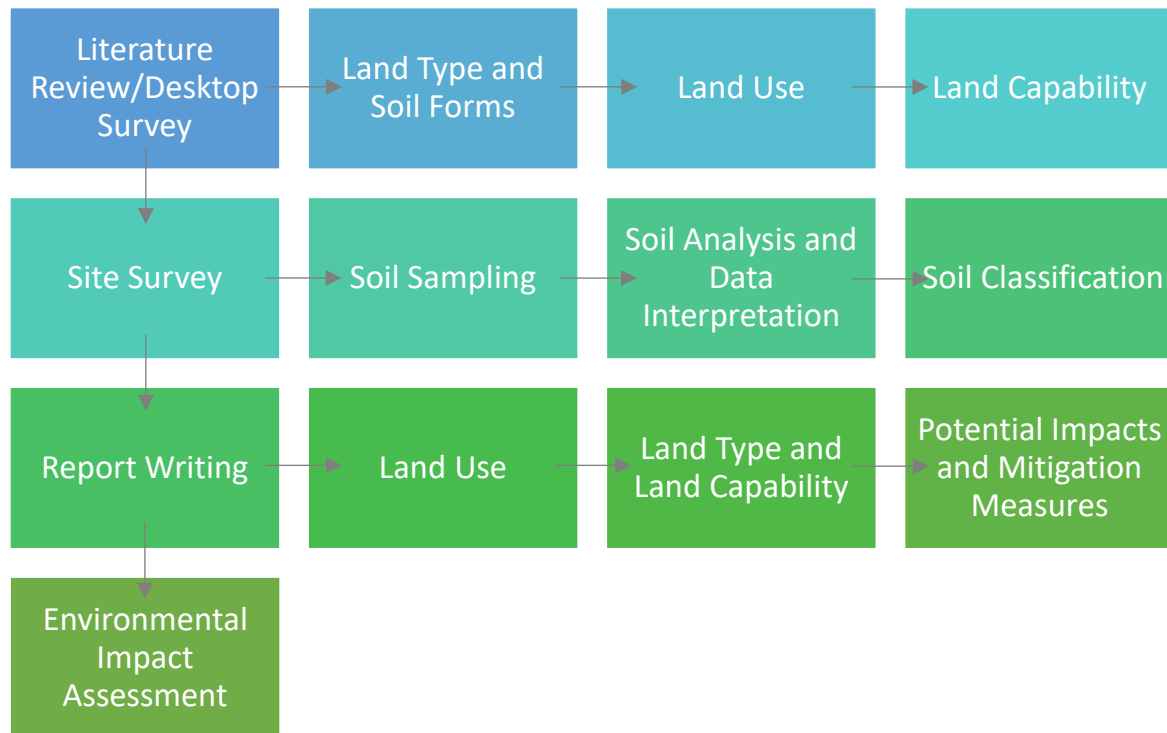


Figure 12-1: Soil, Land Use and Land Capability Assessment and Report Process

12.4.1. Soil Physical and Chemical Analysis

In accordance with the methodology given in the Handbook of Standard Soil Testing Methods for Advisory Purposes, the soil samples will be tested for the following parameters:

- pH;
- Carbon Content;
- Cation Exchange Capacity (CEC);
- Exchangeable Cations: Calcium (Ca), Magnesium (Mg), Potassium (K) and Sodium (Na) (Ammonium acetate extraction);
- Phosphorus (P);
- Heavy Metals and Micronutrients: Copper (Cu), Zinc (Zn), Iron (Fe), Manganese (Mn), Boron (B), Sulphur (S), Aluminium (Al), Iron (Fe), Molybdenum (Mo) and Nickel (Ni); and
- Soil texture (Sand, Silt and Clay fractions).

12.4.2. Land Use

The current land use was identified by aerial imagery during the desktop assessment of the Scoping Phase and will be verified by on-site inspection during the EIA phase. The maps indicate delineated areas of similar land use (Land Type Survey Staff, 1972 - 2006). Land use categories are split into:

- Plantations;
- Natural;
- Waterbodies;
- Mines;
- Urban built-up; and
- Agriculture.

