

# **FORZANDO COAL MINES (PTY) LTD**

## **FORZANDO NORTH COAL MINE**

**APPLICATION TO AMEND THE FORZANDO NORTH MINING RIGHT  
AND ASSOCIATED APPLICATION FOR ENVIRONMENTAL  
AUTHORISATION TO INCLUDE PORTION 8 AND RE OF THE FARM  
BANKPAN 225 IS AND THE RE OF THE FARM KILLOWEN 465 IS ,  
BETHAL MAGISTERIAL DISTRICT, MPUMALANGA**

### **BASIC ASSESSMENT REPORT**

**FINAL FOR CONSIDERATION**

**AUGUST 2023**

**REFERENCE NO.: MP 30/5/1/2/3/2/1 (381MR) EM**



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### DOCUMENT CONTROL

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## EXECUTIVE SUMMARY

Forzando North is an operational coal mine, located within the Bethal Magisterial District of Mpumalanga. The Mine has an approved Mining Right (MP30/5/1/2/2/381MR) and Environmental Management Programme (EMPr) in terms of the Mineral and Petroleum Resources Development Act, Act 28 of 2002 (MPRDA), as well as separate environmental authorisation(s) in terms of the National Environmental Management Act, Act 107 of 1998 (NEMA) and the National Environmental Management Waste Act, Act 59 of 2008 (NEMWA) for ancillary activities.

This application relates to the proposed expansion of the Forzando North Mining Right Area, in terms of Section 102 of the MPRDA, to incorporate contiguous areas currently held under the following Prospecting Rights: 17030PR, 15106PR, and 14478PR on the farms Bankpan 225 IS and Killowen 465 IS.

Through an intensive drilling exercise on the Prospecting Right Areas, economically viable blocks of coal have been defined. It is proposed to mine these newly defined blocks of coal via underground methods, accessing them from the existing underground workings.

Coal will be brought to surface at the existing Forzando North incline. Existing infrastructure and services at Forzando North will be utilised for the Project and thus infrastructure requirements are expected to be minimal and limited to: -

- two new ventilation shafts;
- an additional processing plant, and associated stockpile area – to be located adjacent to the existing Forzando North processing plant
- associated infrastructure:
  - access / haul roads;
  - electricity supply and distribution;
  - slurry and water reticulation pipelines.

The annexation of these Prospecting Rights into the existing Forzando North Mining Right (381MR) will extend the overall life of mine (LoM) by approximately 11 years (to 2039) (Forzando Coal Mines (Pty) Ltd, 2023). Pertinent Project information is summarised in the table below:

Aspect	Description
The Applicant	Forzando Coal Mines (Pty) Ltd
Project Name	Forzando North Coal Mine: Bankpan and Killowen
Reference Number	MP 30/5/1/2/3/2/1 (381MR) EM
Affected Properties	Various portions of the farms Bankpan 225 IS, Killowen 465 IS, Koppie 228 IS, Weltevreden 193 IS, Geluk 226 IS and Halfgewonnen 190 IS
Central Coordinates of existing Mining Right Area (MRA)	26°16'18.65"S, 29°32'47.52"E
Central Coordinates of the Prospecting Right annexation area	26°17'56.67"S, 29°35'4.02"E

Aspect	Description
Direction & Distance to Nearest Towns	The Bankpan and Killowen Project area is situated in Mpumalanga, 15 kilometres northeast of Bethal, 20 kilometres east of Ga-Nala (Kriel) and 25km southwest of Hendrina.
Magisterial District	Bethal
Extent of MRA	Prospecting Right Areas to be annexed: 1 482.6600 Ha Existing Mining Right Area: 4 079.7337 Ha Total Mining Right Area on approval of Section 102 Application: 5 562.3937 Ha
Activity description	Underground mining and processing of coal.
Life of Mine (LoM)	The annexation of these Prospecting Rights into the existing Forzando North Mining Right (381MR) will extend the overall life of mine (LoM) by approximately 11 years (to 2039)
Competent Authority (CA)	Department of Mineral Resources and Energy (DMRE) Mpumalanga Region

In light of the above, Forzando Coal Mines (Pty) Ltd has submitted an application for Environmental Authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998 (NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). Furthermore, Forzando Coal Mines (Pty) Ltd intends to amend and update the existing EMPr as per the recommendations of the recent Compliance Audit (EIMS, 2022a).

Cabanga Environmental has been appointed by Forzando Coal Mines (Pty) Ltd as the independent Environmental Assessment Practitioners (EAP), responsible for completing the Basic Assessment Report (BAR) and Environmental Management Programme (EMPr) for the proposed Project.

The purpose of this report is to provide information on the environmental and social consequences of the proposed Project to inform the decision making process.

Potential impacts were identified by evaluating the activities associated with each project element in the environmental context of the Project area. Impact identification was facilitated through specialist studies, the understanding of the EAP, inputs from the Applicant and inputs from the Public Participation Process (PPP).

Impact Significance was determined by rating the likelihood that an impact would occur, along with the duration (time), extent (spatial scale) and magnitude (effect) of the impact, in the context of the environmental importance or sensitivity of the aspect impacted upon. Impacts were first rated without the consideration of mitigation measures (though some mitigation is inherent in the design of the Project), and again with the consideration of mitigation measures. Impacts of higher significance require more comprehensive mitigation with a higher likelihood of being able to mitigate an impact successfully.

No fatal flaws have been identified for the project. Impacts of Moderate to High significance (post-mitigation) include:

- Degradation, destruction and fragmentation of portions of sensitive habitats (including wetlands) - The footprint of the proposed plant will largely be located within the Mine's current infrastructure footprint with a very low Site Ecological Importance (SEI) however, the proposed expansion of the stockpile area will transgress into areas of Medium – High SEI.
- Direct disturbance / degradation / loss of wetland due to the expansion of the stockpile area - The proposed expansion of the stockpile area, associated with the new plant, will encroach on a Seep wetland and result in the direct loss of approximately 2 Ha of wetlands.
- Displacement of faunal community due to habitat loss and disturbance (noise, dust and vibration) and/or direct mortalities.
- Alteration of the topography, geological nature and deterioration of visual aesthetics.
- Impact on global climate change due to GHG emissions associated with the Project.
- Potential cone of depression as a result of active dewatering activities - groundwater quantity – the mining activities at Forzando North Coal Mine have the potential to affect several privately owned boreholes and the fountain located on Portion 8 of the farm Bankpan 225 IS during the Operational Phase.
- In general, positive impacts are associated with the extended LoM, resulting in the continued employment for the current workforce.

It is Cabanga Environmental's reasoned opinion that the activity be authorised on condition that the EMPr is fully adhered to, annually audited and amended where necessary based on audit findings.

This report was made available for public review and comment for a period of thirty (30) days, from 17 July 2023 – 17 August 2023, following which the report has been updated with comments received. This report constitutes the final Basic Assessment Report (BAR) and is submitted to the DMRE for consideration. Where changes have been made, these have been underlined for ease of reference.

The DMRE, is the Competent Authority in respect of these applications.

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## LIST OF ACRONYMS:

ACRONYM:	DESCRIPTION:
ABA	Acid-Base-Accounting
AEL	Atmospheric Emissions License in terms of NEMAQA
AIPs	Alien Invasive Plant Species
AMD	Acid Mine Drainage
AQIA	Air Quality Impact Assessment
AQMP	Air Quality Management Plan
BAR	Basic Assessment Report
BBBEE	Broad-Based Black Economic Empowerment
BID	Background Information Documents
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983) as amended
CBA	Critical Biodiversity Areas
CFRR	Catalytic Flow Reversal Reactor
CMA	Catchment Management Agency
CMR	Catalytic Monolith Reactor
CMS	Catchment Management Strategy
CO <sub>2</sub> e	Carbon Dioxide equivalent
CRV	Climate Risk and Vulnerability
CSIR	Council for Scientific and Industrial Research
dba	Decibels
DEA	Department of Environmental Affairs (now the Department of Forestry, Fisheries and Environment, DFFE)
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation in terms of NEMA
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
ECA	Environmental Conservation Act, 1989 (Act No 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment (process or report)
EIA Regs.	Environmental Impact Assessment Regulations published under NEMA
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Areas
FEPA	Freshwater Ecosystem Priority Areas



<b>ACRONYM:</b>	<b>DESCRIPTION:</b>
GHG	Greenhouse Gas
GN	General Notice (issued under an Act, providing notice or instructions in terms of Regulations)
HIA	Heritage Impact Assessment
HGM	Hydrogeomorphic
HPA	Highveld Priority Area
I&AP	Interested and Affected Parties
IBA	Important Bird Area
IDP	Integrated Development Plan
IFC	International Finance Corporation
ISSP	International Society for Sustainability Professionals
LC	Least Concern
LED	Local Economic Development
LoM	Life of Mine
MAR	Mean Annual Runoff
<u>MBG</u>	<u>Mining and Biodiversity Guidelines, 2013</u>
mbs	Metres below surface
<u>MBSP</u>	<u>Mpumalanga Biodiversity Sector Plan</u>
MHSA	Mine Health and Safety Act (Act 29 of 1996) as amended
mm	Millimetres
MPHRA	Mpumalanga Provincial Heritage Resources Agency
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002) as amended
MRA	Mining Right Area
MSDS	Material Data Safety Sheets
MTPA	Mpumalanga Tourism and Parks Agency
NAAQS	National Ambient Air Quality Standards
NAEIS	National Atmospheric Emissions Inventory System
NAG	Net Acid Generating
NEMAQA	National Environmental Management: Air Quality Act (Act 59 of 2008) as amended
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004) as amended
NEMPAA	National Environmental Management: Protected Areas Act (Act 57 of 2003) as amended
NEMWA	National Environmental Management: Waste Act (Act 39 of 2004) as amended
NEMA	National Environmental Management Act (Act 107 of 1998) as amended
NFEPA	National Freshwater Ecosystem Priority Areas

ACRONYM:	DESCRIPTION:
NGERs	National Greenhouse Gas Emissions Reporting Regulations, 2017 (Notice 275 of 2017)
NHRA	National Heritage Resources Act (Act No. 25 of 1999) as amended
NNP	Net Neutralisation Potential
NPAES	National Protected Areas Expansion Strategy
NPR	Neutralisation Potential Ration
NSR	Noise-sensitive Receptors
NT	Not Threatened
NWA	National Water Act (Act 36 of 1998) as amended
OHSA	Occupational Health and Safety Act (Act 85 of 1993)
ONA	Other Natural Areas
PCDs	Pollution Control Dams
PES	Present Ecological State (usually followed by category A-F)
PM <sub>10/5/2.5</sub>	Particulate Matter up to 10/5/2.5 micrometres
PPP	Public Participation Process
RLT	Rapid Load Terminal
RoM	Run of Mine
SAGERS	South African Greenhouse Gas Emissions Reporting System
S&LP	Social and Labour Plan
SAAQIS	South African Air Quality Information System
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resource Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard (followed by standard number)
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEA	Sustainability Excellence Associate
SEI	Site Ecological Importance
SPLUMA	Spatial Planning and Land Use Management Act (Act No.16 of 2013)
SQR	Sub Quaternary Reach
Stats SA	Statistics South Africa
TBC	The Biodiversity Company
TC	Total Concentration

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<b>ACRONYM:</b>	<b>DESCRIPTION:</b>
TCT	Total Concentration Threshold
tCO <sub>2</sub> e	Tonnes of Carbon Dioxide equivalent
TDS	Total Dissolved Solids
TFRR	Thermal Flow Reversal Reactor
VU	Vulnerable
WHO	World Health Organization
WMA	Water Management Area
WML	Waste Management Licence in terms of NEMWA
WRC	Water Research Commission
WULA	Water Use License Application

## 1 INTRODUCTION

Forzando North is an operational coal mine, located within the Bethal Magisterial District of Mpumalanga. The Mine has an approved Mining Right (MP30/5/1/2/2/381MR) and Environmental Management Programme (EMPr) in terms of the Mineral and Petroleum Resources Development Act, Act 28 of 2002 (MPRDA), as well as separate environmental authorisation(s) in terms of the National Environmental Management Act, Act 107 of 1998 (NEMA) and the National Environmental Management Waste Act, Act 59 of 2008 (NEMWA) for ancillary activities.

This application relates to the proposed expansion of the Forzando North Mining Right Area, in terms of Section 102 of the MPRDA, to incorporate contiguous areas currently held under the following Prospecting Rights: 17030PR, 15106PR, and 14478PR on the farms Bankpan 225 IS and Killowen 465 IS.

Through an intensive drilling exercise on the Prospecting Right Areas, economically viable blocks of coal have been defined. It is proposed to mine these newly defined blocks of coal via underground methods, accessing them from the existing underground workings.

Coal will be brought to surface at the existing Forzando North incline. Existing infrastructure and services at Forzando North will be utilised for the Project and thus infrastructure requirements are expected to be minimal and limited to: -

- two new ventilation shafts;
- an additional processing plant, and associated stockpile area – to be located adjacent to the existing Forzando North processing plant
- associated infrastructure:
  - access / haul roads;
  - electricity supply and distribution;
  - slurry and water reticulation pipelines.

The annexation of these Prospecting Rights into the existing Forzando North Mining Right (381MR) will extend the overall life of mine (LoM) by approximately 11 years (to 2039) (Forzando Coal Mines (Pty) Ltd, 2023).

In light of the above, Forzando Coal Mines (Pty) Ltd has submitted an application for Environmental Authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998 (NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). As the application relates to activities identified in terms of Listing Notice 1 and 3 of the EIA Regulations, 2014 (as amended) a Basic Assessment process has been followed.

Furthermore, Forzando Coal Mines (Pty) Ltd intends to amend and update the existing EMPr as per the recommendations of the recent Compliance Audit (EIMS, 2022a).

### 1.1 Project Background

Forzando North has a converted Mining Right in terms of item 7(3) in Schedule II of MPRDA. The Converted Mining Right (381 MR) was granted in November 2011 and executed on 28 June 2013. The Mine originally operated under an old order Mining Right approved in terms of the Minerals Act, 1991 (Act No 50 of 1991).

Underground mining commenced in circa. 1996 under the original EMPr dated 07 February 1996, several EMPr Amendments and Addendums followed over the years necessitating the need to consolidate the documents into one succinct report. Thus, a consolidated EMPr was compiled by GCS (Pty) Ltd in 2010. The 2010 EMPr incorporated the activities at the Forzando North (381 MR) and the Forzando South (380 MR)<sup>1</sup> operations, and was approved by the Department of Mineral Resources and Energy (DMRE) on 31 March 2010. The aforementioned EMPr Amendment was also associated with an Environmental Authorisation (17/2/2/2 GS-04) issued by the Department of Agriculture and Land Administration for ancillary activities associated with mining at the Forzando North Coal Mine (refer to Appendix A for a copy of the Record of Decision).

Forzando Coal Mines (Pty) Ltd has applied in terms of Section 102 of the MPRDA to Amend their existing Mining Right (381 MR). The Amendment relates to the expansion of the Forzando North Mining Right Area, to incorporate contiguous areas currently held under the following Prospecting Rights: 17030PR, 15106PR, and 14478PR. The background of the three Prospecting Rights are summarised below:

- 17030PR issued over Portion 8 of the farm Bankpan 225 IS, was granted to Diepsoils Investments (Pty) Ltd on 17 October 2022 for a period of three (3) years. Diepsoils Investments (Pty) Ltd entered into an agreement of sale with Forzando Coal Mines (Pty) Ltd and an application was made on 06 December 2022 to cede the Right to Forzando Coal Mines (Pty) Ltd in terms of Section 11 of the MPRDA.
- 15106PR issued over Portion 0 (RE) of the farm Bankpan 225 IS, was granted to Tsebeblox (Pty) Ltd, on 01 September 2021 for a period of three (3) years. This Right was amended in terms of Section 102 of the MPRDA for the inclusion of Portion 0 (RE) of the farm Killowen 465 IS (held under 14478PR). Subsequently Tsebeblox (Pty) Ltd has entered into an agreement of sale with Forzando Coal Mines (Pty) Ltd and an application was made on 06 December 2022 to cede these Rights to Forzando Coal Mines (Pty) Ltd in terms of Section 11 of the MPRDA.

## 1.2 Scope

The Scope relates to the following interrelated aspects, and will ultimately result in a separate, updated EMPr for the Forzando North Coal Mine:

- Application to amend a Mining Right, Mining Works Programme and associated EMPr in terms of Section 102 of the MPRDA to incorporate contiguous areas currently held under Prospecting Rights: 17030PR, 15106PR and 14478PR;
- Application for Environmental Authorisation (EA) for new Listed Activities associated with the expansion of the Mining Right Area and proposed infrastructure;

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<sup>1</sup> Subsequent to this, Environmental Authorisation was issued on the 25th of May 2022 for the extension of the Forzando South Mining Right Area (380 MR) for the inclusion of contiguous areas, held under Prospecting Rights 1035PR and 1170PR (also known as the Kalabasfontein Project). Through the aforementioned application, a separate EMPr was prepared for the Forzando South operations.

- Application to incorporate the existing Environmental Authorisation (EA), Ref.: 17/2/2/2 GS-04, as previously issued by the Department of Agriculture and Land Administration into the EMPr<sup>2</sup>; and
- Update the EMPr as recommended in the recent Compliance Audit (EIMS, 2022a).

### 1.3 Summary of the Application Process

Forzando Coal Mines (Pty) Ltd submitted an application to amend their Mining Right in terms of Section 102 of the MPRDA on 21 March 2023. An application for EA was submitted simultaneously for Listed Activities associated with the Project, as required in terms of the NEMA and the EIA Regulations, 2014 (as amended). As the application for EA relates to activities identified in terms of Listing Notice 1 and 3 of the EIA Regulations, 2014 (as amended) a Basic Assessment process has been followed (Figure 1).

This report was made available for public review and comment for a period of thirty (30) days, from 17 July 2023 – 17 August 2023, following which the report has been updated with comments received. This report constitutes the final BAR and is submitted to the DMRE for consideration.

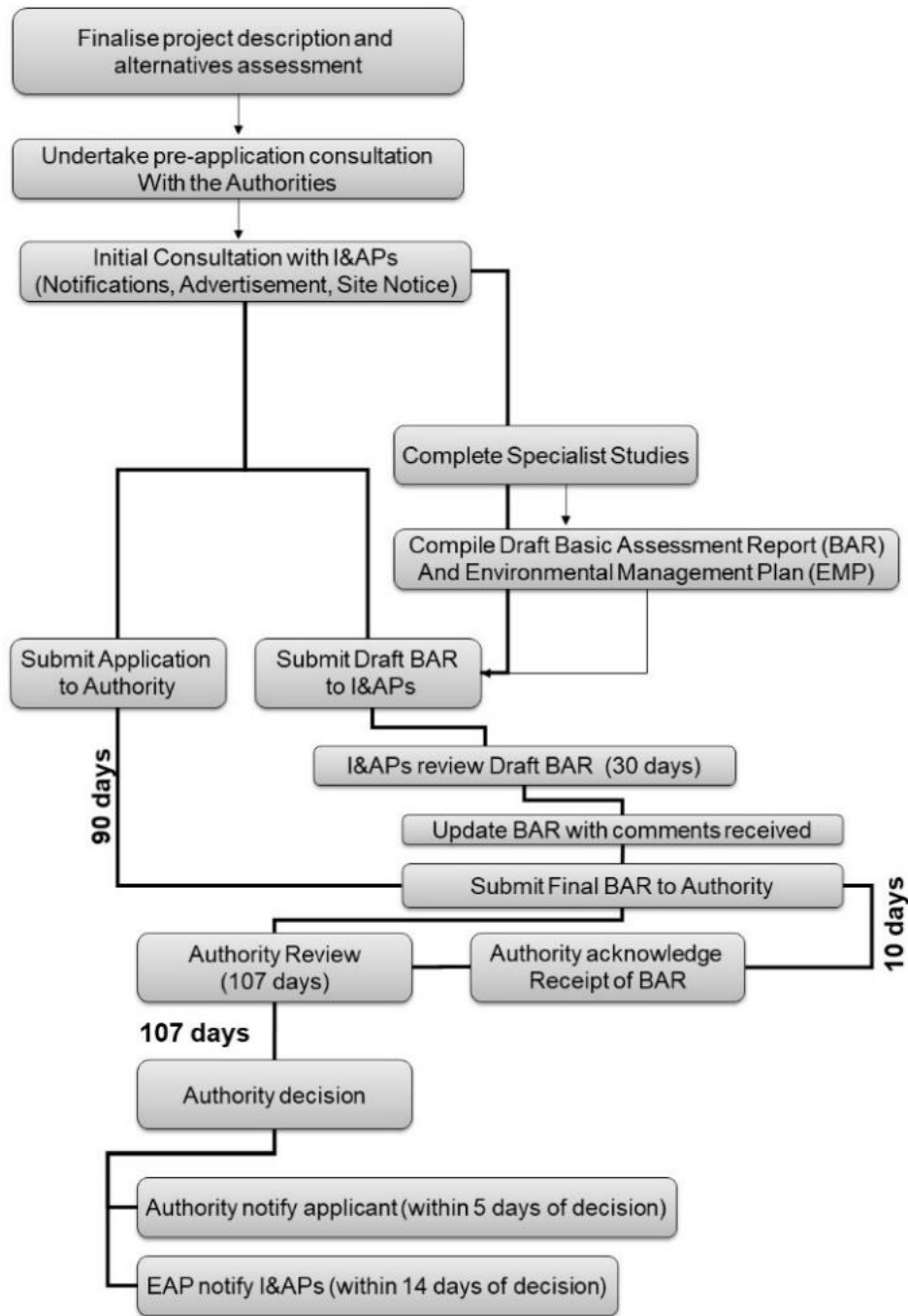
The DMRE, is the Competent Authority in respect of these applications.