12.4.3. Land Capability

Land capability and suitability (agricultural potential) mapping which highlights the capability (what could be practiced) of the various soils identified at a site, and the suitability (what should be practiced considering various restrictions), respectively, were undertaken for the Project Area at desktop level and will be ground verified during the site visit for the EIA phase.

Land capability mapping is based on identifying soil forms during the site visit. The land capability mapping involves dividing the land into one of eight potential classes (Table 12-1) of soil capability, whereby Classes I-IV represent arable land and Classes V-VIII represent non-arable land according to the guidelines (Soil Conservation Service: U.S. Department of Agriculture, 1973; Schoeman, et al., 2000).

Table 12-1: Land Capability Classes

Class	Increased Intensity of Use									Land Capability Groups	
I	W	F	LG	MG	IG	LC	MC	IC	VIC	Arable Land	W - Wildlife
II	W	F	LG	MG	IG	LC	MC	IC	-		F - Forestry
III	W	F	LG	MG	IG	LC	MC	-	-		LG - Light Grazing
IV	W	F	LG	MG	IG	LC	-	-	-		MG - Moderate Grazing
V	W	-	LG	MG	-	-	-	-	-	Grazing Land	IG - Intensive Grazing
VI	W	F	LG	MG	-	-	-	-	-		LC - Light Cultivation
VII	W	F	LG	-	-	-	-	-	-	Wildlife	MC - Moderate Cultivation
VIII	W	-	-	-	-	-	-	-	-		IC - Intensive Cultivation
											VIC - Very Intensive Cultivation

12.4.4. Land Suitability

Soil agricultural potential or suitability mapping will be determined by considering the soil forms, land capability classes, soil chemistry results, the hydrology of the site and the current land use. The process involves allocating terrain factors (such as slope) and soil factors such as depth, texture, internal drainage and mechanical limitations (which affect soil-water processes) which define soil forms, to an area of land. The soil chemistry, which includes pH, cation and anion concentrations as well as nitrogen compositions, which are affected by the site hydrology, will be considered in determining the final suitability of the soil. The suitability guidelines according to the U.S. Department of Agriculture (1973) and Schoeman et al., (2000) will be used to determine the Land Capability.

12.4.5. Soil Impact Assessment

The soil impacts will be assessed based on the impact's magnitude as well as the receiving environment's sensitivity, resulting in an impact significance rating which identified the most important impacts that require management. Based on national guidelines and legislation, the following criteria will be taken into consideration when potentially significant impacts will be examined relating to Soil, Land Use and Land Capability:

- Nature of impacts (direct/indirect and positive/negative);
- Duration (short/medium/long-term; permanent (irreversible)/temporary (reversible) and frequent/seldom);
- Extent (geographical area and size of affected population/species);
- Intensity (minimal, severe, replaceable/irreplaceable);
- Probability (high/medium/low probability); and
- Measures to mitigate avoid or offset significant adverse impacts.

12.5. Wetlands

This section describes the methodology after the completion of the Scoping Phase that will be used in the compilation of the Wetland Environmental Impact Assessment Report.

The wetland delineations will be verified according to the accepted methodology from the Department of Water and Sanitation 'A practical field procedure for identification and delineation of wetlands and riparian areas' (Department of Water Affairs and Forestry, 2005) as well as the "Updated manual for identification and delineation of wetlands and riparian areas" (Department of Water Affairs and Forestry, 2008). These methodologies use the:


- **Terrain Unit Indicator:** Identifies those parts of the landscape where wetlands are more likely to occur;
- **Soil Form Indicator:** Identifies the soil forms, which are associated with prolonged and frequent saturation;



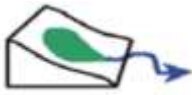

- **Soil Wetness Indicator:** Identifies the morphological “signatures” developed in the soil profile as a result of prolonged and frequent saturation; and
- **Vegetation Indicator:** Identifies hydrophilic vegetation associated with frequently saturated soils.


12.5.1. Terrain Unit Indicator

Terrain Unit Indicator (TUI) areas include depressions and channels where water would be most likely to accumulate. These areas are determined with the aid of topographical maps, contour data, aerial photographs and engineering and town planning diagrams (Department of Water Affairs and Forestry, 2005). In accordance with the guidelines provided by the DWS (formerly known as the Department of Water Affairs and Forestry (DWA) (Department of Water Affairs and Forestry, 2005) wetlands are identified and classified into various HGM units based on their individual characteristics and setting within the landscape. The HGM unit classification system focuses on the hydro-geomorphic setting/position of wetlands in a landscape which incorporates geomorphology; water movement into, through and out of the wetland. The HGM unit is dependent on various aspects, including whether the drainage is open or close, water is dominating the system or is sub-surface water, how the water flows from and into the wetlands and how water is contained within the wetland. Once wetlands have been identified, they are categorised into HGM units as shown in Table 12-2.

Table 12-2: Description of the Various HGM Units for Wetland Classification

Hydromorphic Wetland Type	Diagram	Description
<ul style="list-style-type: none"> • Floodplain 		<ul style="list-style-type: none"> • Valley bottom areas with a well-defined stream channel stream channel, gently sloped and characterised by floodplain features such as oxbow depression and natural levees and the alluvial (by water) transport and deposition of sediment, usually leading to a net accumulation of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.

Hydromorphic Wetland Type	Diagram	Description
<ul style="list-style-type: none"> Valley bottom with a channel 		<ul style="list-style-type: none"> Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterized by the net accumulation of alluvial deposits or may have steeper slopes and be characterised by the net loss of sediment. Water inputs from the main channel (when channel banks overspill) and from adjacent slopes.
<ul style="list-style-type: none"> Valley bottom without a channel 		<ul style="list-style-type: none"> Valley bottom areas with no clearly defined stream channel usually gently sloped and characterised by alluvial sediment deposition, generally leading to a net accumulation of sediment. Water inputs mainly from the channel entering the wetland and also from adjacent slopes.
<ul style="list-style-type: none"> Hillslope seepage linked to a stream channel 		<ul style="list-style-type: none"> Slopes on hillsides, which are characterised by colluvial (transported by gravity) movement of materials. Water inputs are mainly from sub-surface flow and outflow is usually via a well-defined stream channel connecting the area directly to a stream channel.
<ul style="list-style-type: none"> Isolated hillslope seepage 		<ul style="list-style-type: none"> Slopes on hillsides that are characterised by colluvial transport (transported by gravity) movement of materials. Water inputs are from sub-surface flow and outflow either very limited or through diffuse sub-surface flow but with no direct link to a surface water channel.

Hydromorphic Wetland Type	Diagram	Description
<ul style="list-style-type: none"> Pan/Depression 		<ul style="list-style-type: none"> A basin-shaped area with a closed elevation contour that allows for the accumulation of surface water (i.e. It is inward draining). It may also receive subsurface water. An outlet is usually absent and so this type of wetland is usually isolated from the stream network.

12.5.2. Soil Form Indicator

Hydromorphic soils are characterized as soils that has undergone redox reactions because of the fluctuation of water and oxygen within the soil profile, creating segregations of iron (Fe) and manganese (Mn) particles. This fluctuation of water and oxygen in the soils can be attributed to the fluctuating groundwater table, creating seasonal, temporary and permanent wet zones. Hydromorphic soils are thus Soil Form Indicators (SFI) which will display unique characteristics resulting from prolonged and repeated water saturation (Department of Water Affairs and Forestry, 2005). The permanent, as well as occasional saturation of soil results in anaerobic conditions of the soils causing a chemical, physical and biological change to the soil.

Hydromorphic soils are often identified by the colours of various soil components. The frequency and duration of the soil saturation periods strongly influences the colours of these components. Grey colours become more prominent in the soil matrix the higher the duration and frequency of saturation in a soil profile (Department of Water Affairs and Forestry, 2005). A feature of hydromorphic soils are coloured mottles (iron and manganese accumulation) which are usually absent in permanently saturated soils and are most prominent in seasonally saturated soils and are less abundant in temporarily saturated soils (Department of Water Affairs and Forestry, 2005). The hydromorphic soils must display signs of wetness within 50 centimetre (cm) of the soil surface, as this is necessary to support hydrophytic vegetation.