A water use license application will also be submitted to the Department of Water and Sanitation (DWS) for water uses associated with the project.

Once the Competent Authority has reached a decision on the application and communicated their decision to the Applicant, all registered Interested and Affected Parties (I&APs) will be informed of the outcome and their rights to appeal.

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<sup>2</sup> On the 2nd September 2014 the NEMA become the overarching environmental legislation and the One Environmental System for mining came into effect, whereby the Department of Mineral Resources and Energy (DMRE) was appointed as the responsible authority for mining-related activities in terms of NEMA. For management and auditing purposes it is proposed to consolidate the EA as previously issued by Department of Agriculture and Land Administration into the Amended and updated EMPr.



**Figure 1: Summary of Basic Assessment Process**

#### 1.4 Structure of the Report

The required content of a Basic Assessment Report (BAR) is prescribed in Appendix 1 of the EIA Regulations, 2014 (as amended). Table 1 presents these requirements and provides cross-references to the various sections of this report where the requirements are addressed.

**Table 1: Required Content of a BAR**

No	Requirement	Section of report
3(1)	A Basic Assessment Report must contain the information that is necessary for the competent authority to consider and conclude on the application and must include -	
(a)	Details of <ul style="list-style-type: none"> <li>(i) the Environmental Assessment Practitioner (EAP) who prepared the report; and</li> <li>(ii) the expertise of the EAP, including a curriculum vitae.</li> </ul>	Section 2.2 Section 2.3 Appendix C
(b)	The location of the Activity, including: <ul style="list-style-type: none"> <li>(i) The 21-digit Surveyor General code of each cadastral land parcel;</li> <li>(ii) Where available, the physical address and farm name;</li> <li>(iii) The coordinates of the boundary of the property or properties.</li> </ul>	Table 5 Plan 2
(c)	A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale.	Plan 3
(d)	A description of the scope of the proposed activity including: <ul style="list-style-type: none"> <li>(i) All listed and specified activities triggered and being applied for; and</li> <li>(ii) A description of the activities to be undertaken including associated structures and infrastructure.</li> </ul>	Section 1.2 Table 9 Section 4
(e)	A description of the policy and legislative context within which the development is proposed including: <ul style="list-style-type: none"> <li>(i) An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and</li> <li>(ii) How the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools, frameworks and instruments.</li> </ul>	Section 5
(f)	A motivation for the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location.	Section 6
(g)	A motivation for the preferred site, activity and technology alternative.	Section 7
(h)	A full description of the process followed to reach the proposed preferred alternative within the site, including: <ul style="list-style-type: none"> <li>(i) Details of the alternatives considered.</li> </ul>	Section 7
	<ul style="list-style-type: none"> <li>(ii) Details of the public participation process undertaken in terms of regulation 41, including copies of the supporting documents.</li> </ul>	Section 8 and Appendix E
	<ul style="list-style-type: none"> <li>(iii) A summary of the issues raised by I&amp;APs and an indication of how the issues were incorporated, or the reasons for not including them.</li> </ul>	Table 12



No	Requirement	Section of report
	(iv) The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 9
	(v) The impacts and risks identified for each alternative including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which these impacts – a. Can be reversed; b. May cause irreplaceable loss of resources; and c. Can be avoided, managed or mitigated.	Table 46
	(vi) The methodology used in determining and ranking potential impacts and risks associated with the alternatives.	Section 11.1
	(vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 11.2
	(viii) The possible mitigation measures that could be applied and level of residual risk.	Table 47
	(ix) The outcome of the site selection matrix.	Section 7
	(x) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such.	Section 7
	(xi) A concluding statement indicating the preferred alternatives including preferred location of the activity.	Section 7.8
(i)	Full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity.	Section 11
(j)	An assessment of each identified potentially significant impact and risk, including cumulative impacts.	Section 11.3
(k)	A summary of the findings and impact management measures identified in any specialist report and an indication as to how these findings and recommendations have been included in the final report.	Table 49
(l)	An environmental Impact Statement.	Section 15.2
(m)	Impact Management Outcomes for the development for inclusion in the EMPr.	Section 12.1
(n)	Aspects to be included as conditions of the authorisation.	Section 15.3
(o)	Description of assumptions, uncertainties and gaps in knowledge.	Section 14
(p)	A Reasoned opinion as to whether the activity should or should not be approved.	Section 15

No	Requirement	Section of report
(q)	The period for which environmental authorisation is required, the date on which the activity will be concluded and the post-construction monitoring requirements.	Section 4.12
(r)	An undertaking under oath or affirmation by the EAP in relation to the correctness of information, the inclusion of I&AP comments, the inputs of specialists and comments and responses related to the application.	Section 16 and 17
(s)	Details of the financial provision for rehabilitation, closure and ongoing post decommissioning management of negative impacts.	Section 13
(t)	Any specific information that may be required by the competent authority.	Section 1.5
(u)	Any other matters required in terms of Section 24(4)(a) and (b) of NEMA.	Table 2

### 1.5 Specific Information Required

The BAR must also address the matters referred to in section 24(4)(a) and (b) of the NEMA. The provisions of this section, and how these are addressed in this report are summarised in the table below:

**Table 2: How the provisions of NEMA Section 24(4)(a) and (b) are addressed in this report**

Provision of NEMA	Relevance to this application and report
<i>(4) Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment – (a) must ensure, with respect to every application for an environmental authorisation—</i>	
<i>(i) coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state;</i>	The DMRE has been identified as the competent authority in terms of the applications under the MPRDA and NEMA. Relevant local and provincial authorities are also included in the I&AP database. Refer to Appendix E: Public Participation Report.
<i>(ii) that the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in this Act and the principles of environmental management set out in section 2 are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, process, plan or project;</i>	It is assumed that the decision-making authorities will take the provisions of section 2 of the NEMA into account when evaluating the Project.
<i>(iii) that a description of the environment likely to be significantly affected by the proposed activity is contained in such application;</i>	Please see the baseline description in Section 9 of this report.
<i>(iv) investigation of the potential consequences for or impacts on the environment of the activity</i>	Impact identification and assessment is presented in Section 11.2 and 11.3 of this report.

Provision of NEMA	Relevance to this application and report
<i>and assessment of the significance of those potential consequences or impacts; and</i>	
<i>(v) public information and participation procedures which provide all interested and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures; and</i>	The PPP is summarised in Section 8 of this report. This report is being made available for a public comment period of 30 days. The full PPP Report is attached as Appendix E.
<i>(b) must include, with respect to every application for an environmental authorisation and where applicable—</i>	
<i>(i) investigation 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;</i> <i>(ii) investigation of mitigation measures to keep adverse consequences or impacts to a minimum;</i>	Alternatives, including the no-development option, are discussed in Section 7 of this report. Impacts of the proposed project were identified in Section 11.2 and assessed in Section 11.3. Management and Mitigation is discussed in Section 12. Also see Appendix G: Forzando North EMPr.
<i>(iii) investigation, assessment and evaluation of the impact of any proposed listed or specified activity on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act;</i>	Listed activities relevant to the proposed project are identified in this report. The impact(s) of these activities on palaeontological and heritage resources has been assessed (Section 11.3.8, Appendix F 8 and Appendix F 9).
<i>(iv) reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information;</i>	Current assumptions, limitations and gaps are highlighted in this report (Section 14).
<i>(v) Investigation and formulation of arrangements for the monitoring and management of consequences for or impacts on the environment, and the assessment of the effectiveness of such arrangements after their implementation;</i>	Management and Mitigation is discussed in Section 12. The monitoring programme is outlined in the EMPr (Appendix G).
<i>(vi) consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection (3); and</i>	The baseline environment is described in this report (Section 9) and relevant maps (Plans) are provided throughout this report and in A3 format as Appendix D.
<i>(vii) provision for the adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question.</i>	Provisions of the Heritage Resources Act, Water Act and other relevant legislation are included in this report (Section 5).

## 2 CONTACT DETAILS

### 2.1 Details of the Applicant

The Forzando North operations are owned and operated by Forzando Coal Mines (Pty) Ltd, a subsidiary of the Overlooked Group of Mines.

**Table 3: Applicant details**

<b>Project applicant:</b>	Forzando Coal Mines (Pty) Ltd		
<b>Registration no (if any):</b>	1970/000578/07		
<b>Trading name (if any):</b>	n/a		
<b>Responsible Person, (e.g. Director, CEO, etc.):</b>	General Manager, Technical and Sustainability		
<b>Contact person:</b>	Setlogelo David Kobuoe		
<b>Physical address:</b>	5th Floor Park Lane West 97 Amarand Avenue Menlyn Maine, Pretoria		
<b>Postal address:</b>	P.o.Box 25307 Monument Park Pretoria		
<b>Postal code:</b>	0105	<b>Cell:</b>	082 411 0898
<b>Telephone:</b>	011 441 6879	<b>Fax:</b>	n/a
<b>E-mail:</b>	david.kobuoe@overlooked.co.za		

### 2.2 Details of the EAP

Cabanga Environmental has been appointed as the independent Environmental Assessment Practitioner (EAP) for the proposed Project. The details of the persons who prepared this report are provided in Table 4. Detailed Curriculum Vitae are attached as Appendix C.

**Table 4: Project Team**

<b>Author</b>	<b>Jane Barrett</b>
<b>Highest qualification</b>	BSc Environmental Management & Botany
<b>Years' experience</b>	12+years
<b>Professional registration</b>	South African Council for Natural Scientific Professions (SACNASP): Cert Sci. Nat. 130485 Sustainability Excellence Associate (SEA) certified with the International Society of Sustainability Professionals (ISSP) and the Green Business Certification Inc. Credential ID: 0011543107

<b>Review &amp; EAP</b>	<b>Lelani Claassen</b>
Highest qualification	BSc Hons Environmental Management
Years' experience	12+ years
Professional registration	Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioner's Association of South Africa (EAPASA). Registration Number 2018/153. SACNASP: Pr. Sci. Nat (Reg. 121645)
<b>Approval</b>	<b>Ken van Rooyen</b>
Highest qualification	MSc Geography
Years' experience	30+ years
Professional registration	SACNASP: Pr. Sci. Nat (Reg. 400121/93)

### 2.3 Summary of Past Experience

**Jane Barrett** is an experienced environmental and sustainability consultant with a demonstrated history of leading and executing complex projects. She holds a BSc degree in Environmental Management and is currently enrolled for a Diploma in Greenhouse Gas Measurement, Reporting and Verification. She has successfully completed certificated courses in Project Management; Carbon Foot printing; and Environmental, Social and Governance Reporting.

She has a good understanding of Environmental Legislation, and its application to factual scenarios. Her experience includes but is not limited to: Environmental Impact Assessments; Environmental Management Plans; Monitoring and Compliance Reporting; Environmental Auditing; Water Use Licensing; Mineral Right Applications; Pre-feasibility and Feasibility Studies.

Jane is registered with the South African Council for Natural Scientific Professions (SACNASP) (Environmental Science) (Cert. Sci. Nat 130485).

**Lelani Claassen** started her career as an environmental consultant in 2008. She holds an Honours degree in Environmental Management from UNISA, which she completed whilst working as an environmental consultant following the successful completion of a BSc Degree in Landscape Architecture from the University of Pretoria. She has also successfully completed the SABS Short-course: Environmental Legal Requirements for ISO 14001 compliance.

Her project experience is extensive in scope and covers various aspects of development including residential developments, filling stations and depots, infrastructure, and mining projects. Lelani's experience includes environmental authorisation processes, concept (Fatal Flaw), Pre-Feasibility and Feasibility Studies, environmental compliance audits and environmental-legal compliance assessments. She also has experience as an Environmental Control Officer on construction projects.

Lelani is a Registered EAP (Registration Number 2018/153) with the EAPASA, the only Registration Authority for EAPs in South Africa in terms of Section 24H of the NEMA. Lelani is also a Registered Scientist with SACNASP (Environmental Science (Pr. Sci. Nat 121645)).

**Ken van Rooyen** started his career working as an Exploration Geologist in 1987 after which he specialised in Environmental Management, working both within the Mining Industry and then as an Environmental Consultant.

His main areas of interest are:

- the design, management and repair of mine residue facilities;
- rehabilitation planning and modelling;
- risk assessment; and
- quantifying environmental liabilities.

He obtained a Master's degree in Geography based on his final dissertation entitled "An integrated method of coal discard and slurry disposal to reduce the environmental impact from coal residue".

Ken's project experience is extensive in scope and covers various developments including agricultural and residential developments, power generation, infrastructure, and mining projects. In addition to working on projects throughout South Africa, Ken has worked in Botswana, Mozambique, Zimbabwe, Zambia, Madagascar, Sierra Leone, Rwanda, Mali, Nigeria, and the United States of America.

He has presented at numerous local and international forums on issues such as waste management, integrated environmental management, and sustainability. As well as represented companies on various committees and advisory groups e.g. the Atmospheric Pollution Prevention Committee, the Water Research Commission (Vaal Barrage), the National Groundwater Quality Management Strategy Advisory Group, the Inkomati-Usuthu Catchment forum and many more.

Ken is registered with SACNASP (Environmental Science) (Pr. Sci. Nat 400121/93).

### 3 PROJECT LOCATION

#### 3.1 Regional and Local Setting

The Bankpan and Killowen project area is situated in Mpumalanga, 15 kilometres northeast of Bethal, 20 kilometres east of Ga-Nala (Kriel) and 25km southwest of Hendrina. It is located to the north and south of the existing Forzando North (381MR) and Forzando South (380MR) Mining Right Areas, see Plan 1 - Plan 3.

The annexation area falls within the Gert Sibande District Municipality (DC30), specifically Ward 10 of the Msukaligwa Local Municipality (MP302). The Mine's Adit and infrastructure is located within the Govan Mbeki (MP307) and Steve Tshwete Local Municipalities (MP313).

#### 3.2 Property Description

The project area comprises three prospecting rights, 17030PR, 15106PR & 14478PR, which covers a total of 1 482.6600ha over portions 8 & RE of the farm Bankpan 225 IS and portion 0 (RE) of the farm Killowen 465 IS.

The Forzando North Mining Right Area (381MR), the existing Mining Right to which the three Prospecting Rights are to be annexed, covers a total area of 4 079.7337ha including various

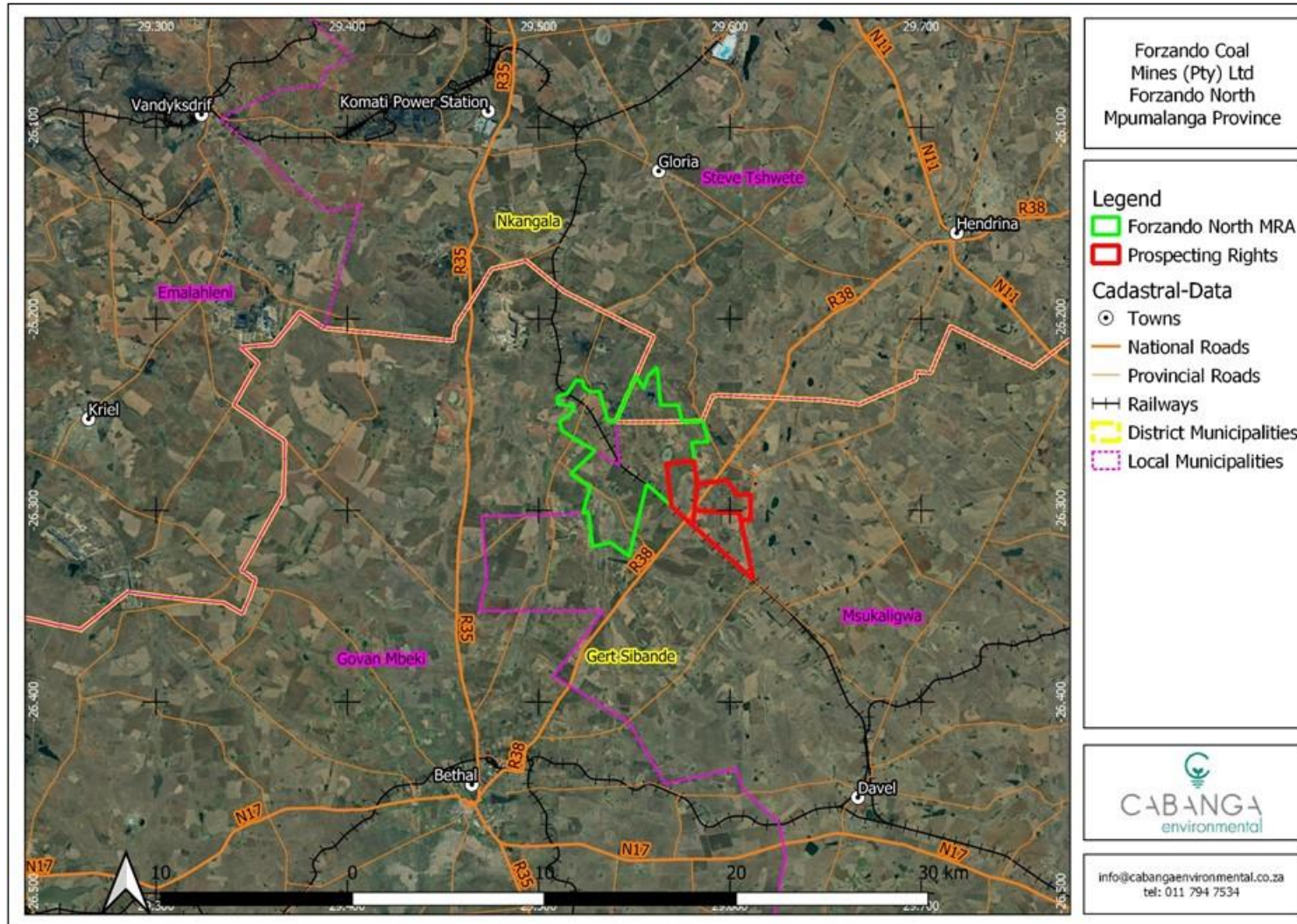
portions of the farms Bankpan 225 IS, Koppie 228 IS, Weltevreden 193 IS, Geluk 226 IS and Halfgewonnen 190 IS, see details in Table 5 overleaf. The operations also affect Portions 1 and 5 of Halfgewonnen 190 IS, where some of the mine infrastructure is located.

Two new ventilation shafts will be required for the underground mining, these are proposed to be located on Portions 1, 2 and 14 of the farm Bankpan 225 IS.

A new processing plant is also proposed, this will be located at the existing Forzando North infrastructure area adjacent to the existing plant.