Soils that are commonly associated with wetlands are: Champagne, Rensburg, Arcadia, Katspruit, Kroonstad, Longlands, Fernwood and Westley soil forms. These soil forms are associated with high clay content and accumulation of clay, promoting water logging and creating low drainage, thus water logging conditions. These soils are commonly associated with low-laying landscapes such as valley bottoms, foot-slopes and mid-slopes.

12.5.3. Soil Wetness Indicator

In practice, the Soil Wetness Indicator (SWI) is used as the primary indicator (Department of Water Affairs and Forestry, 2005) Iron and manganese accumulation in a soil profile, termed mottles, are some of the recognized 'wet-indicators'. These two elements are insoluble under

aerobic (unsaturated) conditions and become soluble when the soil becomes anaerobic (saturated). The fluctuating water table creates these conditions by increasing and reducing the oxygen levels in the soil profile by increased and reduced water levels. Iron is one of the most abundant elements in soils and is responsible for the red and brown chroma of many soils.

During anaerobic (saturated) conditions, the iron and manganese in the soils are mobile and thus begin to leach out of the soil profile. Where oxidation takes place around for example roots, aggregate surfaces and pores, relatively insoluble ferric oxides is deposited leading to formation of red/green mottles and concretions. These soil profiles are commonly known as leached soils, gleysol, E-horizons or Albic horizons. Resulting from the prolonged anaerobic conditions, the soil matrix is left a grey, greenish or bluish colour, and is said to be “gleyed”. Recurrence of the cycle of wetting and drying over many decades concentrates these insoluble iron compounds. Thus, soil that is gleyed and has mottles within the first 0.5 m of the surface are indicating a zone that is seasonally or temporarily saturated, interpreted and classified as a wetland (Department of Water Affairs and Forestry, 2005).

12.5.4. Vegetation Indicator

Plant communities undergo distinct changes in species composition along the wetness gradient from the centre of the wetland to the edge, and into adjacent terrestrial areas. Valuable information for determining the wetland boundary and wetness zone is derived from the change in species composition. A supplementary method for employing vegetation as an indicator is to use the broad classification of the wetland plants according to their occurrence in the wetlands and wetness zones (Kotze & Marneweck, Guidelines for delineating the wetland boundary and zones within a wetland under the South African Water Act, 1999; Department of Water Affairs and Forestry, 2005) This is summarised in Table 12-3 below.

When using vegetation indicators for delineation, emphasis is placed on the group of species that dominate the plant community, rather than on individual indicator species (Department of Water Affairs and Forestry, 2005). Areas where soils are a poor indicator (black clay, vertic soils), vegetation (as well as topographical setting) is relied on to a greater extent and the use of the wetland species classification as per Table 12-3 becomes more important. If vegetation was to be used as a primary indicator, undisturbed conditions and expert knowledge are required (Department of Water Affairs and Forestry, 2005). Due to this uncertainty, greater emphasis is often placed on the SWI to delineate wetland areas.

Table 12-3: Classification of Plant Species According to Occurrence in Wetlands

Type	Description
<ul style="list-style-type: none"> Obligate Wetland Species (OW) 	<ul style="list-style-type: none"> Almost always grow in wetlands: >99% of occurrences.

Type	Description
<ul style="list-style-type: none"> Facultative Wetland Species (FW) 	<ul style="list-style-type: none"> Usually grow in wetlands but occasionally are found in non-wetland areas: 67–99% of occurrences.
<ul style="list-style-type: none"> Facultative Species (F) 	<ul style="list-style-type: none"> Are equally likely to grow in wetlands and non-wetland areas: 34–66% of occurrences.
<ul style="list-style-type: none"> Facultative Dry-land Species (FD) 	<ul style="list-style-type: none"> Usually grow in non-wetland areas but sometimes grow in wetlands: 1–34% of occurrences.