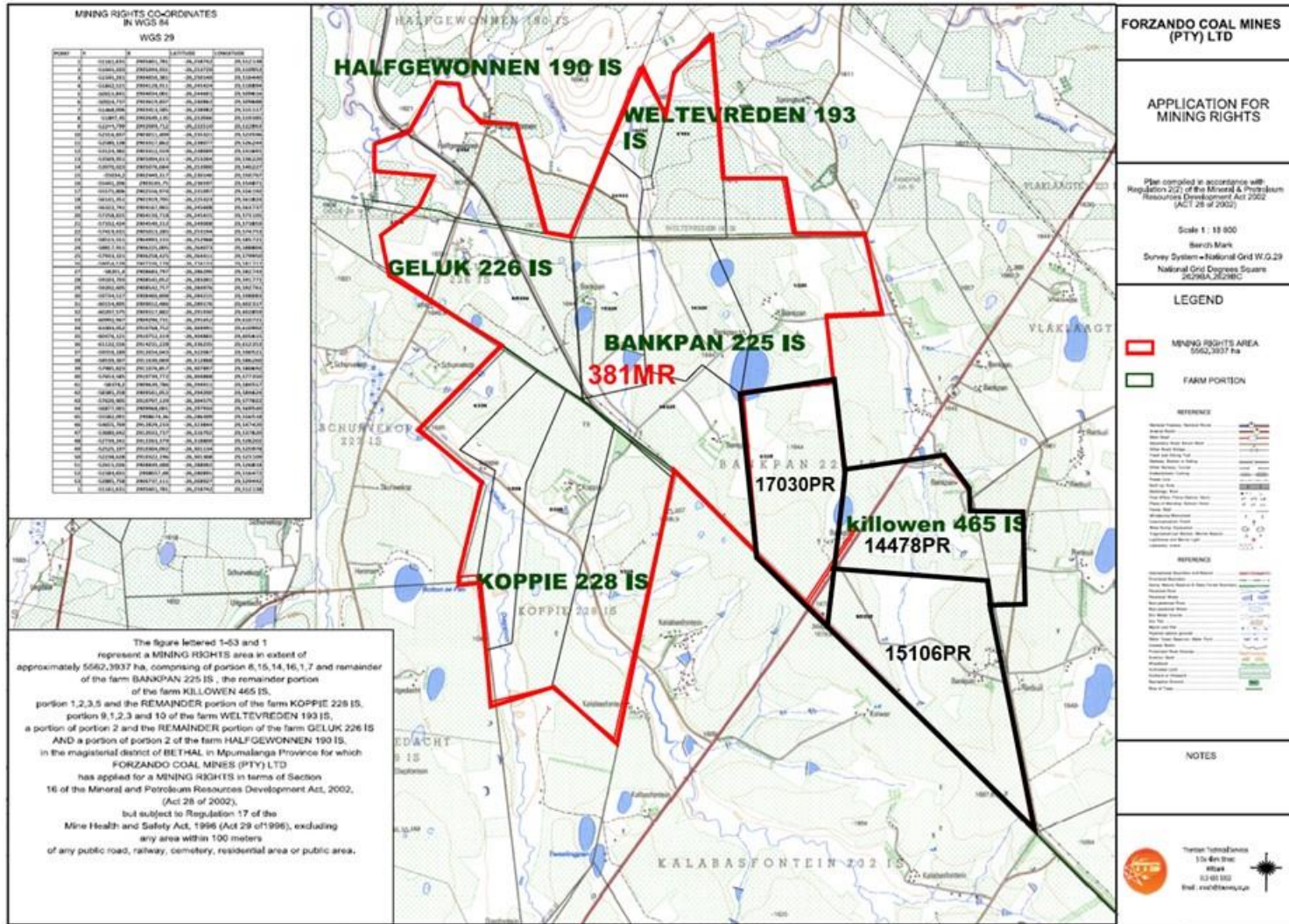
### **3.3 Surface Right Owners**

Plan 4 indicates the current surface right holders for the MRA.

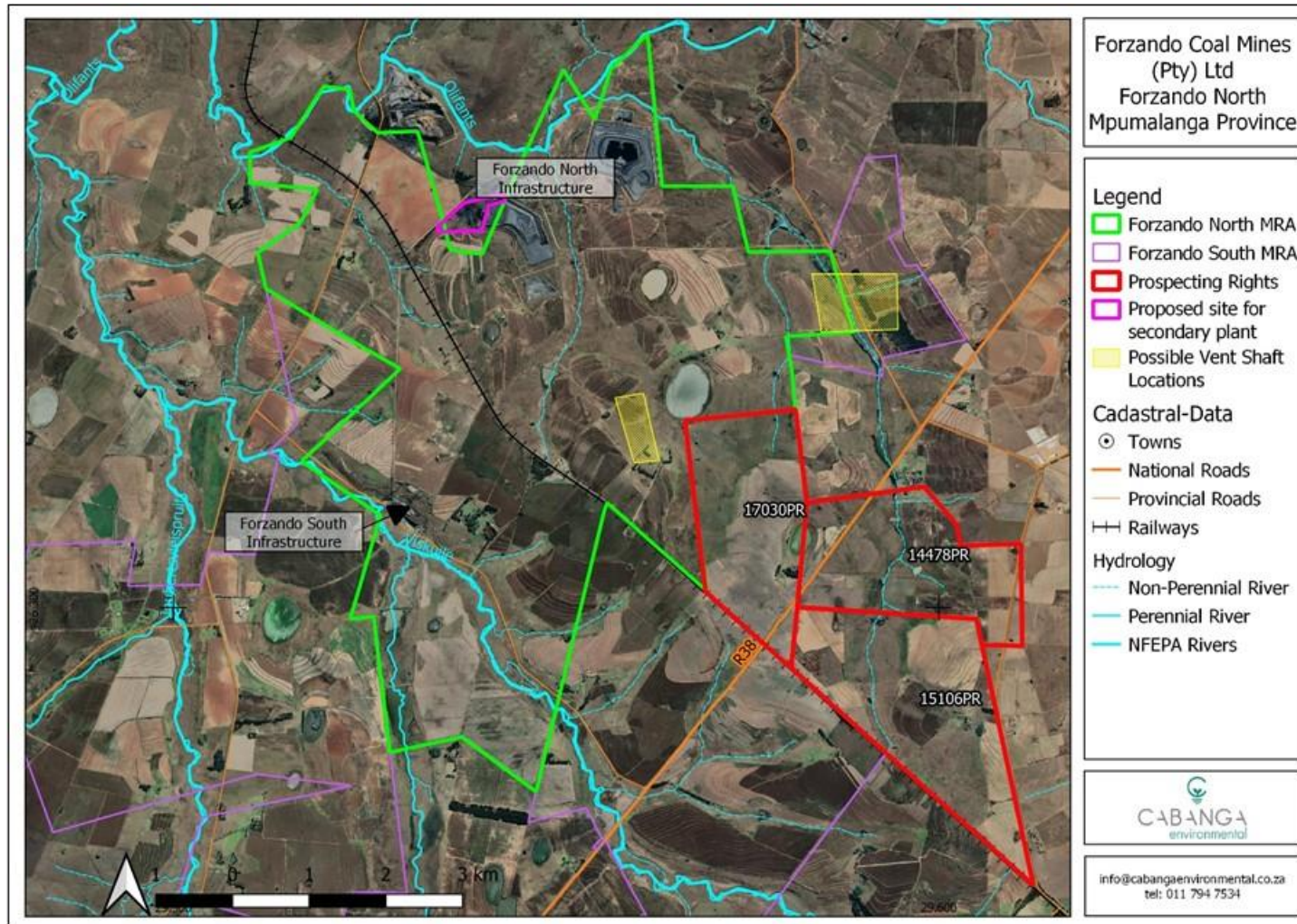


Plan 1: Regional Setting





Plan 2: Regulation 2(2) Plan (Forzando Coal Mines (Pty) Ltd, 2023)



**Plan 3: Local Setting showing the proposed position of the ventilation shafts and processing plant in relation to the existing infrastructure and Mining Right Areas**

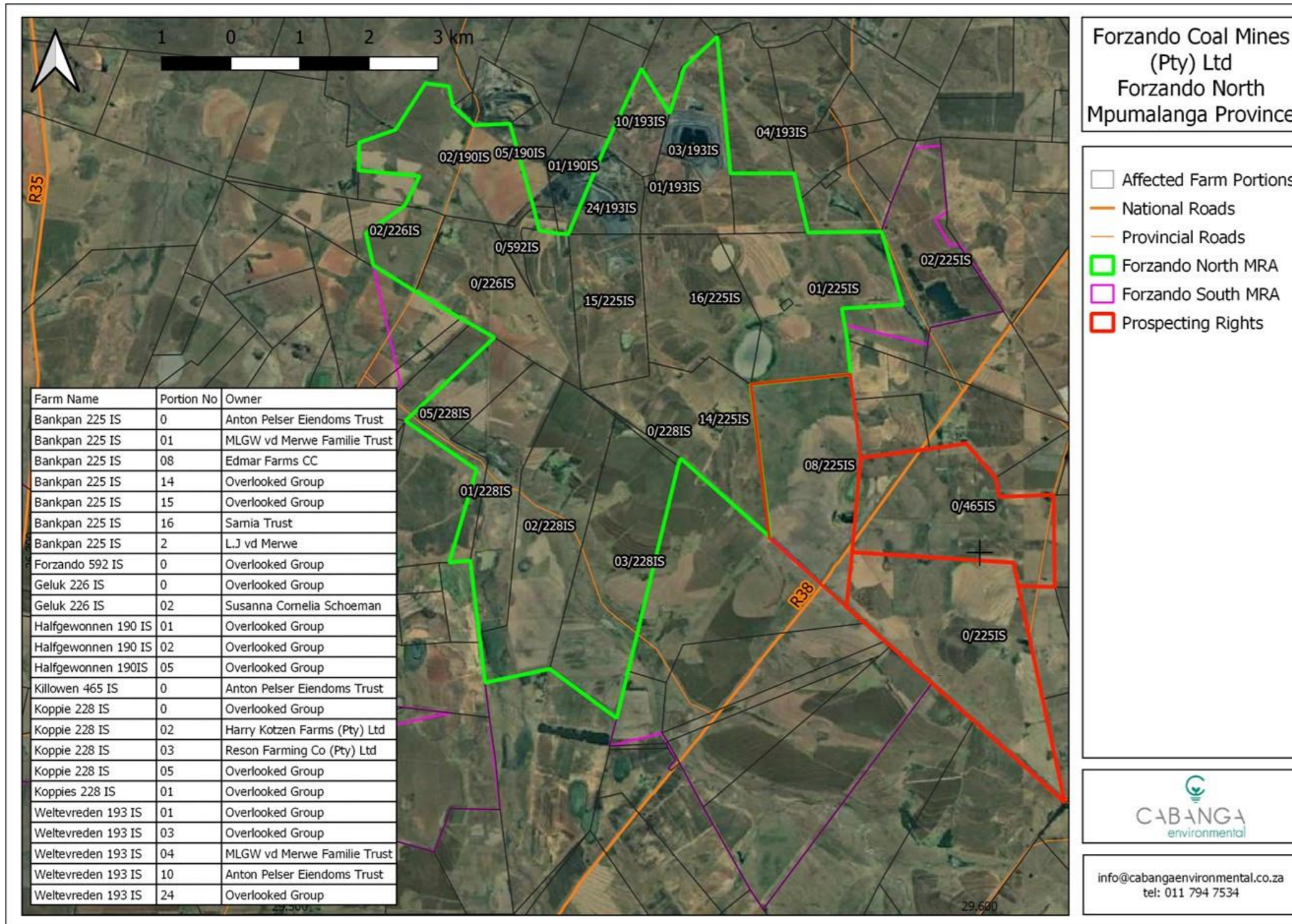
**Table 5: Property details**

<b>Application area (Ha)</b>	Prospecting Right Areas to be annexed: 1 482.6600 Ha Existing Mining Right Area: 4 079.7337 Ha Total Mining Right Area on approval of Section 102 Application: 5 562.3937 Ha				
<b>Magisterial district:</b>	Bethal				
<b>Distance and direction from nearest town</b>	15 kilometres northeast of Bethal, 20 kilometres east of Ga-Nala (Kriel) and 25km southwest of Hendrina				
<b>Farm Name &amp; Portions of the Mining Right Area<sup>3</sup>:</b>	<b>Farm Name:</b>	<b>Portion:</b>	<b>SG Code:</b>	<b>Area (Ha)<sup>4</sup>:</b>	<b>DMRE Reference No.:</b>
	Killowen 465 IS	0 (RE)	TOIS00000000046500000	460.6600	MP30/5/1/2/2/14478PR
	Bankpan 225 IS	0 (RE)	TOIS00000000022500000	597.0000	MP30/5/1/2/2/15106PR
	Bankpan 225 IS	8	TOIS00000000022500008	425.0000	MP30/5/1/2/2/17030PR
	Bankpan 225 IS	RE 1	TOIS00000000022500001	430.3588	MP30/5/1/2/2/381MR
		7 (of 1)	TOIS00000000022500007	1.7131	
		RE 14	TOIS00000000022500014	338.5508	
		15 (of 14)	TOIS00000000022500015	244.1806	
	16 (of 14)	TOIS00000000022500016	320.4166		
Koppie 228 IS	0 (RE)	TOIS00000000022800000	9.5618		

<sup>3</sup> Where the green highlighted cells indicate the areas to be annexed.

<sup>4</sup> Extent of the property included within the Mineral Right.

		RE 1	TOIS00000000022800001	281.9697		
		2	TOIS00000000022800002	453.3509		
		3 (Rechoboth)	TOIS00000000022800003	453.3424		
		5 (of 1)	TOIS00000000022800005	171.3727		
	Weltevreden 193 IS	1	TOIS00000000019300001	3.4261		
		3	TOIS00000000019300003	273.4535		
		Mineral area 2 (PTN of Mineral Area 1) on Portion 4	TOIS00000000019300004	85.0141		
		9 (of 2)	TOIS00000000019300009	90.0801		
		10 (of 2)	TOIS00000000019300010	93.2921		
	Geluk 226 IS	Mineral Area 1 on Portion 0 (RE)	TOIS00000000022600000	494.0817		
		Mineral Area 1 on Portion 2	TOIS00000000022600002			
	Halfgewonnen 190 IS	Mineral Area 3 on RE 2	TOIS00000000019000002	335.5687		
	<b>Farm Name &amp; Portions of additional properties affected by surface infrastructure:</b>	Halfgewonnen 190 IS	1	TOIS00000000019000001		Associated with the existing infrastructure area at Forzando North.
		Halfgewonnen 190 IS	5	TOIS00000000019000005		
Bankpan 225 IS		2	TOIS00000000022500002	Associated with the proposed ventilation shaft (East) and associated service routes, power supply and distribution.		



Plan 4: Land Tenure<sup>5</sup>

<sup>5</sup> Where Overlooked Group includes Overlooked Coal Mine (Pty) Ltd, Overlooked Coal Mine Alpha (Pty) Ltd and Katlego Coal (Pty) Ltd (previously known as Exxaro Coal Central (Pty) Ltd)

## 4 PROJECT DESCRIPTION

The purpose of this section is to provide the public with sufficiently detailed information regarding the proposed project in relation to the existing operations, so as to facilitate meaningful public participation; and to provide the relevant decision-making authorities with sufficiently detailed information to enable informed consideration of the application, and decision-making.

**Table 6: Project Summary** (Forzando Coal Mines (Pty) Ltd, 2023)

Item	Detail
Mineral	Coal
Mining method	Underground bord-and-pillar using continuous miners
Depth of the mineral below surface	S4L: Ranges from 20 – 140 m
Geological formation	Coal seams of the Witbank / Highveld Coalfields in the Vryheid Formation of the Ecca Group in the Karoo Basin.
Life of mine (LoM)	17 years (incl. the annexation area)
Production rate	Between 0.5 Mt – 1.0 Mt per annum
Market	Export and local

### 4.1 Existing and Proposed Infrastructure

The existing infrastructure at Forzando North can be summarised as follows:

- Haul/access roads and parking;
- Security, fencing and access control;
- Workshop area incl. stores, hydrocarbon storage, and wash bays;
- Administrative complex incl. offices, clinic, change house, laundry and lamp rooms;
- Incline shaft;
- Ventilation shafts and fans;
- Soil and overburden stockpiles;
- Coal beneficiation plant(s);
- Water and slurry reticulation pumps and pipelines;
- Coal product load-out stockpile, located to the west of the discard dump;
- Run-of-mine (ROM) coal stockpiles;
- Metallurgical coal stockpiles;
- Coal discard dumps (No. 1, 2 and 3);
- Sewage Treatment Plant;
- Water Treatment plant;
- Clean and dirty water diversion drains;
- Pollution control dams (PCDs) x7;
- Erikson dam;
- Substation(s) and associated power lines;
- Salvage yard and waste storage area;

- Rail line of about 1,6 km to the Richards Bay Coal Terminal railway line;
- Rail loop of about 400 m diameter; and
- Burrow Pit.

Additional infrastructure associated with the Project and under application can be summarised as follows:

- Two new ventilation shafts;
- An additional processing plant, and associated stockpile area – to be located adjacent to the existing Forzando North processing plant; and
- Associated infrastructure:
  - access / haul roads;
  - electricity supply and distribution;
  - slurry and water reticulation pipelines.

These are further discussed in the sections that follow.

#### **4.1.1 Access Roads & Transport**

The Forzando North infrastructure area is accessed via an unpaved access road located off the D622 (also known as the Halfgewonnen Road). Internal vehicle movement at the operations is via a series of unpaved roads.

The proposed development of an additional processing plant will necessitate that internal haul roads, at the existing plant area, be extended by approximately 2km. The roads will have a maximum width of 8m.

Product coal will be temporarily stockpiled at the plant area before being conveyed to the rapid load terminal (RLT), located at the existing rail siding loop for export or loaded onto trucks for transport to local markets.

Service roads will be required for each of the proposed ventilation shafts. These roads will be unsurfaced "Jeep" tracks of between 4-5m wide and a maximum of 2 km long, accessed from existing farm roads.

#### **4.1.2 Security Fencing & Access Control**

The Forzando North infrastructure area is fenced, and access to site is controlled via a security checkpoint. The proposed ventilation shafts will also be fenced for safety reasons. Fencing is specified at 2m high, diamond mesh with barbed wire.

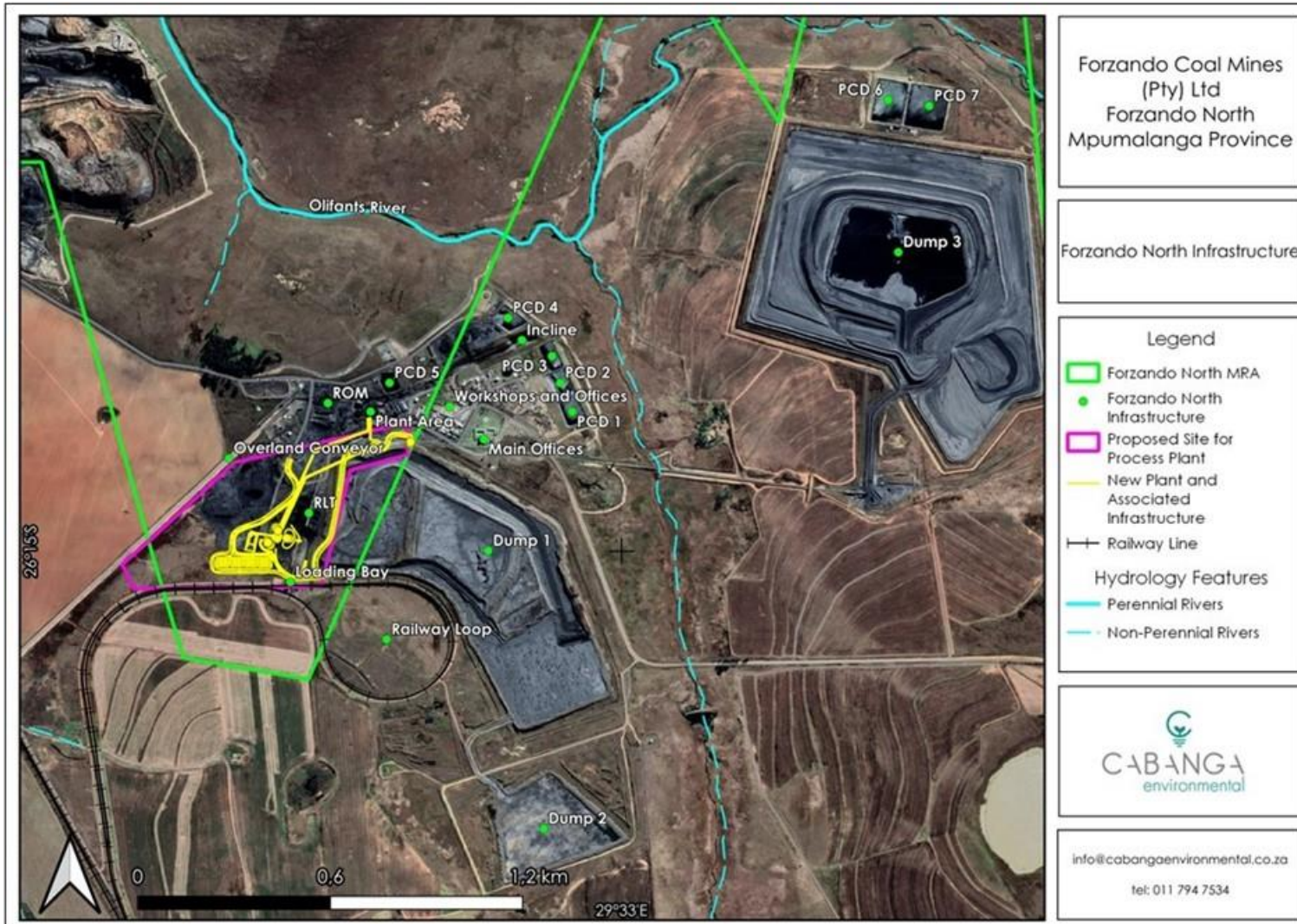
#### **4.1.3 Administration, Workshops & Other Buildings**

The existing administration complex and workshop area will continue to be utilised for the life of mine. No changes are proposed.