(Source: (Department of Water Affairs and Forestry, 2005))

12.5.4.1. Wetland Ecological Health Assessment (WET-Health)

According to Macfarlane et al. (2009) the health of a wetland can be defined as a measure of the deviation of wetland structure and function from the wetland's natural reference condition. A level 1 WET-Health assessment will be done on the wetlands in accordance with the method described (Kotze, Marneweck, Batchelor, Lindley, & Collins, 2007) to determine the integrity (health) of the characterised HGM units for the wetlands associated with the Ubuntu Colliery. A Present Ecological State (PES) analysis will be conducted to establish baseline integrity (health) for the associated wetlands. The health assessment attempts to evaluate the hydrological, geomorphological and vegetation health in three separate modules to attempt to estimate similarity to or deviation from natural conditions. The overall health score of the wetland will be calculated using Equation 1, which provides a score ranging from 0 (pristine) to 10 (critically impacted in all respects).

Central to WET-Health is the characterisation of HGM units, which have been defined based on geomorphic setting (e.g. hillslope or valley-bottom; whether drainage is open or closed), water source (surface water dominated, or sub-surface water dominated) and pattern of water flow through the wetland unit (diffusely or channelled) as described above.

The overall approach is to quantify the impacts on wetland health and then to convert the impact scores to a PES score. This takes the form of assessing the spatial extent of the impact of individual activities and then separately assessing the intensity of the impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The impact scores and PES categories are provided in Table 12-4 (Macfarlane, Kotze, & Ellery, 2009).

$$\text{Wetland Health} = \frac{3(\text{Hydrology}) + 2(\text{Geomorphology}) + 2(\text{Vegetation})}{7}$$

Equation 1: Overall Wetland Ecological Health Score

Table 12-4: Impact Scores and Present Ecological State Categories (WET-Health; Macfarlane et al., 2009)

Impact Category	Description	Combined Impact Score	PES Category
None	Unmodified, natural.	0-0.9	A
Small	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota has taken place.	1-1.9	B
Moderate	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.	2-3.9	C
Large	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4-5.9	D
Serious	The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9	E
Critical	Modifications have reached a critical level and ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8-10	F

As is the case with the PES, future threats to the state of the wetland may arise from activities in the catchment upstream of the unit, within the wetland itself or from processes downstream of the wetland. In each of the individual sections for hydrology, geomorphology and vegetation, five potential situations exist depending upon the direction and likely extent of change (Table 12-5) (Macfarlane, Kotze, & Ellery, 2009).

Table 12-5: Trajectory of Change Classes and Scores Used to Evaluate Likely Future Changes to the Present State of the Wetland

Change Class	Description	HGM change score	Symbol
Substantial Improvement	State is likely to improve substantially over the next 5 years.	2	↑↑
Slight Improvement	State is likely to improve slightly over the next 5 years.	1	↑
Remain Stable	State is likely to remain stable over the next 5 years.	0	→
Slight Deterioration	State is likely to deteriorate slightly over the next 5 years.	-1	↓
Substantial Deterioration	State is expected to deteriorate substantially over the next 5 years.	-2	↓↓

Once all HGM Units have been assessed, a summary of health for the wetland as a whole needs to be calculated. This is achieved by calculating a combined score for each component by area-weighting the scores calculated for each HGM Unit. Recording the health assessments for the hydrology, geomorphology and vegetation components provide a summary of impacts, Present State, Trajectory of Change and Health for individual HGM Units and for the entire wetland.

12.5.4.2. Wetland Ecological Services (WET-EcoServices)

The importance of a water resource in ecological, social or economic terms, acts as a modifying or motivating determinant in the selection of the management class (Department of Water Affairs and Forestry, 1999). The assessment of the ecosystem services supplied by the identified wetlands will be conducted according to the guidelines as described by Kotze & Ellery, 2009. An assessment will be undertaken that examines and rates the following services according to their degree of importance and the degree to which the service is provided:

- Flood attenuation;
- Sediment trapping;
- Toxicant removal;
- Erosion control;
- Stream flow regulation;
- Phosphate trapping;
- Nitrate removal;
- Carbon storage;

- Maintenance of biodiversity;
- Natural resources;
- Cultural significance;
- Education and research.
- Water supply for human use;
- Cultivated foods;
- Tourism and recreation; and

The characteristics will be used to quantitatively determine the value and, by extension, sensitivity of the wetlands. Each characteristic will be scored to give the likelihood that the service is being provided. The scores for each service will then be averaged to give an overall score to the wetland (Table 12-6).

Table 12-6: Classes for Determining the Likely Extent to Which a Benefit is Being Supplied

Score	Rating of the Likely Extent to Which the Benefit is Being Supplied
<0.5	Low
0.6-1.2	Moderately Low
1.3-2	Intermediate
2.1-3	Moderately High
>3	High

12.5.4.3. Ecological Importance and Sensitivity

The Ecological Importance and Sensitivity (EIS) tool was derived to assess the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred. The purpose of assessing importance and sensitivity of water resources is to be able to identify those systems that provide higher than average ecosystem services, biodiversity support functions or are especially sensitive to impacts. Water resources with higher ecological importance may require managing such water resources in a better condition than the present to ensure the continued provision of ecosystem benefits in the long term. The methodology outlined by DWAF (1999) and updated in Kotze and Rountree (Kotze, Ellery, Macfarlane, & Jewitt, 2012; Rountree, Malan, & Weston, 2013), will be used for this study.

In this method there are three suites of importance criteria; namely:

- **Ecological Importance and Sensitivity:** incorporating the traditionally examined criteria used in EIS assessments of other water resources by DWS and thus enabling consistent assessment approaches across water resource types;

- **Hydro-functional Importance:** which considers water quality, flood attenuation and sediment trapping ecosystem services that the wetland may provide; and
- **Importance in Terms of Basic Human Benefits:** this suite of criteria considers the subsistence uses and cultural benefits of the wetland system.

These determinants are assessed for the wetlands on a scale of 0 to 4, where 0 indicates no importance and 4 indicates very high importance. It is recommended that the highest of these three suites of scores be used to determine the overall Importance and Sensitivity category of the wetland system, as defined in Table 12-7.

Table 12-7: Interpretation of Overall EIS Scores for Biotic and Habitat Determinants

Ecological Importance and Sensitivity Category (EIS)	Range of Median
<u>Very High</u> Systems that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	>3 and ≤4
<u>High</u> Systems that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and ≤3
<u>Moderate</u> Systems that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	>1 and ≤2
<u>Low/Marginal</u> Systems that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	>0 and ≤1

12.6. Air Quality

For the EIA Phase, the Air Quality Impact Assessment will establish an emissions inventory and make use of air quality dispersion modelling. This is detailed below.

12.6.1. Emission Inventory

The establishment of an emissions inventory based on the proposed Project and related activities will be conducted to provide input parameters for the AERMOD dispersion modelling during the impact assessment phase.

12.6.2. Air Quality Dispersion Modelling

The United States Environmental Protection Agency's Preferred/Recommended Models: AERMOD modelling system will be utilised to simulate all emission scenarios for the different pollutants. The model simulation will assess the emissions from the various sources within the mine boundary and determine the potential contributions from the mine to the ambient air quality of the area. The results will be contour plots (maps) representing the zone of influence.

The predicted zone of influence for each pollutant simulated will be used to assess operational phase impacts and, in some instances, cumulative impacts of the operation on the ambient air quality as it applies to the South African Air Quality standards for compliance.

12.7. Noise

For the EIA Phase, an inventory of noise generating machinery and their sound power levels will be conducted. This will be followed by noise modelling to determine the propagation of noise from mine related activities to the surrounding receivers. An impact assessment will be drafted which will rate impacts and discuss recommended mitigation measures and management measures for all the phases of the project.

12.7.1. Inventory of Noise Generating Machinery

A detailed list of machinery that will be employed in the construction, operation and decommissioning phases will be sourced from the applicant, and a typical example is indicated in Table 12-8 below. Table 12-8 indicates the noise sound power levels for potential machinery, that may be employed in the model simulations.