#### **4.1.4 Storage of Dangerous Goods**

Diesel storage facilities (3 x 20m<sup>3</sup> tanks) are located at the workshop area, and are appropriately bunded. No additional storage requirements are associated with the proposed Project.

Chemicals used at Forzando North are stored in designated areas, the appropriate Material Safety Data Sheets (MSDS) are kept on file.



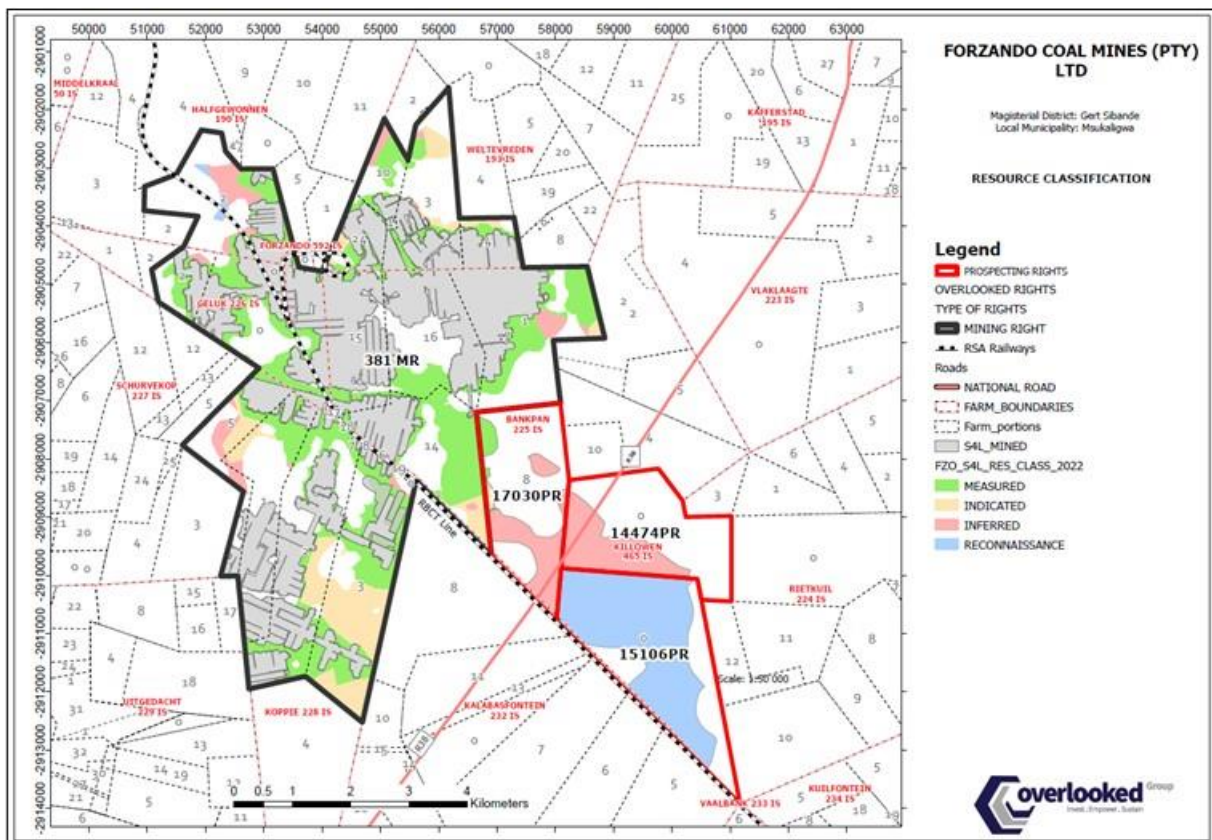
Plan 5: Overview of the Forzando North incline and infrastructure area



## 4.2 Mineral Reserve, Life of Mine (LoM) and Mine Plan

Seven main coal seams are recognised in the area, named, from base upwards as S1L, S1, S2, S2Leader, S4, S5 and S6 (Forzando Coal Mines (Pty) Ltd, 2023). However, only the S2 and S4 seams are of economic interest. To the south the S2 is not well developed due to dolerite intrusions and thus only the S4 will be targeted for extraction in the Project area annexation.

Through an intensive drilling exercise on the Prospecting Right areas, economically viable blocks of coal have been defined (Plan 6). The Applicant plans to mine these newly defined blocks of coal via underground methods, accessing them from the existing Forzando North workings (refer to Figure 2).

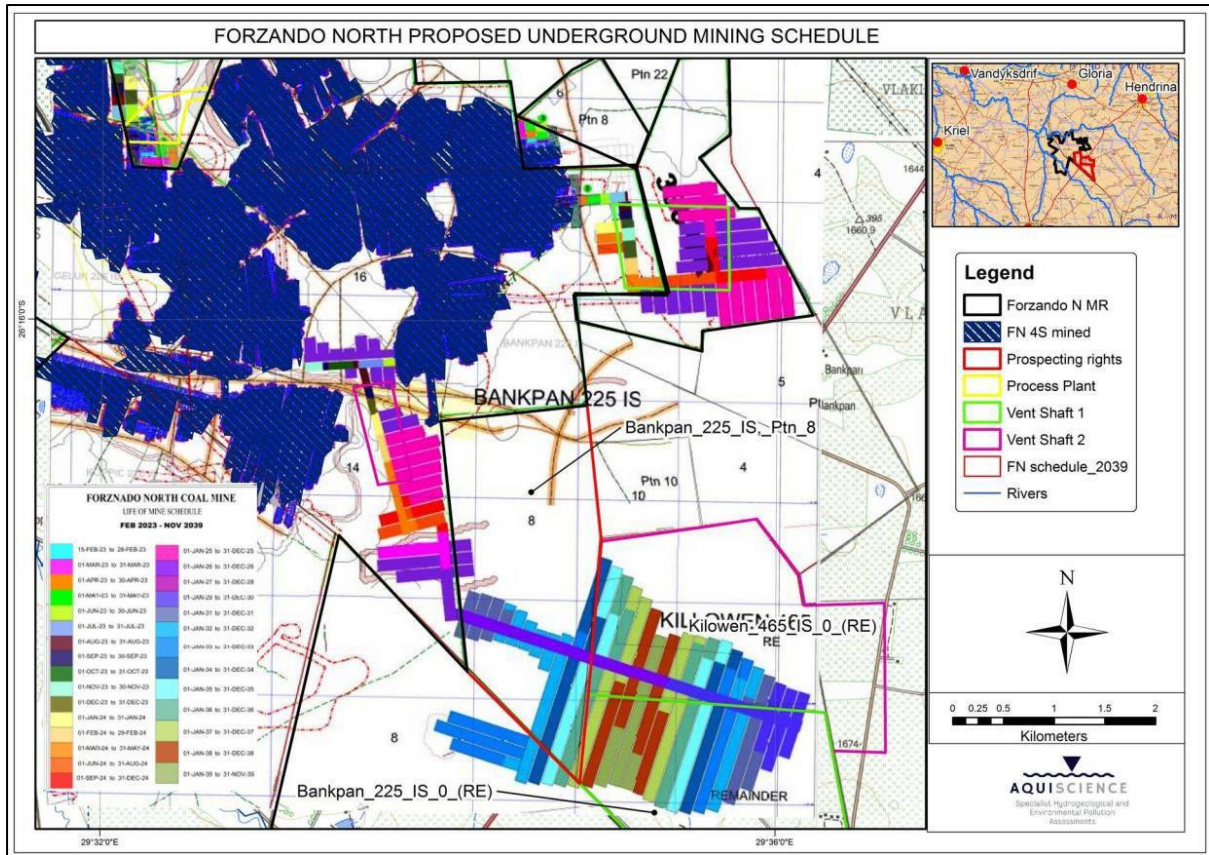


**Plan 6: Resource Classification (Forzando Coal Mines (Pty) Ltd, 2023)**

The reserves will be mined using a mechanised bord-and-pillar method using continuous miners. In mechanised bord-and-pillar mining, extraction is achieved by developing a series of roadways (bords) in the coal seam and connecting them by splits (cut-through) to form pillars. These pillars are left behind as part of a primary roof support system. To maintain pillar stability the following parameters have been recommended (M.Mazibuko, 2023):

- Minimum pillar centres: 16.0m x 16.0m increasing up to 24.0m x 24.0m as dictated by the depth to the floor of the No. 4-lower seam. The resultant safety factors are indicated in the Rock Engineer's Report (Appendix F 12);
- Maximum bord width: 6.8m;
- Maximum width-to-height ratio: 2.5;

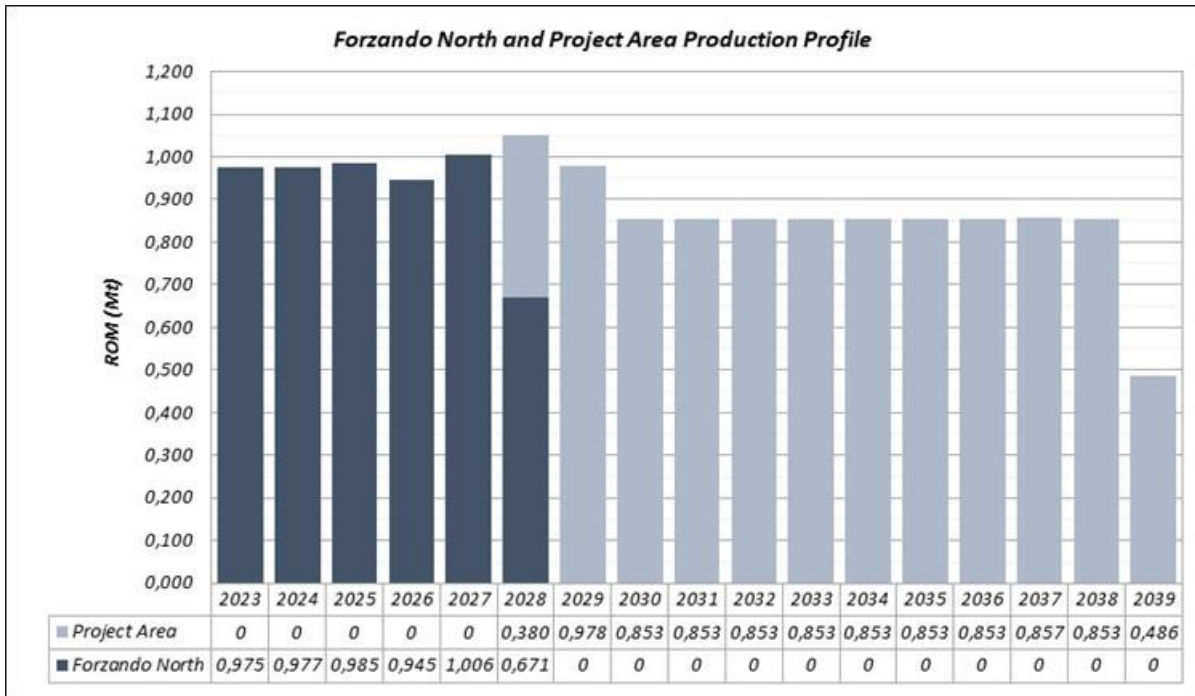
- More stringent parameters to be applied when undermining sensitive infrastructure, such as farm houses, streams and pans; and
- Areas intersected by dolerite dykes will be mined according to specific recommendations issued by the rock engineer (M.Mazibuko, 2023).



**Figure 2: LoM showing the proposed underground workings (Aqiscience, 2023)**

The Project area annexation is intended to assist Forzando North to maintain its production levels of approximately 1.0Mt per annum up until 2038 before decreasing to ~0.5Mt in the last year of its LoM in 2039 (Forzando Coal Mines (Pty) Ltd, 2023).

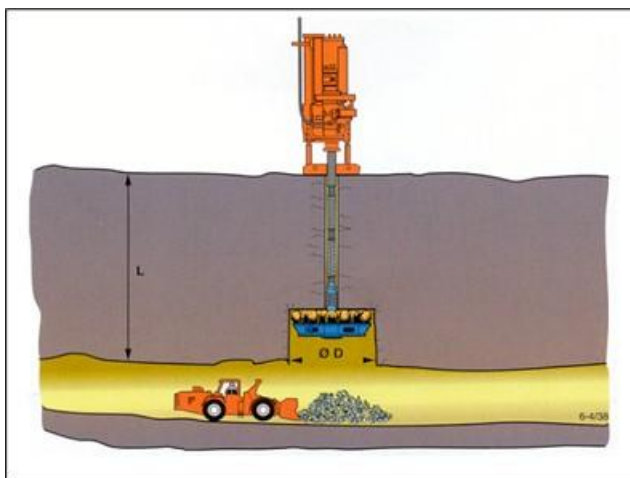
Figure 3 overleaf highlights the production profile over the LoM. Three sections, Sections 1, 2 and 3, are currently in operation at Forzando North. However, only two sections, Sections 1 and 3 are scheduled to be relocated to the Project area (2029) once the reserves at Forzando North are depleted (2028).



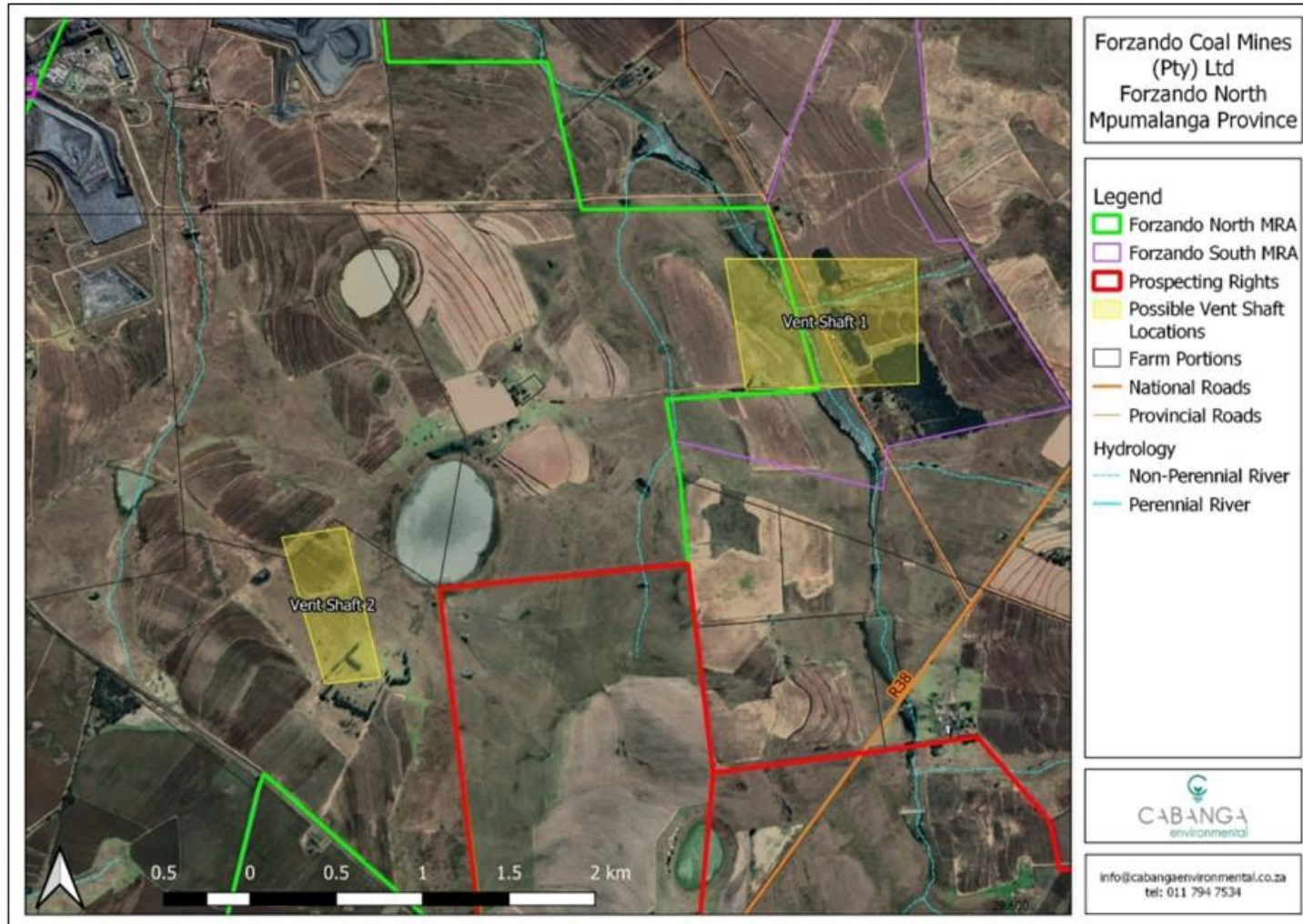
**Figure 3: LoM Production Profile (Forzando Coal Mines (Pty) Ltd, 2023)**

### 4.3 Ventilation Shafts

Two additional ventilation shafts are proposed, these ventilation shafts will be circular, vertical shafts that will be raise bored: A pilot hole will be drilled into the underground workings, a reamer head will then be attached to the drill rods, rotated and reamed back up as illustrated in Figure 4 below. Drill chips (rock) will be handled underground. A sump will be required on surface to circulate water during the drilling process. A surface area of 2,500m<sup>2</sup> will be impacted on by each ventilation shaft, although a much larger area has been assessed to allow for micro-siting (Plan 7). Once bored, each ventilation shaft will be fitted with ducting and a ventilation fan. Figure 5 illustrates a typical ventilation shaft and fan.



**Figure 4: Illustration of raise boring by typical up-reaming (P.H.Ferreira, Unknown)**



**Plan 7: Location of proposed Ventilation Shafts**

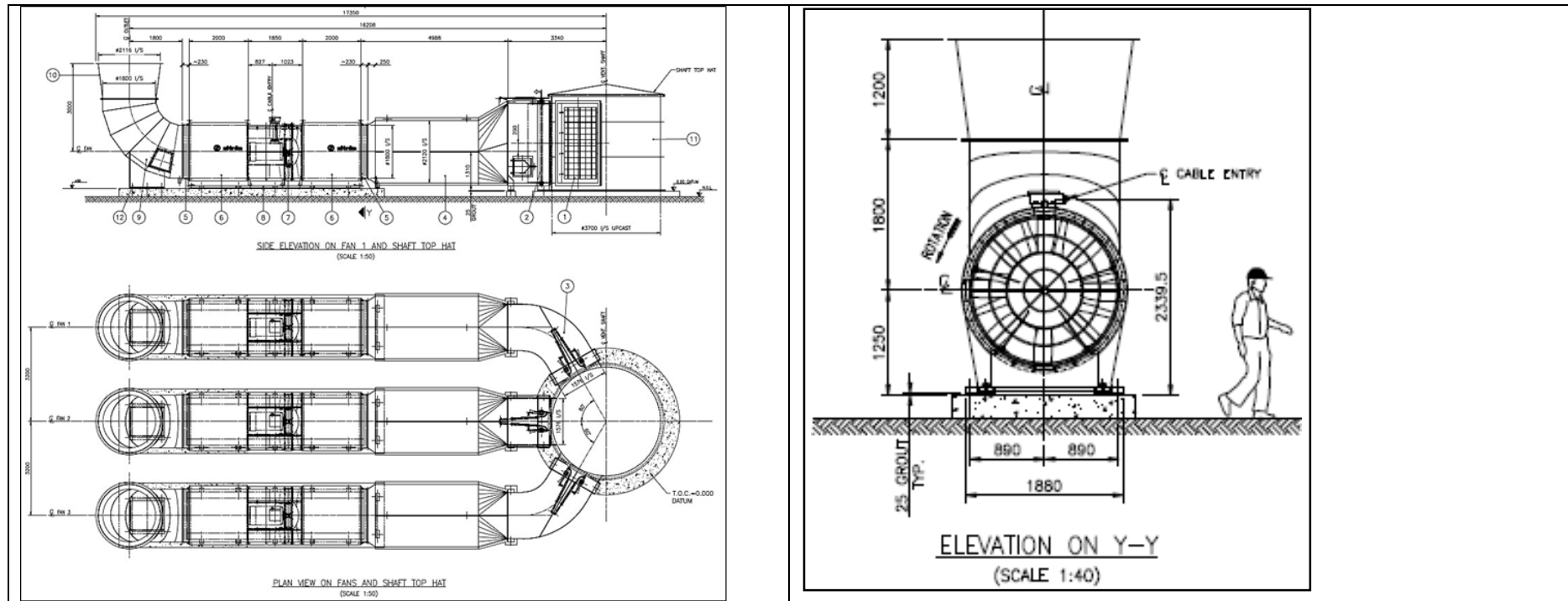


Figure 5: Typical ventilation shaft and fan<sup>6</sup>

<sup>6</sup> For illustrative purposes only.

#### **4.4 Coal Handling and Processing**

This section is extracted directly from the Mining Works Programme (Forzando Coal Mines (Pty) Ltd, 2023).

##### **Existing Processing Plant:**

The Forzando North plant is designed to beneficiate RoM from both the Forzando North and South operations. Coal is conveyed from the inclines to the RoM stockpile area where it is temporarily stockpiled prior to processing.

The existing plant consists of two modular streams, namely the Blue and Brown Plants (Figure 7 - Figure 8) with a combined designed capacity to beneficiate approximately 4.1Mt of ROM per annum.

Live capacity of the stockpile is 20,000 tonnes while the emergency stockpile can stack 40,000 tonnes. ROM stockpile is fed to the Bivitech screen via a stockpile withdrawal conveyor. The Bivitech screen is a double deck screen, where undersize from the screen reports to Blue Plant product belt and the oversize reports to the secondary crusher. Coal is reduced to a 50mm top size in a closed-circuit operation. Crushed material then reports to Dense Medium Plant feed bins (Figure 9) and Spiral Plant for further processing. Capacity of the crushing plant circuit is approximately 500tph.

Discard arising from the two modules reports to discard conveyor and it is discharged into the waste load out bin for trucking to the co-disposal discard dump (Dump 3). Slurry from the thickener is also pumped to the co-disposal dump. Water from the co-disposal dump reports back to the dams and it is re-used in the plant as process water.

Coal from the product stockpiles is conveyed to Rapid Loading Terminal (RLT) silo. Train wagons loaded are positioned under the loading flask. A flask weighs the coal for each wagon, with the discharge from the flask being controlled by means of a gate and a profile chute. The trains received at the load-out terminal consist 100 wagons which are loaded to a total capacity of 8,400 tonnes per train. The facility has the capacity to load 104 wagons as and when it is required by Transnet Freight Rail (TFR).

All existing surface infrastructure will be retained to service production from Forzando North, inclusive of the Project annexation area, with an additional processing plant and expanded stockpile area proposed.

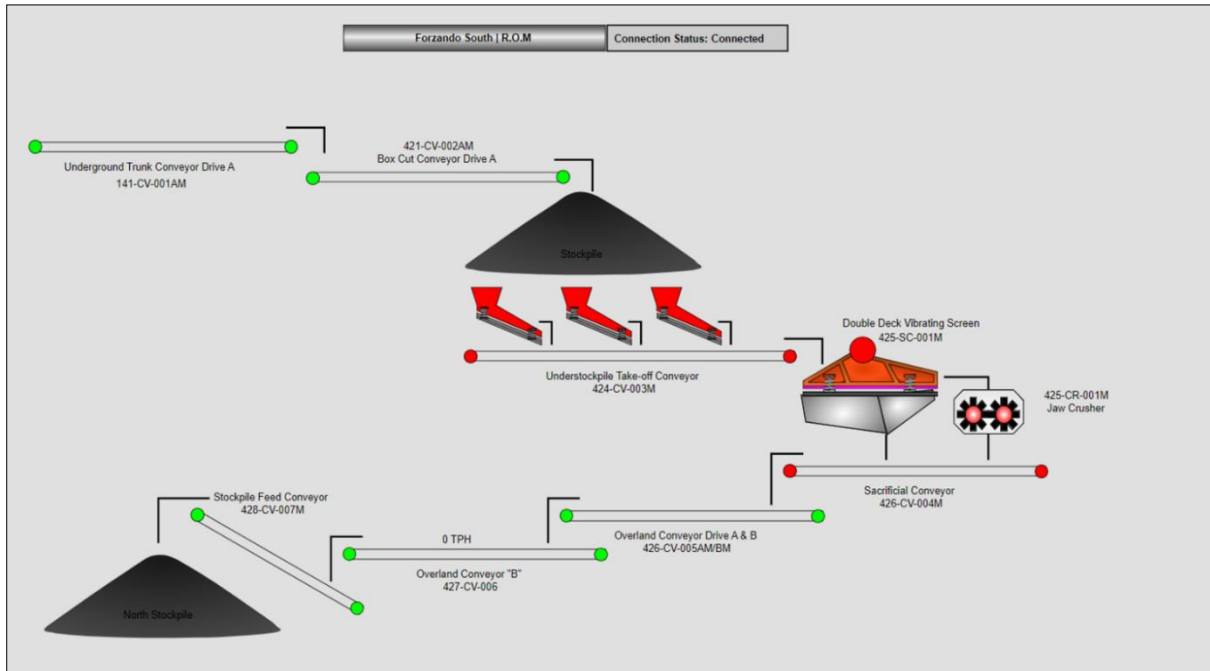


Figure 6: Forzando South ROM Coal Flow Diagram (Forzando Coal Mines (Pty) Ltd, 2023)

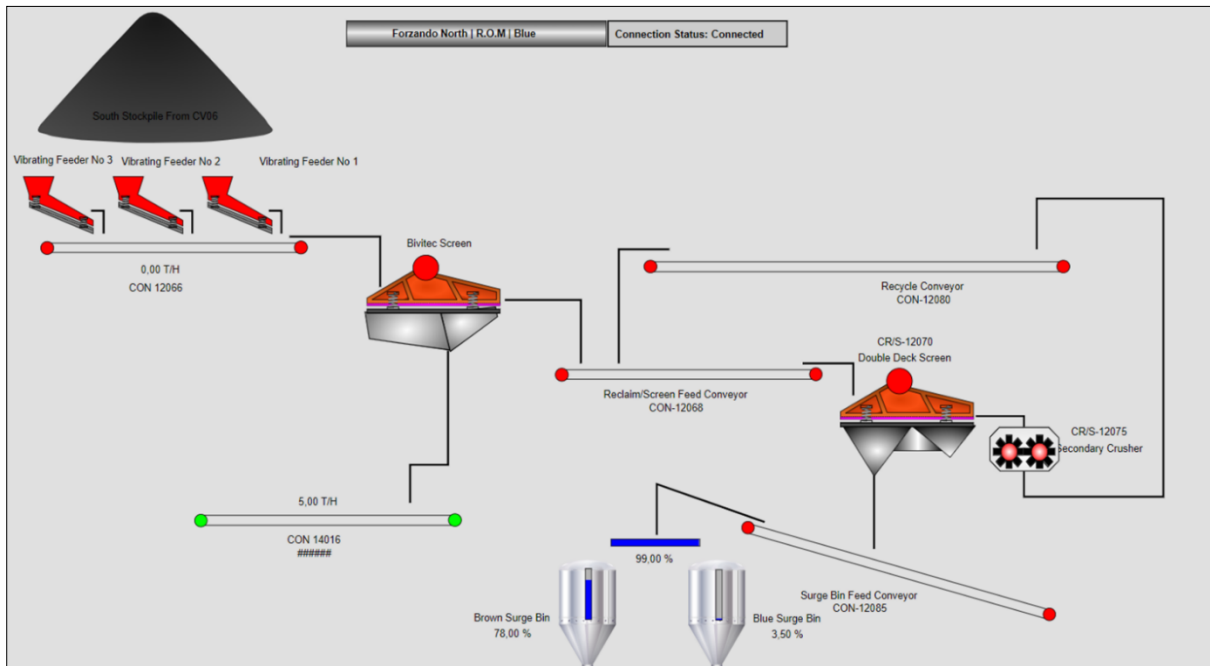


Figure 7: Blue Plant ROM Coal Flow Diagram (Forzando Coal Mines (Pty) Ltd, 2023)

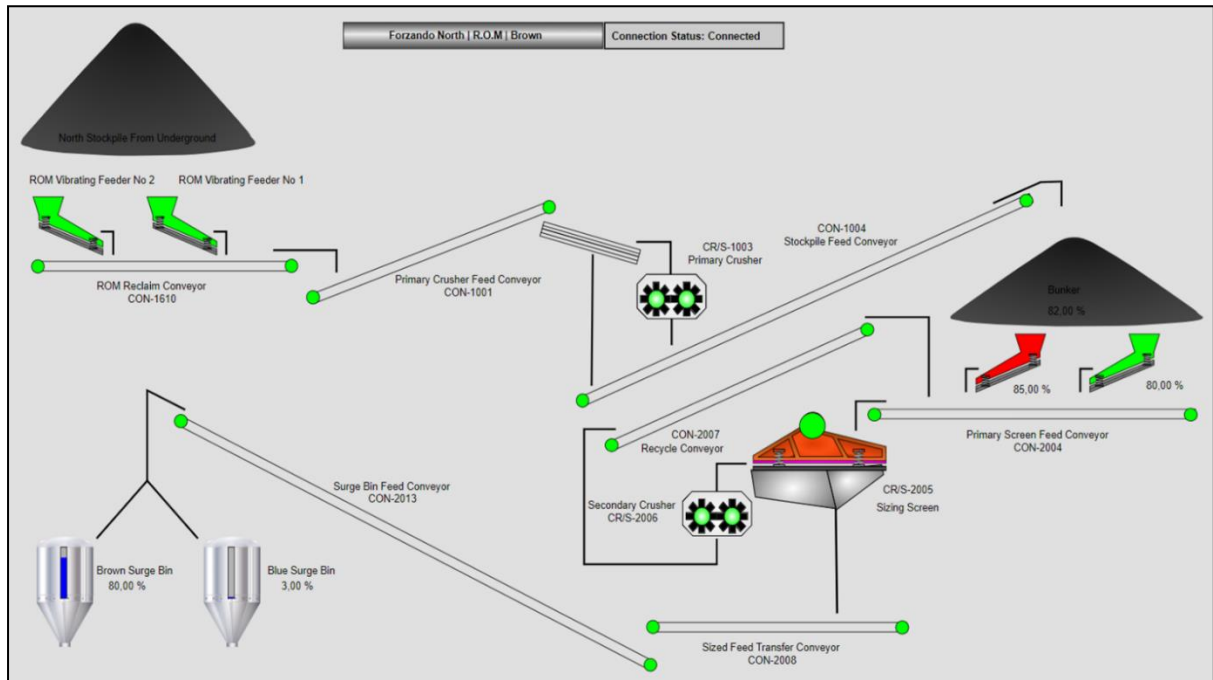


Figure 8: Brown Plant ROM Coal Flow Diagram (Forzando Coal Mines (Pty) Ltd, 2023)

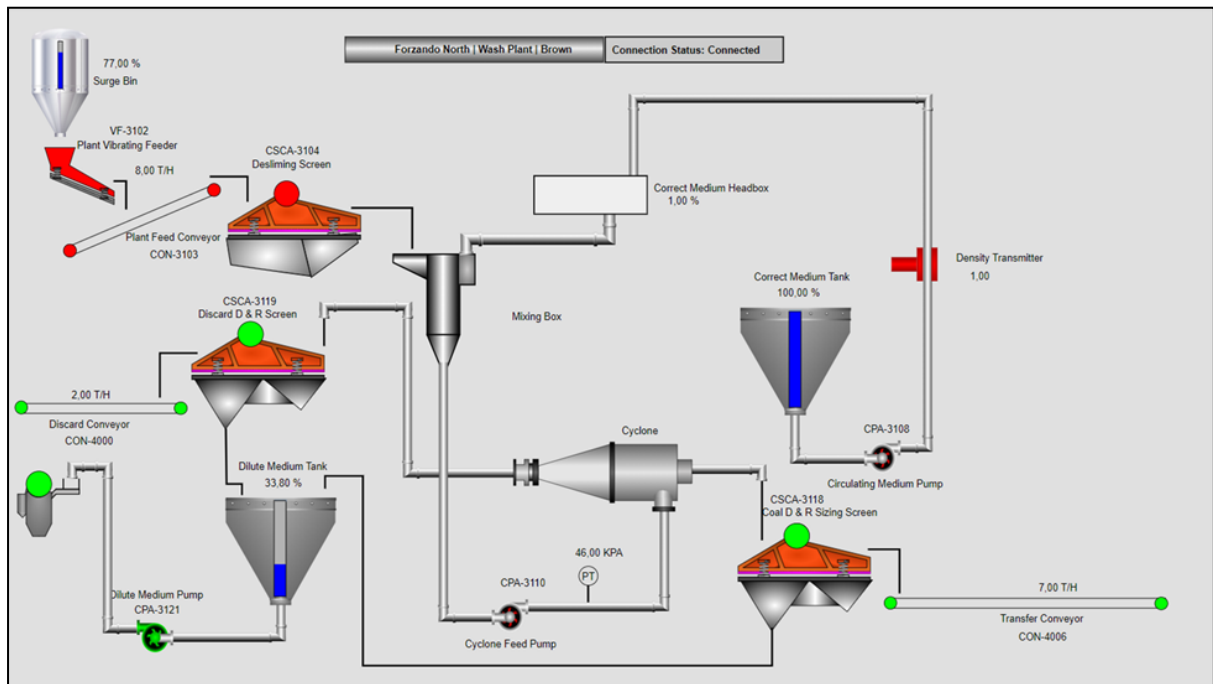


Figure 9: DMS Flow Diagram (Forzando Coal Mines (Pty) Ltd, 2023)

**Proposed Processing Plant:**

The proposed processing plant will be located at the existing Forzando North infrastructure area (Plan 8) and will consist of a RoM section for crushing and bypass system; and a single dense medium circuit. The RoM section will operate at 350t while the dense medium separator



(DMS) and bypass section will operate at 220t/h and 130t/h. The total designed capacity of the plant will be 2.2Mt of RoM per annum.

Live capacity of the RoM stockpile will be 24,000 tonnes with an emergency stockpile area of 8,000 tonnes. The RoM stockpile will be fed to the primary sizer and the undersize of the crusher will be fed to the vibrating screen feeder where the oversize will be crushed to 50mm and the undersize will form a bed for the secondary crusher. Both products will be fed to a bin at 350t/h. The feed from the RoM bin will be split into two, fed to DMS at 220t/h and RoM bypass at 130t/h.

The DMS consists of the following equipment: screens, two product cyclones, classifying cyclones, spirals and conveyors. The primary product will be stockpiled on a radial stockpile destined for export market through the Rapid Load Out Terminal (RLT) silo while the secondary product will be stockpile on a conical stockpile to be sold locally

The discard arising from the 220t/h module will be conveyed to the co-disposal dump (dump No. 3). Slurry from the thickener will also be pumped to the co-disposal dump.

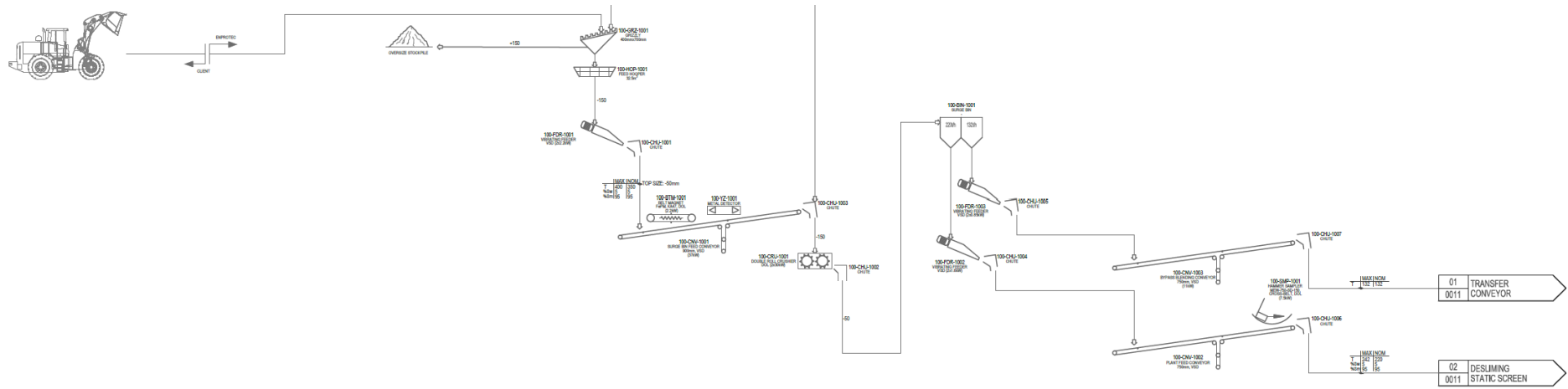
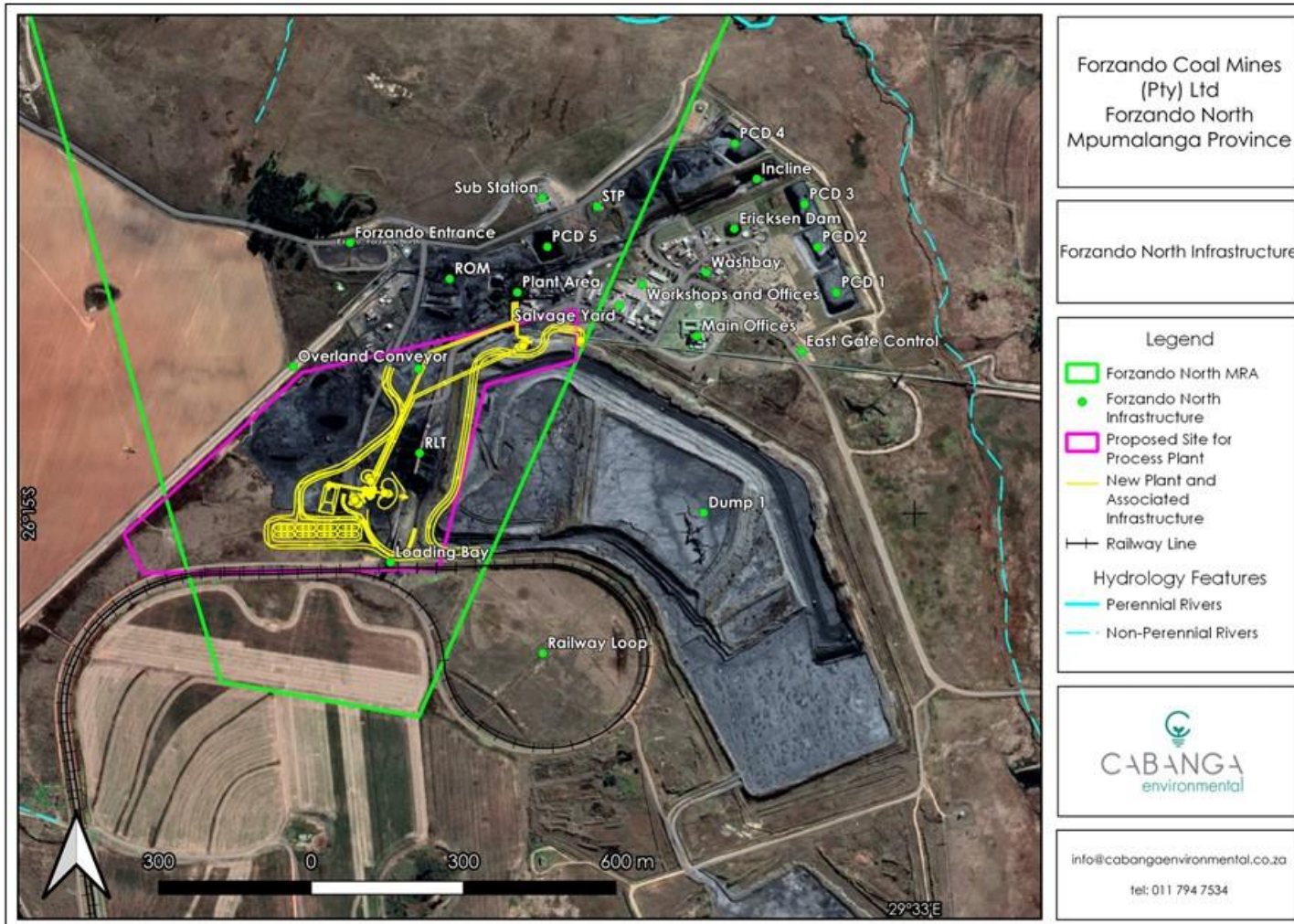


Figure 10: Process Diagram of the proposed plant (drawing supplied by Forzando Coal Mines (Pty) Ltd)



**Plan 8: Layout of the proposed processing plant**

## **4.5 Mine Residue Stockpiles and Deposits**

### **4.5.1 Non-carbonaceous Material**

Overburden from the construction of the existing boxcut has been stockpiled on site for reuse during decommissioning and closure phase.