Table 12-8: Sound Power Levels from Main Noise Sources

Noise source	Sound power levels dB						
Octave band frequencies, Hz	63	125	250	500	1000	2000	4000
Construction phase							
Haul Truck	108	118	115	114	110	106	102

Noise source	Sound power levels dB						
Excavators	113	117	107	108	106	101	95
Front end Loader	108	116	107	108	105	99	95
Drill	109	118	113	113	113	112	110
Dozer	110	122	113	114	110	108	104
Generator	109	106	101	102	104	100	96
Air compressor	118	107	98	93	91	89	92
Pneumatic tool	118	118	108	109	107	111	117
Breaker	107	116	115	116	120	120	120
Circular saw	106	123	115	114	114	116	120
Operational phase							
Stacker / Reclaimer	86	92	99	107	106	103	101
Conveyor belts	64	72	77	83	80	77	70
Air fin coolers	96	103	103	104	107	107	101
Turbine room	127	127	124	121	122	125	122
Boiler	124	124	121	118	116	114	110
Compressor	99	104	103	101	104	109	106
Transformer	106	108	103	103	97	92	87

12.7.2. Noise Modelling

Information from the noise generating machinery will serve as input data for the predictive modelling that will be conducted during the EIA phase. The model will take cognisance of the proposed mining activities through the use of the modelling software SoundPlan. The software specializes in computer simulations of noise pollution dispersion. The model will estimate the cumulative mining noise levels from all the major noise-generating components and activities of the proposed Project.

The models will be set up to run a conservative scenario with worst-case assumptions, so the following should be noted:

- The average yearly temperature will be used;

- The average yearly humidity will be used;
- Calm wind conditions will be assumed; and
- The mitigation effect of vegetation will not be taken into account.

The outcome of the model will be compared with the SANS 10103:2008 day and night-time guideline limit values. To specifically determine the significance of the impact the baseline levels are compared to the outcome of the model.

12.8. Heritage Impact Assessment

The section below discusses the activities to be undertaken for the Heritage Impact Assessment during the EIA Phase.

12.8.1. Secondary Data Collection

Data collection informs the cultural heritage baseline profile of the study area under consideration. Data was collected through a desktop literature review, which comprised the South African Heritage Resources Information System (SAHRIS) database as well as online electronic journal articles, reference books and select internet sources.

12.8.2. Primary Data Collection

Shannon Hardwick undertook a pre-disturbance survey of the site-specific study area on 08 and 09 July 2020. This survey focused on areas covered by proposed infrastructure footprints and was predominantly pedestrian, with vehicular travel amongst areas under investigation.

The survey was non-intrusive (i.e. no sampling was undertaken). The aim of the survey was to:

- Visually record and verify the current state of the cultural landscape; and
- Record a representative sample of the visible, tangible heritage resources present within the development footprint area, site-specific study area and greater study area.

Identified heritage resources were recorded as waypoints using a handheld GPS device. The heritage resources were also recorded through written and photographic records.

12.8.3. Site Naming Convention

Following the site naming convention employed in the original HRM process, heritage resources identified by Digby Wells during the field surveys are prefixed by an 'H' to indicate a heritage resource. The identified heritage resources are then numbered in the order in which they were identified.

Heritage resources identified through secondary data collection were prefixed by the relevant SAHRIS case or map identification number (*where applicable*) and the original site name as used by the author of that assessment (e.g. 2077/Site 1).

12.9. Item 2(h)(v): Proposed method of assessing duration and significance

Duration and significance will be assessed using the methodology stipulated in Section 11.1.1.

12.10. Item 2(h)(vi): Stages at which the competent authority will be consulted

The competent authority for this application is the Mpumalanga DMRE who will be informed throughout the Scoping and EIA process. The DMRE has also been identified as a Key Stakeholder and will be provided all notifications provided to I&APS, throughout the process. The DMRE will also be invited to attend a site inspection and any meetings (virtual or otherwise). The following project dates apply to the Project Schedule:

- Submission of the Application Form: 6 November 2020;
- Submission of the Draft Scoping Report for Public Review: 6 November 2020 – 7 December 2020;
- Expected submission of Updated Scoping Report: 6 January 2021;
- Expected submission of the Draft EIA: 17 March 2021; and
- Expected submission of Updated EIA: 4 May 2021.

12.11. Item 2(h)(vii): 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 included 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. A Public Participation Plan has been formulated for this Project and attached in Appendix C.

12.12. Item 2(h)(viii): 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;
- Identification of possible fatal flaws;
- Assess potential impacts using the methodology provided herein;
- Provide detailed and feasible mitigation and management measures in an EMP; and
- Public participation activities, including public and key stakeholder meetings.