### **4.6 Discard and Slurry**

Three discard dumps are associated with the Forzando North operations however, only one is currently operational (dump no. 3)<sup>7</sup>. This dump will continue to be utilised for the remaining LoM and no additional mine residue facilities are associated with the proposed Project.

Two waste streams are generated by the beneficiation process namely, slurry and discard. Coarse discard is and will continued to be conveyed from the plant area to the co-disposal discard dump. The discard stream from the new processing plant will tie into the existing discard conveyor.

Slurry is and will continue to be pumped to the co-disposal dump, via dedicated pumps and pipelines. However the development of the new processing plant will necessitate that an additional slurry pipeline be installed. This pipeline will be fixed to the existing discard conveyor and will be approximately 3,5km in length, with a diameter of 160mm and 22ℓ/second throughput.

## **4.7 Water Management, Supply and Reticulation**

### **4.7.1 Stormwater Management**

Clean and dirty stormwater is separated in terms of GN704 with clean water being diverted around the mine's infrastructure area and dirty water contained in the Pollution Control Dams (PCDs).

In total there are seven (7) PCDs located at the Mine, five (5) of which are located at the plant and infrastructure area as depicted in Figure 11; and two (2) located at the co-disposal discard dump (dump No. 3) (O.F.S Consulting (Pty) Ltd, 2020):

- PCD 1 has a confirmed storage capacity of 14 800m<sup>3</sup>. This dam has a small catchment area (workshop and wash bay area) and receives water from the Discard Dump No. 1 inflow canal.
- PCD 2 has a reported capacity of 8 000m<sup>3</sup>. This dam receives overflow water from PCD 1 and has a small catchments area. When full this dam overflows to PCD 3.
- PCD 3 has a reported capacity of 4 300m<sup>3</sup>. This dam receives runoff from the administration complex. This dam also receives overflow from PCD 2.
- PCD 4 has a confirmed capacity of 15 608m<sup>3</sup> and PCD 5 is 3 500m<sup>3</sup>, these dams receive dirty water runoff from the plant and coal stockpile area as illustrated in Figure 12. The most recent surface water management plan (O.F.S Consulting (Pty) Ltd, 2020)

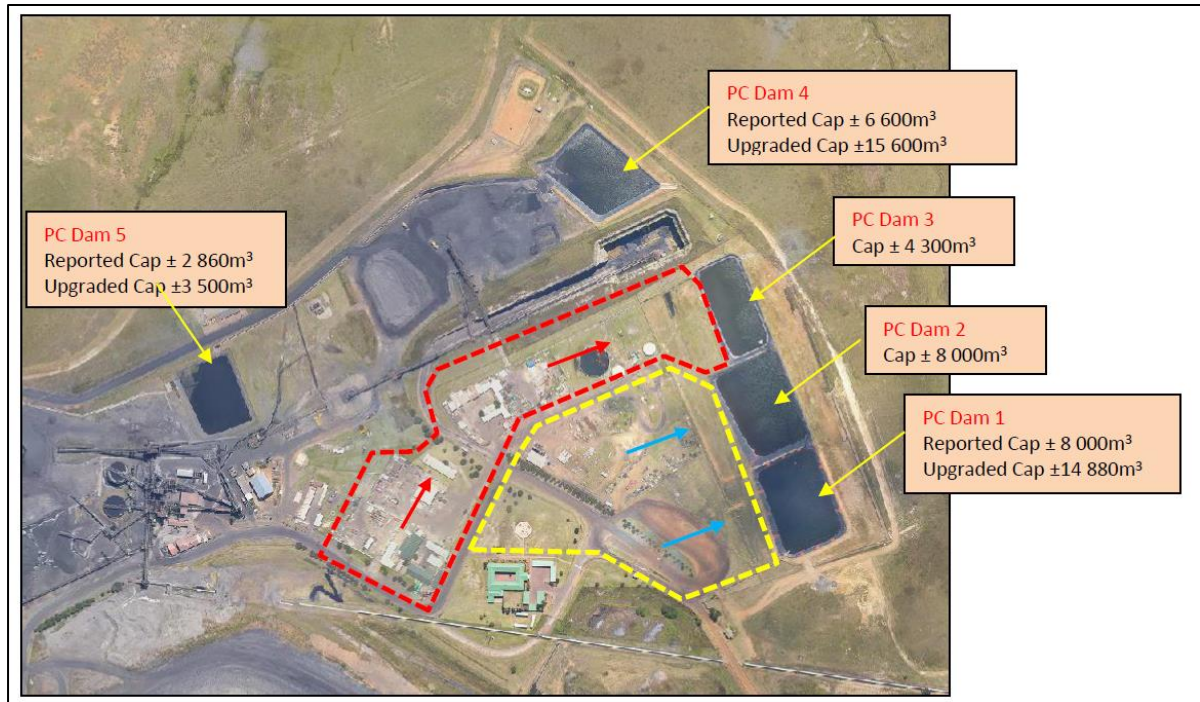
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<sup>7</sup> Discard dump no. 1 has been reclaimed with only the starter walls remaining. Discard dump no. 2 is currently being reclaimed.

proposes that a diversion channel be installed to divert some of the runoff away from these PCDs to PCDs 1 – 3.

- PCDs 6 and 7 serve as return water dams for the co-disposal discard dump (dump No. 3) and have a combined storage capacity of 74 790m<sup>3</sup>. Return water is pumped from here to PCD 1, where it is incorporated into the mine's water balance.

The proposed processing plant and stockpile extension area, associated with this application, will be developed within the catchment area of PCDs 4 and 5.



**Figure 11: PCDs 1 – 5 located at the plant and stockpile area (O.F.S Consulting (Pty) Ltd, 2020)**



**Figure 12: Catchment Areas of PCDs 4 and 5 (O.F.S Consulting (Pty) Ltd, 2020)**

#### **4.7.2 Potable Water**

Water for domestic and potable purposes is obtained from the Usuthu Vaal Scheme and treated via reverse osmosis at the onsite water treatment plant. The treated water is stored within the small Erikson Dams and Jojo Tanks from where it supplies potable water to the plant offices, workshop offices, change houses, and administration complex (O.F.S Consulting (Pty) Ltd, 2020).

The proposed project will not result in an increase in the number of employees and it is anticipated that the existing potable water supply will meet the capacity requirements. The current and future potable water requirements are summarised in Table 7 below.

**Table 7: Potable Water Requirements (Forzando Coal Mines (Pty) Ltd, 2023)**

Potable Water - Washrooms and Consumption		
Average Demand	Total Users / Day	4 200
Water Demand	Kilolitre / Cap / Day	0.008
Average Daily Demand	Kilolitre / Day	34
Peak Demand	Litres / Second	0.43
Offices	Kilolitre / Day	34
Total Potable	Kilolitre / Day	34
Contingency	%	10
Allow for	Kilolitre / Day	3.4

#### 4.7.3 Process Water

Water is recycled on site as far as possible and dirty water from the PCDs is prioritised for use within the processing plant(s), for use underground (coal cutting) and for dust suppression. Make water is obtained from the Usuthu Vaal Scheme, if and when required. The Mine is entitled to use a maximum of 600 000 m<sup>3</sup>/annum (50,000 m<sup>3</sup>/month) from the scheme. This water is stored within the big Erikson Dam (O.F.S Consulting (Pty) Ltd, 2020).

The process water demand for the operations are summarised in Table 8.

**Table 8: Process Water Requirements (Forzando Coal Mines (Pty) Ltd, 2023)**

Process Water Requirements		
Underground		
Minimum Demand	Kilolitre / Month	6 824.7
Maximum Demand	Kilolitre / Month	8 341.3
Average Demand	Kilolitre / Month	7 583
Peak Demand	Litres / Second	3.22
Dust Suppression (Water Cart)		
Minimum Demand	Kilolitre / Month	16 353.9
Maximum Demand	Kilolitre / Month	19 988.1
Average Demand	Kilolitre / Month	18 171
Peak Demand	Litres / Second	7.71
Existing Processing Plant		
Average Total	Kilolitre / Month	62 000
	Mega litres / Day	2.07
Maximum Total	Kilolitre / Month	75 000
	Mega litres / Day	2.5
Proposed Processing Plant		
Average Total	Kilolitre / Month	37 121
	Mega litres / Day	1.53
Maximum Total	Kilolitre / Month	40 833
	Mega litres / Day	1.68

## **4.8 Provision of Services**

### **4.8.1 Power Supply**

Eskom supplies power to the Forzando North operations. Electricity is distributed to the mine via a substation, mini-substation(s) and 11 kV overhead powerlines.

Additional overhead powerlines (11 kV) will be associated with the new processing plant and the proposed ventilations shafts, these will be between 2 – 7,5km in length. The powerlines will consist of wooden monopoles, no concrete foundations will be required. Construction will consist of drilling / auguring to a depth of approximately of 1,8m whereafter the pole will be placed and stabilised with infill material. The powerlines will follow the existing and proposed road servitudes.

### **4.8.2 Waste Management (non-mineralised waste)**

Waste streams generated at Forzando North include sewage waste, general domestic waste, and hazardous waste.

Sewage is managed via a system of conservancy tanks, from here it is piped to the existing sewage treatment plant (capacity of 45m<sup>3</sup>). Treated effluent water from the plant reports to PCD 4.

During the construction of the ventilation shafts, portable toilets will be provided. These will be serviced by a reputable contractor, the Environmental Control Officer (ECO) will be required to retain proof of safe and lawful disposal of sewage.

General domestic waste and hazardous waste bins are provided throughout the site to ensure separation of general and hazardous waste at source. Bins are emptied into skips on site (still separated as either general or hazardous waste), these are removed from site by contractors for disposal to relevant recyclers / landfill (as the case may be).

No landfill sites have/will be constructed on site.

## **4.9 Emissions**

No scheduled gaseous emissions will take place on site. Vehicles and machinery emit fumes but these will continue to be serviced and maintained regularly to keep these emissions within the relevant vehicle/machine's specifications.

Dust is and will continue to be monitored and managed on site to ensure these are within the standards set by the Department of Environmental Affairs (DEA) as well as that of the Mine Health and Safety Act, 1996 (MHSA).

## **4.10 Operating Hours**

Forzando North is operational 24-hours per day, 7 days per week, with scheduled shut-downs taking place for maintenance. The mine operates in various shifts.

## **4.11 Employment**

Currently one hundred and seventy one (171) people are permanently employed at Forzando North. The proposed Project is not expected to contribute to job creation, but rather focus on the retention of jobs by prolonging the remaining LoM.



#### **4.12 Timeframes for Implementation of the Project**

Construction activities are limited to the development of the proposed processing plant, 2 x ventilation shafts and associated infrastructure as described in the aforementioned sections. The construction phase is anticipated to take no more than 12 months to complete.

The mine is currently operational, the Project area annexation is intended to assist Forzando North to maintain production levels over its LoM with mining being scheduled to take place once the reserves at Forzando North are depleted (2028); extending the overall LoM by approximately 11 years (to 2039) (Forzando Coal Mines (Pty) Ltd, 2023).

Decommissioning and Closure activities are expected to take a further 5 years.

The Environmental Authorisation is being sought for a period of 22 years.

#### **4.13 Listed Activities Being Applied For**

The Department of Environmental Affairs (DEA) have published three notices which list activities for which environmental authorisation is required in terms of section 24(2) and 24D of NEMA, prior to commencement.

Furthermore, a list of waste management activities that have, or are likely to have, a detrimental effect on the environment were published in terms of section 19(2) of the NEMWA. No person may commence, undertake or conduct a listed waste management activity unless a WML is issued in respect of that activity.

The DMRE is the Competent Authority for mining related activities in terms of both NEMA and NEMWA. As such an integrated application has been submitted as per the One Environmental System.

The Listed Activities in terms of the NEMA EIA Regulations 2014 (as amended) pertaining to the proposed Project are indicated in the table overleaf.

No listed waste management activities are applicable to the Project.

**Table 9: Listed Activities Associated with the Project**

NAME OF ACTIVITY	EXTENT Ha or m <sup>2</sup>	LISTED ACTIVITY TRIGGERED	APPLICABLE LISTING NOTICE	ACTIVITY NO.	ACTIVITY DESCRIPTION	APPLICABILITY TO PROJECT
Clearance of vegetation, stripping and stockpiling of soils	2,5 Ha	X	GNR 983 Listing Notice 1	19	<p>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</p> <p>But excluding where such infilling, depositing, dredging, excavation, removal or moving –</p> <ul style="list-style-type: none"> <li>(a) will occur behind a development setback;</li> <li>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</li> <li>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</li> <li>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</li> </ul> <p>where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</p>	The stockpile expansion area, associated with the proposed plant, will encroach on a Seep wetland. Soil stripping activities will remove in excess of 10m <sup>3</sup> of soil.
			GNR 983 Listing Notice 1	27	<p>The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for –</p> <ul style="list-style-type: none"> <li>(i) The undertaking of a linear activity; or</li> <li>(ii) Maintenance purposes undertaken in accordance with a maintenance management plan.</li> </ul>	An area of ~ 2,5 Ha will be cleared for construction of the proposed plant, stockpile expansion area and ventilation shafts.
			GNR 983 Listing Notice 1	30	<p>Any process or activity identified in terms of Section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).</p>	<p>Section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) empowers the Minister to, by notice in the Gazette, identify any process or activity in a listed ecosystem as a threatening process.</p> <p>Section 53(2) of NEMBA states that "a threatening process identified in terms of subsection (1) must be regarded as a specified activity contemplated in section 24(2)(b) of the National Environmental Management Act and a listed ecosystem must be regarded as an area identified for the purpose of that section."</p> <p>Section 24(2)(b) of NEMA, in turn, refers to the identification of "geographical areas based on environmental attributes, and as specified in spatial development tools adopted in the prescribed manner by the Minister or MEC, with the concurrence of the Minister, in which specified activities may not commence without environmental authorisation from the competent authority;"</p> <p>In light of the legislation mentioned in the above paragraphs, the Project area falls within the Eastern</p>

NAME OF ACTIVITY	EXTENT Ha or m <sup>2</sup>	LISTED ACTIVITY TRIGGERED	APPLICABLE LISTING NOTICE	ACTIVITY NO.	ACTIVITY DESCRIPTION	APPLICABILITY TO PROJECT
						Highveld Grassland, which is listed as Endangered in the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022). Furthermore, as identified in this Table, the Project involves Activities identified in Listing Notice 3 of the EIA Regulations (with specific reference to the geographical areas identified in terms of 24(2)(b) of NEMA).  Therefore, development of the project involves the undertaking of listed activities in specified geographical areas, and is thus regarded an activity identified in terms of section 53(1) of the NEMBA.
			GNR 985 Listing Notice 3	12 (f) (i)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.  <b>f. Mpumalanga</b>  (i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;  (ii) Within critical biodiversity areas identified in bioregional plans; or  (iii) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning or proclamation in terms of NEMPAA.	The site falls within the Eastern Highveld Grasslands which is listed as Endangered in the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022).  An area of ~ 2,5 Ha will be cleared for construction of the proposed plant and ventilation shafts.
Operation of machinery and vehicle movement						
Presence of personnel onsite						
Extension of existing haul roads at the plant area (in already disturbed footprint area)	16,000m <sup>2</sup>	X	GNR 985 Listing Notice 3	18.f.i(cc) and (ee)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.  <b>f. Mpumalanga</b>  <b>(i) Outside urban areas:</b>  (aa) A protected area identified in terms of NEMPAA, excluding conservancies;  (bb) National Protected Expansion Strategy Focus Areas;  (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the Competent Authority;	Internal haul roads at the plant will be extended by approximately 2km. The roads will have a maximum width of 8m.  The Project area falls within the Olifants Environmental Management Framework, and within the Eastern Highveld Grasslands which is listed as Endangered in the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022).

NAME OF ACTIVITY	EXTENT Ha or m <sup>2</sup>	LISTED ACTIVITY TRIGGERED	APPLICABLE LISTING NOTICE	ACTIVITY NO.	ACTIVITY DESCRIPTION	APPLICABILITY TO PROJECT
					(dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation; or <b>(ii) Inside urban areas:</b> (aa) Areas zoned for use as public space; or; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purposes.	
Service tracks/access routes to the ventilation shafts	10,000m <sup>2</sup>	X	GNR 985 Listing Notice 3	4.f.i.(cc) and (ee)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. <b>g. Mpumalanga</b> <b>(ii) Outside urban areas:</b> (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (bb) National Protected Expansion Strategy Focus Areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the Competent Authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation; or <b>(iii) Inside urban areas:</b> (aa) Areas zoned for use as public space; or; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the	A service road will be required for each of the ventilation shafts. These roads will be unsurfaced "Jeep" tracks of between 4-5m wide and a maximum of 2 km long, accessed from existing farm roads. The Project area falls within the Olifants Environmental Management Framework, and within the Eastern Highveld Grasslands which is listed as Endangered in the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022). Furthermore, portions of the areas assessed for the ventilation shafts overlap with CBA2 and NPAES areas (Plan 22 - Plan 23).

NAME OF ACTIVITY	EXTENT Ha or m <sup>2</sup>	LISTED ACTIVITY TRIGGERED	APPLICABLE LISTING NOTICE	ACTIVITY NO.	ACTIVITY DESCRIPTION	APPLICABILITY TO PROJECT
					competent authority or zoned for a conservation purposes.	
Construction of the proposed Plant and expansion of existing stockpile area	Plant Footprint = 2 Ha Proposed expansion to the stockpile area = 2 Ha	X	GNR 983 Listing Notice 1	12	<p>The development of –</p> <p>(iv) Dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</p> <p>(v) infrastructure or structures with a physical footprint of 100 square metres or more;</p> <p>where such development occurs –</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; -</p> <p>excluding –</p> <p>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 of Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area;</p> <p>(ee) where such development occurs within existing roads, roads reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of the development and where indigenous vegetation will not be cleared.</p>	The stockpile expansion area, associated with the proposed plant will encroach on a Seep wetland. The stockpile area will have a footprint of approximately 2 Ha.
			GNR 983 Listing Notice 1	19	<p>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</p> <p>But excluding where such infilling, depositing, dredging, excavation, removal or moving –</p> <p>(e) will occur behind a development setback;</p> <p>(f) is for maintenance purposes undertaken in accordance with a maintenance management plan;</p>	The stockpile expansion area, associated with the proposed plant will encroach on a Seep wetland. Soil stripping activities will remove in excess of 10m <sup>3</sup> of soil.

NAME OF ACTIVITY	EXTENT Ha or m <sup>2</sup>	LISTED ACTIVITY TRIGGERED	APPLICABLE LISTING NOTICE	ACTIVITY NO.	ACTIVITY DESCRIPTION	APPLICABILITY TO PROJECT
					(g) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (h) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	
Raise bore drilling of 2x Ventilation Shafts, construction and installation of ventilation fans	5,000m <sup>2</sup> (2500m <sup>2</sup> each)	X	GNR 983 Listing Notice 1	12	The development of – (vi) Dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (vii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs – (d) within a watercourse; (e) in front of a development setback; or (f) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; - excluding – (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 of Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, roads reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of the development and where indigenous vegetation will not be cleared.	The areas assessed for the ventilation shafts overlap with several water resources. Dependant on the geology and final siting of the shafts, these may encroach on the water resources and/or their Regulated Zone.
			GNR 983 Listing Notice 1	19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	The areas assessed for the ventilation shafts overlap with several water resources. Dependant on the geology and final siting of the shafts, these may encroach on the water resources and/or their Regulated Zone. Soil stripping activities and earthworks will result in excess of 10m <sup>3</sup> being removed.

NAME OF ACTIVITY	EXTENT Ha or m <sup>2</sup>	LISTED ACTIVITY TRIGGERED	APPLICABLE LISTING NOTICE	ACTIVITY NO.	ACTIVITY DESCRIPTION	APPLICABILITY TO PROJECT
					<p>But excluding where such infilling, depositing, dredging, excavation, removal or moving –</p> <ul style="list-style-type: none"> <li>(i) will occur behind a development setback;</li> <li>(j) is for maintenance purposes undertaken in accordance with a maintenance management plan;</li> <li>(k) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</li> <li>(l) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</li> </ul> <p>where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</p>	
			GNR 985 Listing Notice 3	14 (ii) (a) (f) (i) (ff)	<p>The development of—</p> <ul style="list-style-type: none"> <li>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</li> <li>(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— <ul style="list-style-type: none"> <li>(a) within a watercourse;</li> <li>(b) in front of a development setback; or</li> <li>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</li> </ul> </li> </ul> <p><b>(f) Mpumalanga</b></p> <p>(i) Outside urban areas:</p> <ul style="list-style-type: none"> <li>(aa) A protected area identified in terms of NEMPAA, excluding conservancies;</li> <li>(bb) National Protected Area Expansion Strategy Focus areas;</li> <li>(cc) World Heritage Sites;</li> <li>(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</li> <li>(ee) Sites or areas identified in terms of an international convention;</li> <li>(ff) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</li> </ul>	<p>Portions of the areas assessed for the ventilation shafts overlap with CBA2 and NPAES areas (Plan 22 - Plan 23). These will have a combined footprint of 5,000m<sup>2</sup> (2500m<sup>2</sup> each).</p>

NAME OF ACTIVITY	EXTENT Ha or m <sup>2</sup>	LISTED ACTIVITY TRIGGERED	APPLICABLE LISTING NOTICE	ACTIVITY NO.	ACTIVITY DESCRIPTION	APPLICABILITY TO PROJECT
					(gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, where such areas comprise indigenous vegetation; or (ii) Inside urban areas: (aa) Areas zoned for use as public open space; or Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	
Operation of vent shafts & fans	5,000m <sup>2</sup> (2500m <sup>2</sup> each)					
Underground mining (incl. dewatering for the safe continuation of mining)	Prospecting Right Areas to be annexed: 1 482.6600 Ha	X	GNR 983 Listing Notice 1	21D	Any activity including the operation of that activity which requires an amendment or variation to a right or permit in terms of Section 102 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity contained in this Listing Notice or in Listing Notice 3 of 2014, required for such amendment.	An application has been made in terms of Section 102 of the MPRDA to expand the existing Mining Right Area at Forzando North Coal Mine (381MR) to incorporate contiguous areas currently held under the following Prospecting Rights: 17030PR, 15106PR, and 14478PR.
			GNR 983 Listing Notice 1	34	The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, excluding – (i) where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of Section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) In which case the National Environmental Management Waste Act, 2008 applies; (ii) the expansion of existing facilities or infrastructure for the treatment of effluent, wastewater, polluted water or sewage where the capacity will be increased by less than 15,000 cubic metres per day; or the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic metres or less per day.	The proposed expansion of the Mining Right Area, and associated dewatering will trigger additional Water Uses in terms of Section 21 of the National Water Act, Act 36 of 1998.
Coal handling and stockpiling incl. conveyances and the beneficiation process (operation of the plant)	Proposed expansion to the stockpile area = 2 Ha	X	GNR 983 Listing Notice 1	34	The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, excluding –	The installation of the proposed processing plant will necessitate the need to expand the existing coal stockpile area. This will trigger additional Water Uses in terms of Section 21 of the National Water Act, Act 36 of 1998.



NAME OF ACTIVITY	EXTENT Ha or m <sup>2</sup>	LISTED ACTIVITY TRIGGERED	APPLICABLE LISTING NOTICE	ACTIVITY NO.	ACTIVITY DESCRIPTION	APPLICABILITY TO PROJECT
					<p>(iii) where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of Section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) In which case the National Environmental Management Waste Act, 2008 applies;</p> <p>(iv) the expansion of existing facilities or infrastructure for the treatment of effluent, wastewater, polluted water or sewage where the capacity will be increased by less than 15,000 cubic metres per day; or</p> <p>the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic metres or less per day.</p>	
Mine residue handling and disposal: discard and slurry will be disposed of onto the existing, licensed discard dump						No new mine residue facilities will be constructed. The existing licensed dump will continue to be used for the LoM.
Installation and operation of the slurry pipeline	The slurry pipelines associated with the processing plant will have 160mm diameter and 22l/second throughput, and approximately 3,5km in length					The slurry pipeline will be attached to the existing discard conveyor. No new areas will be disturbed.
Installation and operation of water reticulation pipelines	The pipelines associated with the processing plant will have 200mm diameter and 50l/second throughput. <2km in length					Additional reticulation pipelines will be associated with the proposed plant. These will be located within the Mine's existing infrastructure area. No new areas will be disturbed.
Installation and operation of electricity distribution infrastructure	11kV 2 – 7,5km in length					Electricity is supplied to the mine's infrastructure area by Eskom via the existing Ysterkop substation. Distribution to the processing plant and ventilation shafts will be via 11kV powerlines – no environmental authorisation is required.
Refuse and waste management						Waste generated by the plant personnel will feed into the existing waste streams.
Maintenance and operation of existing Mine infrastructure and facilities						Continued use of existing ancillary infrastructure such as the administration complex, change houses, lamp rooms, parking, workshops, stores, weighbridges, wash bays etc
Storage and use of dangerous goods / Hazardous Substances						Forzando North has a separate environmental authorisation for the storage of up to 80m <sup>3</sup> .

NAME OF ACTIVITY	EXTENT Ha or m <sup>2</sup>	LISTED ACTIVITY TRIGGERED	APPLICABLE LISTING NOTICE	ACTIVITY NO.	ACTIVITY DESCRIPTION	APPLICABILITY TO PROJECT
Operation and maintenance of the existing stormwater management system						Dirty water from the proposed plant and associated stockpile area will drain to the existing PCDs.
Water use	The proposed plant will use a maximum of 40 833 m <sup>3</sup> / month	X	GNR 983 Listing Notice 1	34	<p>The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, excluding –</p> <p>(v) where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of Section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) In which case the National Environmental Management Waste Act, 2008 applies;</p> <p>(vi) the expansion of existing facilities or infrastructure for the treatment of effluent, wastewater, polluted water or sewage where the capacity will be increased by less than 15,000 cubic metres per day; or</p> <p>the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic metres or less per day.</p>	The installation of the proposed processing plant will necessitate the need to expand the existing coal stockpile area. This will trigger additional Water Uses in terms of Section 21 of the National Water Act, Act 36 of 1998.
Sealing and closure of underground portal. Backfilling of boxcut adit. Removal of surface infrastructure and general rehabilitation. Decommissioning and Closure of Mine	Current and proposed surface activities affects~300 Ha The Project will extend the LoM to 2039					It is noted that the intended closure of any facilities, structures, or infrastructure associated with a Listed Activity will in turn trigger Listing Notice 1, Activity No. 31. However, as there is approximately 16 years LoM remaining this has been excluded from this application.

## 5 POLICY & LEGISLATIVE CONTEXT

Section 24 of the Constitution of the Republic of South Africa states that:

*Everyone has the right to (a) an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –*

- *Prevent pollution and ecological degradation;*
- *Promote conservation; and*
- *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*

To give effect to Section 24 of the Constitution, several laws have been promulgated towards realisation of these rights. This section describes the key legislation, policies, plans, guidelines and development planning frameworks and tools and their relevance to the proposed Project.

### 5.1 Mineral and Petroleum Resources Development Act, 2002 (MPRDA)

The MPRDA (Act No. 28 of 2002) and its Regulations (GNR527, 23 April 2004 as amended by: GNR R1288 dated 29 October 2004; GNR1203 dated 30 November 2006; and GNR349 dated 18 April 2011) is the predominant legislation dealing with the acquisition of rights to search for, extract and process mineral resources in South Africa. The MPRDA came into effect on 1 May 2004. The MPRDA holds that mineral resources in South Africa belong to the Nation and that the State is the custodian thereof.

Any person may apply for a mineral right by following the application procedure set out in the MPRDA and administrated by the DMRE. Applications for rights must be accepted if the application requirements are met, and if no other person holds a prospecting right, mining right, mining permit or retention permit for the same mineral on the same land. The MPRDA further states that nobody may prospect or mine without environmental authorisation (Section 5A) in terms of the NEMA.

Section 102 of the MPRDA further states that :

*A reconnaissance permission, prospecting right, **mining right**, mining permit, retention permit, technical corporation permit, reconnaissance permit, exploration right and production right work programme; **mining work programme, environmental management programme, and environmental management plan** may not be amended or varied (**including by extension of the area** covered by it or by the addition of minerals or a share or shares or seams, mineralised bodies, or strata, which are not at the time the subject thereof) without the written consent of the Minister.*

Forzando Coal Mines (Pty) Ltd has submitted an application in terms of Section 102 to amend their Mining Right (381MR) and EMPr in terms of Section 102 of the MPRDA on 21 March 2023. The application relates to the extension of the existing MRA by inclusion of contiguous areas which are held under Prospecting Rights 17030PR, 15106PR and 14478PR.

## **5.2 Mining Charter, 2018**

Section 100(2)(a) of the MPRDA empowers the Minister to develop a Broad-Based Black Economic Empowerment (BBBEE) Charter for the South African Mining and Minerals Industry ("Mining Charter") as a regulatory instrument.

One of the objectives of the MPRDA and Mining Charter is to ensure the attainment of Government's objectives to redress historical socio-economic inequalities, to ensure broad-based economic empowerment and the meaningful participation of Historically Disadvantaged Persons in the mining and minerals industry.

The first Mining Charter was published in 2004. The Mining Charter was amended in 2010 to streamline and expedite the attainment of its objectives. Further shortcomings of the previous Charter were identified and Government initiated another review process in 2015, culminating in the publication of the latest Mining Charter, 2018.

The Mining Charter also prescribes allocation of benefits to host communities in accordance with an approved host community development programme, in addition to the Social and Labour Plan (S&LP) requirements as per Section 23 of the MPRDA. Further to the direct benefits accruing to historically disadvantaged South Africans by the implementation of elements of the Mining Charter (including ownership, employment equity and Human Resources Development), Mines are also now obligated to meet certain BBBEE targets in terms of procurement, supplier and enterprise development.

Forzando Coal Mines (Pty) Ltd is a Level 1 BBBEE contributor with 100% black ownership.

## **5.3 Other Mining Legislation**

Regulation 17(8) of the Mine Health and Safety Act, 1996, (MHSA) Regulations state that "no person may erect, establish or construct any buildings, roads, railways, dams, waste dumps, reserve land, excavations or any other structures whatsoever within a horizontal distance of 100 (one hundred) metres from workings, unless a lesser distance has been determined safe by a professional geotechnical specialist and all restrictions and conditions determined by him or her or by the Chief Inspector of Mines are complied with."

There are several other pieces of legislation which deal with issues such as royalties (the Mineral and Petroleum Resources Royalty Act, 2008), title registration (the Mining Titles Registration Act, 1967), and MHSA. These issues constitute specialist fields on their own and will not be discussed in further detail.

Sections of the MPRDA have been amended to make the Minister of Mineral Resources the responsible authority for implementing environmental matters in terms of the NEMA as it relates to mining and prospecting operations and incidental activities, and to align the MPRDA with NEMA.

## **5.4 The National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA)**

The NEMA, as amended was set in place in accordance with Section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that the potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the

environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity.

The EIA Regulations, Government Notice Regulation (GN R) 1 982 were published on 04 December 2014 and promulgated 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). The NEMA EIA Regulations, 2014 and Listing Notices have been amended numerous times.

The undertaking of Listed Activities in terms of the EIA Regulations requires Environmental Authorisation to be obtained. There are new Listed Activities associated with the proposed Project, as summarised in Table 9. These Activities are identified in terms of Listing Notice No. 1 and 3 of the EIA Regulations 2014 (as amended), a Basic Assessment Process is therefore relevant to the application. The EIA Regulations further set out the requirements for reporting, timeframes, public participation and specialist reports.

An application for EA was submitted for Listed Activities associated with the Project, as required in terms of the NEMA and the EIA Regulations, 2014 (as amended).

This report constitutes the final BAR, and is submitted to the DMRE for consideration.

### **5.5 National Environmental Management Waste Act,**

Regulations to the NEMWA identifies a number of activities (Category A and B) which require a WML prior to being undertaken. The establishment of a residue stockpile or residue deposit resulting from activities which require a mining right in terms of the MPRDA is an activity which requires a Waste Management License (WML) in terms of the NEMWA. It is noted, however that the Forzando North Coal Mine already has an approved Mining Right and EMPr and that an EMPr approved in terms of the MPRDA shall be deemed to have been approved and issued in terms of the NEMWA (according to the transitional provisions of GN.R 633 – Amendments to the List of waste management activities that have or are likely to have a detrimental effect on the environment).

Activities identified in Category C of the NEMWA Regulations (GN R 921) do not require a WML, but must comply with the relevant requirements or standards determined by the Minister. The Norms and Standards for Storage of Waste, published under Government Notice R.926 in Government Gazette 37088 of 29 November 2013 are relevant to the operations at Forzando North Coal Mine. These Norms and Standards have been incorporated into the EMPr where applicable.

As the DMRE does not have a formal registration system for waste storage facilities, approval of the EMPr will be regarded as registration in terms of the Norms and Standards for the Storage of Waste unless instructed otherwise by the DMRE.

### **5.6 National Water Act, 1998 (NWA)**

The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial

use of water in the public interest, and that a person can only be entitled to use water if the use is permissible in terms of Section 22 of the NWA.

Forzando Coal Mines (Pty) Ltd has an approved Water Use License (WUL) (License number: 04/B11A/BCGIJ/1664) which authorises the following water uses at the Mine:

- Section 21 (b): Storage of water;
- Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse;
- Section 21 (g): Disposing of waste in a manner that could detrimentally impacts on a water resource; and
- Section 21 (j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

In addition to the above, Forzando Coal Mines (Pty) Ltd has a separate authorisation (31/177/96) for the abstraction of water from the Usuthu-Vaal Government Water Scheme.

Additional water uses will be associated with the Project, as such it is anticipated that a new application will be submitted to the DWS in due courses.

Specific regulations made in terms of Section 26(1) of the NWA pertain to the use of water for mining and related activities. The provisions of GN R704 have been incorporated into the design of the proposed Project, where possible. Where the implementation of provisions of GN R 704 is not possible, an application for exemption will be made as per Regulation 3 of GN R 704.

Regulation 2 of GN R 704 stipulates this Mine's obligations in terms of notifications to the DWS, if changes take place at the Mine, or if incidents occur. These provisions have been incorporated into the EMPr and associated emergency response plan and communication protocols, furthermore DWS has been notified of the proposed Project via the PPP.

## **5.7 National Environmental Management Air Quality Act, 2004 (NEMAQA)**

According to the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEMAQA) the DFFE, 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 NEMAQA. A fundamental aspect of the new approach to the air quality regulation, as reflected in the NEMAQA is the establishment of National Ambient Air Quality Standards (NAAQS) (GN R 1210 of 2009). 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.

Activities that are identified in GN 893 require an Atmospheric Emissions License (AEL) to be issued in terms of NEMAQA. No such activities are associated with the proposed project and an AEL will not be required.

GN1123 declared the Highveld Priority Area (HPA) in terms of the NEMAQA. The HPA Air Quality Management Plan (AQMP) was published in GN144. The proposed Project area falls within the HPA and thus must comply with the AQMP. Specific measures have been included in the EMPr, along with specific requirements for prevention and management of dust and emissions, and relevant monitoring and reporting requirements. An Air Quality Impact Assessment (AQIA) was completed for the Project, and is attached as Appendix F 10.

GN701 declared greenhouse gases as priority air pollutants. The greenhouse gas reporting regulations (GN275) identifies Mining and Quarrying as one of the industries who must report their Greenhouse Gas Emissions to the competent authority. Forzando Coal Mines (Pty) Ltd is registered and submits their emissions on an annual basis via the South African Greenhouse Gas Emissions Reporting System (SAGERS). A Climate Change Impact Assessment has been completed for the Project and is attached as Appendix F 1.

The National Atmospheric Emission Reporting Regulations, 2015 identifies all mines as a Group C Emission Source, and requires the Mine to report to the National Atmospheric Emissions Information System (NAEIS) on their dust, PM<sub>10</sub> and PM<sub>2.5</sub> emissions on an annual basis.

### **5.8 National Environmental Management: Protected Areas Act, 2003 (NEMPAA)**

The National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003) (NEMPAA) (as amended) provides for the protection and conservation of ecologically viable areas of South Africa's biological diversity, natural landscapes and seascapes. It further provides for the establishment of a register of protected areas (SAPAD), the management of those areas and for intergovernmental co-operation and public consultation in matters concerning protected areas.

The Rietvlei Private Nature Reserve is situated ~30 km south-east of the Project area and the Heyns Private Nature Reserve is situated ~31.5 km north-west of the Project area (TBC, 2023d).

### **5.9 National Protected Areas Expansion Strategy (NPAES)**

The Department of Environmental Affairs (now DFFE) led the development of the National Protected Areas Expansion Strategy (NPAES) in consultation with the protected area agencies and other key private and public sector stakeholders. South Africa's protected area network currently falls far short of representing all ecosystems and maintaining healthy functioning ecological processes. In this context, the goal of the NPAES is to achieve cost effective protected area expansion, thus enabling better ecosystem representation, ecological sustainability, and resilience to climate change. A comprehensive set of priority areas was compiled based on the priorities identified by provincial and other agencies in their respective protected area expansion strategies. These focus areas are generally large, intact and unfragmented and are, therefore, of high importance for biodiversity, climate resilience and freshwater protection. The Project Area overlaps with priority focus areas for expansion according to the 2018 NPAES dataset (TBC, 2023d).

### **5.10 National Environmental Management Biodiversity Act, 2004 (NEMBA)**

The NEMBA provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA. The Act relates to the protection of species and ecosystems that warrant national protection, among others.

Certain Fauna and Flora Species of Conservation Concern (SCC) are known to occur in the area, a Terrestrial Biodiversity Assessment was completed (TBC, 2023d), which study identified at least five plant species provincially protected in terms of the Mpumalanga Nature Conservation Act, 1998 (No. 10 of 1998) onsite.

Due to extensive mining, agriculture and other ecological disturbance in the wider region alien invasive species are considered a threat to the biological diversity of surrounding areas. Alien invasive management has been incorporated into the EMPr.

### 5.11 Conservation of Agricultural Resources Act, 1983 (CARA)

CARA provides for control over the utilisation of the natural agricultural resources of the Republic to promote the conservation of soil, water sources and vegetation and the combating of weeds and invader plants.

A soil and agricultural potential study was undertaken by The Biodiversity Company (TBC, 2023a) for the proposed Project. The most sensitive soil forms (Ermelo, Carolina, Avalon and Westleigh soil forms) identified within the Project area, depending on clay percentage, depth, rock percentage and surface crusting have been assigned to land capability classes II, III, and IV. These classes have then been assigned to land potential classes L3 and L4 given the climatic and land capability conditions. The classified land potential classes are associated with arable lands and can be used for rotation crops and long-term leys (TBC, 2023a).

### 5.12 National Heritage Resources Act, 1999 (NHRA)

The NHRA aims to promote good management and preservation of the country's heritage resources. The NHRA requires (Section 38) that a person who intends to undertake certain types of activities (including developments that will change the character of a site, and development of roads, pipelines or powerlines exceeding 300m in length among others), must notify the responsible Heritage Authority of such development proposal and furnish such information that the Authority may require.