12.13. Item 2(h)(ix): 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 11-1 provides the proposed project activities, potential impact associated with each activity and proposed preliminary mitigation and residual risk, per environmental aspect.

13. Item 2(k): 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 Appendix 4. The Competent Authority has not requested any other information at this stage. 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 EIA Report;
- 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.

14. Item 2(l): Other matters required in terms of Section 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. This will be undertaken as part of the EIA for the Project.

15. Item 2(i): 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:

October 2020

16. Item 2(j): 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:

October 2020

17. References

- Darwell, W., Smith, K., Tweddle, D., & Skelton, P. (2009). *The status and distribution of freshwater biodiversity in southern Africa*. Gland, Switzerland: IUCN and Grahamstown, South Africa: SAIAB.
- Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, & South African National Biodiversity Institute. (2013). *Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector*. Pretoria.
- Department of Water Affairs and Forestry. (1999). *South African Version 1.0 of Resource Directed Measures for Protection of Water Resources*.
- Driver, A., Nel, J., Snaddon, K., Murray, K., Roux, D., & Hill, L. (2011). *Implementation Manual for Freshwater Ecosystem Priority Areas. Draft Report for the Water Research Commission*. Retrieved from <http://www.wrc.org.za/Knowledge Hub D>
- Higgitt, N., & Nel, J. (2012). *Heritage Impact Assessment for the Brakfontein Thermal Coal Mine*. Digby Wells Environmental: Unpublished Report prepared for Universal Coal (Pty) Ltd. Case ID 479.
- Kleynhans, C., & Hill, L. (1999). *Determination of Resource Quality Objectives for Habitat Integrity. RDM Riv_AppR23-Version1.0. Institute of Water Quality Studies*. . Pretoria, South Africa: Department of Water Affairs and Forestry.
- Kleynhans, C., Thirion, C., & Moolman, J. (2005). *A Level 1 River Ecoregion classification System for South Africa, Lesotho and Swaziland*. Water.
- Kotze, D., & Ellery, W. (2009). *WET-Outcome Evaluate: an evaluation of the rehabilitation outcomes at six wetland sites in South Africa*. Pretoria: WRC: TT 343/09.
- Kotze, D., Ellery, W., Macfarlane, D., & Jewitt, G. (2012). *A rapid assessment for coupling anthropogenic stressors and wetland ecological condition*. Ecological Indicators.
- Land Type Survey Staff. (1972 - 2006). *Land Types of South Africa: Digital Map (1:250 000) and Soil Inventory Databases*. Pretoria: Agricultural Research Council - Institute for Soil, Climate and Water.
- Land Type Survey Staff. (1972 - 2006). *Land Types of South Africa: Digital Map (1:250 000) and Soil Inventory Databases*. . Pretoria: Agricultural Research Council - Institute for Soil, Climate and Water.
- Mucina, L., & Rutherford, M. C. (2012). *The Vegetation of South Africa, Lesotho and Swaziland*. Pretoria: South African National Biodiversity Institute.
- Nel, J., Murray, K., Maherry, A., Petersen, C., Roux, D., Driver, A., . . . Nienaber, S. (2011). *Technical Report for the National Freshwater Priority Areas project*. WRC: 1801/2/11.
- Rountree, M., Malan, H., & Weston, B. (2013). *Manual for the Rapid Ecological Reserve Determination of Inland Wetlands (Version 2.0)*.

- Schoeman, J., van der Walt, M., Monnik, K., Thackrah, A., Malherbe, J., & Le Roux, R. (2000). *The Development and Application of Land Capability Classification System for South Africa*. . Pretoria: ARC - ISCW Report No. GW/A/2000/57: ARC - Institute for Soil, Climate and Water .
- Soil Conservation Service: U.S. Department of Agriculture. (1973). *Land-Capability Classification*. Agriculture Handbook No. 210.



Appendix A: Approvals for the Ubuntu Colliery

- Mining Right
- Environmental Management Programme
- Colliery Name Change
- Water Use Licence



Appendix B: EAP's CV and Qualifications



Appendix C: Public Participation Chapter