The South African Heritage Resources Agency (SAHRA) and Mpumalanga Provincial Heritage Resources Agency (MPHRA) have been notified of the proposed Project via the South African Heritage Resources Information System (SAHRIS).

A Heritage / Archaeological impact assessment was completed for the proposed operations in (see Appendix F 8). Heritage resources have been identified on site. It is anticipated that these can be preserved *in-situ* as they will not be directly affected by any surface infrastructure.

### 5.13 Other relevant Legislation

In addition to the Laws and Guidelines discussed above, Table 10 summarises some of the other key legislation and guidelines relevant to this application:

**Table 10: Other Relevant Legislation and Guidelines**

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW THIS DEVELOPMENT COMPLIES WITH THE LEGISLATION AND GUIDELINES
NEMA: Public Participation Guidelines (GNR807). Department of Environmental Affairs (2017), Public Participation guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa.	Guidelines have and will continue to be followed during the Public Participation Process (PPP).



APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW THIS DEVELOPMENT COMPLIES WITH THE LEGISLATION AND GUIDELINES
DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa	The Guideline was considered in assessing the need and desirability (Section 6) of the Project aspects.
Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute, 2013. Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria	The Mining and Biodiversity Guideline was considered and acknowledged in the compilation of the BAR and EMPr.
Spatial Land Use and Management Act, 2013 (Act No. 16 of 2013) (SPLUMA)	SPLUMA aims to develop a framework to govern planning permissions and the lawful use of land. As the Project Area will be mined via underground methods, no change in Land Use is proposed with the exception of the areas proposed for the ventilation shafts (5000m <sup>2</sup> ).
Restitution of Land Rights Act, 1994, the Land Reform (Labour Tenants) Act, 1996 and the Extension of Security of Tenure Act, 1997.	Consultation with the Land Claims Commissioner has been initiated (See Appendix E for proof of consultation). To date no response has been forthcoming. If it is confirmed that there are land claims on the affected properties, the Applicant will consult with the land claimants.
Local Government Municipal Systems Act, 2000 (Act No. 32 of 2000) as amended	The Act requires local government to compile a Spatial Development Framework (SDF) which must include the provision of basic guidelines for a land use management system for the municipality. The objectives of an SDF are to promote sustainable functional and integrated human settlements, maximise resource efficiency, and enhance regional identity and unique character of a place. In addition, Municipalities are required to develop Integrated Development Plans (IDPs) which is a government co-ordinated approach to planning that seeks to ensure the economic and social enhancement of all within their jurisdiction. It provides a land use framework, considers infrastructure development, and the protection of the environment.
Development Facilitation Act, 1995 (Act No. 67 of 1995)	<p>The Act promotes the integration of the social, economic, institutional and physical aspects of land development and also promotes integrated land development in rural and urban areas in support of each other.</p> <p>The Act encourages the availability of residential and employment opportunities in close proximity to or integrated with each other, while optimising the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities.</p>
The Subdivision of Agricultural Land Act, 1970 (Act 70 of 1970)	The Subdivision of Agricultural Land Act, 1970 (Act 70 of 1970) controls the subdivision and use of agricultural land. Portions of the development footprint traverse land used for agricultural

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW THIS DEVELOPMENT COMPLIES WITH THE LEGISLATION AND GUIDELINES
	<p>purposes. Land with high-value agricultural potential should be protected and not sub-divided or fragmented into smaller portions that would threaten the viability of agricultural activities. Sub-division of agricultural land requires the consent of the Minister of Agriculture, and the registration of servitudes over agricultural land also requires Ministerial Consent, except for (Section 6A(1)(a) a "servitude for the conducting of electricity with a width not exceeding 15 metres". Potential impacts of the proposed project on agricultural land are assessed in Section 11.3.3</p>
<p>NEMA Regulations pertaining to the financial provision for prospecting, exploration, mining or production activities (GNR1147 –20 November 2015) (as amended).</p>	<p>Financial Provision has been calculated (Section 13) and will be provided for by means of a Guarantee.</p>
<p>National Road Traffic Act, Act No. 93 of 1996 and National Land Transport Act, Act No. 5 of 2008</p>	<p>These Acts relate specifically to the planning and development of transport systems and the safe use of roads.</p> <p>Additional traffic will be generated during the construction phase as equipment and machinery is brought onto site for the development of the new plant and ventilation shafts. However this is expected to be limited to ~40 trips. Once construction is complete the traffic levels are anticipated to revert to the current low intensity levels. Thus, it was not deemed necessary to undertake any additional transport or traffic studies.</p>
<p>Hazardous Substances Act, 1973 (Act No 15 of 1973)</p>	<p>The Hazardous Substances Act provides for the control of hazardous substances (sub-divided into four groups) defined as any substance that by their nature are toxic, corrosive, irritant, flammable, sensitising or pressure generating, which may cause ill-health, injury or death in humans.</p> <p>Minimum requirements for hazardous substances associated with the project have been incorporated into the EMPr.</p>
<p>Mpumalanga Tourism and Parks Agency Act, Act No. 5 of 2005 (MTPA Act)</p>	<p>The Mpumalanga Nature Conservation Act was considered, management measures to protect natural fauna and flora in line with the Act have been included in the EMPr where relevant.</p>
<p>Environmental Conservation Act, 1989 (Act No 73 of 1989) (ECA) and Govan Mbeki Local Municipality Nuisance bylaws</p>	<p>Noise Control Regulations were promulgated in terms of the ECA, to set out the powers of local authorities to control noise, define legal prohibitions relating to noisy activities and define and prohibit noise nuisance.</p> <p>Govan Mbeki Local Municipality has published a nuisance bylaw which (among others) prohibits noise disturbance, but does not set out specific noise limits (<a href="http://www.govanmbeki.gov.za/wp-content/Bylaws/bylaw_nuisance.pdf">http://www.govanmbeki.gov.za/wp-content/Bylaws/bylaw_nuisance.pdf</a>).</p>
<p>Procedures for the Assessment and Minimum Criteria (National Gazettes, No. 43110 of 20 March, 2020)</p>	<p>Specialist Reports (Appendix F) have been compiled in line with the protocols and minimum requirements, where applicable.</p>

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW THIS DEVELOPMENT COMPLIES WITH THE LEGISLATION AND GUIDELINES
The Explosives Act ,1956 (as amended)	<p>The Explosives Act relates to the manufacture, storage, sale, transport, import, export and use of explosives.</p> <p>The Project will be mined via mechanised underground methods, blasting will only be required in stone works (i.e. mining through dykes and faults). As such there are no surface influences pertaining to air blast and fly rock. Similarly to the existing operations, blasting is expected to be small with insignificant or no influence on surface. No specific impact is expected regarding ground vibration on the surface areas (Blast Management &amp; Consulting, 2019).</p> <p>Explosives will be handled and stored in accordance with the Explosives Act and MHSA. The existing Magazine located at Forzando North will continue to be utilised for the LoM.</p>

## 6 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

The DEA (now DFFE) published an updated Integrated Environmental Management Guideline on Need and Desirability in 2017.

According to these guidelines, the consideration of “need and desirability” decision-making requires the consideration of the strategic context of the proposed Project along with the broader public interest and societal needs. Furthermore, the development must not exceed ecological limits and the proposed actions must be measured against the short-term and long-term public interest to promote justifiable social and economic development.

The latest Guideline Document on the assessment of Need and Desirability (DEA, 2017a)) includes a number of questions, the answers to which should be considered in the BAR Process. These questions (as per the Guideline) have been summarised and grouped and answers to each are presented in Table 11.

**Table 11: Need and Desirability Motivation**

Theme	Specific Questions	Answer related to this Application
"Securing ecological sustainable development and use of natural resources"	How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	A detailed impact assessment is presented in Section 11.3 of this Report.
	How were the following ecological integrity considerations considered? <ul style="list-style-type: none"> <li>• Threatened and sensitive Ecosystems</li> <li>• Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)</li> <li>• Conservation targets</li> </ul>	<p>The proposed Project Area is located within the Eastern Highveld Grassland national vegetation type which is listed as Endangered on the revised national list of ecosystems that are Threatened and in need of protection (DFFE, 2022). The Eastern Highveld Grassland has conservation target of 24%, approximately 44% has been transformed primarily through cultivation, plantations, mining, urbanisation and the building of dams (Mucina &amp; Rutherford, 2006). This grassland habitat unit is interspersed with water resource habitat units (predominantly made up of wetlands). Despite the levels of disturbance present, these habitats still maintain their functional integrity and contribute to valuable ecosystem services. (TBC, 2023d).</p> <p>According to the Mpumalanga Biodiversity Sector Plan dataset (2022), the Project Area overlaps with CBA Optimal (CBA2), other natural areas, moderately modified and heavily modified areas (TBC, 2023d).</p> <p>No infrastructure or surface activities is proposed for the Mining Right annexation area, these reserves will be accessed via the existing underground workings.</p> <p>The footprint of the proposed plant will largely be located within the Mine's current infrastructure footprint with a very low Site Ecological Importance (SEI) however, the proposed expansion of the stockpile area will transgress into areas of Medium – High SEI (TBC, 2023d).</p> <p>The areas assessed for the ventilation shafts overlapped areas of Low – High SEI, with portions of the area comprising the vulnerable Eastern</p>

Theme	Specific Questions	Answer related to this Application
	<p>Highveld Grassland, some of which fall within CBA 2 areas. It is anticipated that the ventilation shaft can be placed to avoid areas with High SEI.</p>	
	<p>How does the proposed development respond to the relevant framework documents?</p> <ul style="list-style-type: none"> <li>• Environmental Management Framework,</li> <li>• Spatial Development Framework</li> <li>• Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).</li> </ul>	<p>The Mpumalanga Spatial Development Framework (SDF) (MPSDF, 2019) mentions mining as the predominant Regional Spatial Development Initiative in the area where the site is located. Mining and Energy-related development is identified as one of nine key drivers of the Mpumalanga Vision 2030, and states the following: "Infrastructure investment aimed at enhancing the mining and electricity industry should be consolidated in the western Highveld of Mpumalanga where the vast majority of coal mines and power stations are located. In areas such as eMalahleni, Steve Tshwete, Standerton and Secunda" (MPSDF, 2019).</p> <p>The annexation of these Prospecting Rights into the existing Forzando North Mining Right (381MR) will extend the overall life of mine (LoM) by approximately 11 years (to 2039) (Forzando Coal Mines (Pty) Ltd, 2023).</p> <p>The site is not located in close proximity to any RAMSAR Sites, the closest being the Blesbokspruit approximately 100km west of the site, Verloren Valei Nature Reserve over 120km north-east of the site and Seekoeivlei Nature Reserve approximately 140km south of the site.</p>
	<p>How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity, or pollute or degrade the biophysical environment?</p> <p>What measures were explored to avoid negative impacts, or minimise and remedy (including offsetting) the impacts?</p> <p>What measures were explored to enhance positive impacts?</p>	<p>Vegetation clearance associated with the expansion of the stockpile area and ventilation shafts will disturb ecosystems and biological diversity on the site. However, the footprint of these have been kept as small as possible to limit the area of disturbance. It is anticipated that &lt;4Ha will be cleared.</p> <p>Further discussion on management and mitigation is included in Section 12 and a discussion on alternatives is included in Section 7. The updated and amendment EMPr is attached as Appendix G.</p>

Theme	Specific Questions	Answer related to this Application
	<p>What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, to minimise, reuse and/or recycle or to safely treat and/or dispose of unavoidable waste?</p>	<p>The proposed Project will result in general (domestic) waste, construction waste, hazardous waste, sewage and mineral waste. These will feed into the existing waste streams at the Forzando North Coal Mine and will be managed in accordance with the existing authorisations, where necessary the mitigation measures and monitoring requirements have been updated in the EMPr Amendment (Appendix G).</p>
	<p>How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to avoid these impacts or minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>A Phase I heritage impact assessment was completed (Appendix F 8). No heritages sites will be directly impacted by the proposed operations, and all sites can be managed <i>in-situ</i>. Impacts and Management measures are discussed in Section 11 and Section 12.</p>
	<p>How will this development use and/or impact on natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of resources been considered? What measures were explored to avoid these impacts or minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>The mineral resource to be mined is coal, which is a non-renewable resource. Further resource use relates to the use of water. Water is and will continue to be used for processing, dust suppression and underground for mining. All dirty water will be captured on site and re-used as far as possible. Impacts and Management measures are discussed in Section 11 and Section 12.</p>
	<p>Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency? Do the proposed location, type and scale of development promote a reduced dependency on resources?</p>	<p>The Project is associated with the mining and processing of coal for the International Market. It can't be said that the proposed project exacerbates dependence on increased use of resources to maintain economic growth, but it does not reduce the dependency either. The location of the project has been associated with coal mining for many years, as is evident by the current and historical coal mining operations in the area, as well as the existing coal-fired power stations in the surroundings.</p>

Theme	Specific Questions	Answer related to this Application
		Mitigation measures as outlined in Section 12 and detailed in the EMPr (Appendix G), along with the specified rehabilitation measures will to some extent ensure sustainability objectives are met.
	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used?	The area holds numerous natural resources, including the mineral reserves, which are the subject of this application. These reserves can be accessed from the current underground workings and will be mined as a continuation of the existing operations, thus limiting the need for additional surface infrastructure.
	How were a risk-averse and cautious approach applied in identifying and assessing impacts?	The impact assessment methodology is described in Section 11.1. Where information is lacking the precautionary approach is implemented.
	What are the limits of current knowledge and the risks associated therewith?	Knowledge gaps and assumptions are further discussed in Section 14. Environmental Impact Assessment is by its very nature associated with some uncertainty. However, the use of qualified and reputable specialists in the compilation of this report reduces the level of uncertainty.
	How will the ecological impacts of this development impact on people's environmental rights?	The groundwater study (Appendix F 6) concluded that the cumulative dewatering impacts of the historical mining and areas under application will result in a cone of depression extending to the north and south potentially affecting several privately owned boreholes and the fountain located on Portion 8 of the farm Bankpan 225 IS (see Table 45). Forzando Coal Mines (Pty) Ltd will need to ensure that alternate water supply (equal in quality and quantity) is provided to the affected water users.
	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified resulted in the selection of the "best practicable environmental option."	The project site is generally delimited by the mineral resource. It is proposed that the Bankpan and Killowen reserves be mined as a continuation of the existing underground workings, accessed from the Forzando North Adit. From an environmental point of view this is considered the "best practicable environmental option" as no new boxcut, adits or inclines will be required.

Theme	Specific Questions	Answer related to this Application
		<p>The location of the ventilation shafts are determined based on the mine plan and geology, therefore there is little flexibility in their placement. It is noted that that Vent shaft 1 (east) is located within an area of High SEI (delineated wetlands) however, this has been placed to avoid the CBA2. Alternatives are discussed in Section 7.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">" promoting justifiable economic and social development"</p>	<p>What is the socio-economic context of the area in terms of:</p> <ul style="list-style-type: none"> <li>• The IDP and any other strategic plans, frameworks of policies applicable to the area,</li> <li>• Spatial priorities and desired spatial patterns;</li> <li>• Existing land uses, planned land uses, cultural landscapes etc.</li> <li>• Municipal Economic Development Strategy ("LED Strategy")</li> </ul>	<p>Forzando Coal Mines (Pty) Ltd is acknowledged in the Gert Sibande IDP and SDF (Gert Sibande Municipality, 2022). According to the SDF Mining is the dominant sector within the district and contributes 17.3% to the Gert Sibande District economy.</p> <p>The current land use in the area is agriculture, with some natural grasslands and wetlands identified in the MRA. As the proposed expansion will be mined via underground methods, and the area of disturbance will be limited in extent, it is not anticipated that the Mine will not exclude other land uses from occurring and continuing on the remainder of the portions within the MRA.</p>
	<p>Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?</p> <p>Will the impact be socially and economically sustainable in the short- and long-term?</p>	<p>Please refer to the impact assessment in Section 11, where socio-economic impacts have been assessed.</p> <p>The negative socio-economic impacts associated with the project primarily relate to the fragmentation of agricultural land.</p> <p>Positive impacts are associated with the implementation of the S&amp;LP including Local Economic Development (LED) projects and skills development projects. The project will contribute directly and indirectly to the Country's Gross Domestic Product, as well as provide continued employment to current workforce at Forzando North.</p>
	<p>In terms of location, describe how the placement of the proposed development will:</p> <ul style="list-style-type: none"> <li>• result in the creation of residential and employment opportunities in close proximity to or integrated with each other;</li> </ul>	<p>The project is not aimed at provision of residential opportunities.</p> <p>Currently one hundred and seventy one (171) people are permanently employed at Forzando North. The proposed Project is not expected to contribute to job creation, but rather focus on the retention of jobs by prolonging the remaining LoM.</p>



Theme	Specific Questions	Answer related to this Application
	<ul style="list-style-type: none"> <li>• reduce the need for transport of people and goods;</li> <li>• result in access to public transport or enable non-motorised and pedestrian transport;</li> <li>• compliment other uses in the area; be in line with the planning for the area;</li> <li>• optimise the use of existing resources and infrastructure;</li> <li>• contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs;</li> <li>• encourage environmentally sustainable land development practices and processes;</li> <li>• the investment in the settlement or area in question will generate the highest socio-economic returns;</li> <li>• impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area;</li> <li>• in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?</li> </ul>	<p>The Project area is located approximately 15 kilometres northeast of Bethal, 20 kilometres east of Ga-Nala (Kriel) and 25km southwest of Hendrina. The relatively close proximity of the site to these towns reduces the need for transport of people and goods.</p> <p>At least some mine employees will access the mine using public transport.</p> <p>The annexation area is contiguous to the existing MRA and will be mined underground, via the existing workings. The project is therefore considered to be complimentary to the existing land use.</p> <p>Additional infrastructure requirements for the project are minimal and will largely be associated with the proposed plant and 2 x ventilation shafts. Thus, it can be concluded that the project optimises the use of existing infrastructure.</p> <p>No bulk infrastructure development is associated with the project. The project is not associated with residential land uses and therefore neither encourages or discourages urban sprawl.</p> <p>The project will be undertaken in accordance with the Mining Right. The project does not contribute to the correction of historically distorted spatial patterns of settlement.</p> <p>The project will not be undertaken prior to the relevant approvals are obtained.</p> <p>The location of the project is determined by the location and depth of the coal resource.</p> <p>The Mine's social and labour plan (S&amp;LP) will continue to be implemented. The investments that the mine make to the local communities will therefore continue.</p>

Theme	Specific Questions	Answer related to this Application
		<p>A heritage assessment has been commissioned and heritage resources on the site must be preserved and protected from damage. As surface disturbance will be limited to the new plant (to be located at the existing infrastructure area) and two new ventilation shafts it is not expected that the project will result in a change in the sense of place.</p> <p>The project will not act as a catalyst to creation for integrated settlements as it is not associated with residential land use. No employees will be housed on site.</p>
	<p>What measures were taken to pursue environmental justice and equitable access to environmental resources, benefits and services so that adverse environmental impacts shall not be distributed so as to unfairly discriminate against any person, (who are the beneficiaries and is the development located appropriately)?</p> <p>What measures were taken to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?</p>	<p>The primary beneficiaries of the Project are considered to be the existing employees of Forzando North and those local residents successful in their potential applications for new job opportunities over the remaining LoM. The development location is determined by the location and depth of the coal resource, and other environmental considerations.</p> <p>The Mine's S&amp;LP will contribute to the socio-economic development of the area through projects identified in collaboration with the Local and District Municipalities.</p> <p>The Project does not promote unfair discrimination against any group of people.</p>
	<p>What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?</p>	<p>The mine will be operated in strict accordance with the Mine Health and Safety Act (MHSA), which is beyond the scope of the EIA process and beyond the expertise of the EAP.</p>
	<p>What measures were taken to:</p> <ul style="list-style-type: none"> <li>• ensure the participation of all interested and affected parties,</li> <li>• provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,</li> </ul>	<p>A comprehensive public participation process (PPP) has been undertaken for the Project. The PPP is guided by the EIA Regulations, 2014 (as amended).</p> <p>Public Participation is undertaken to ensure the opportunity for all potential I&amp;APs to participate in meetings and the EIA process.</p>

Theme	Specific Questions	Answer related to this Application
	<ul style="list-style-type: none"> <li>ensure participation by vulnerable and disadvantaged persons</li> <li>ensure openness and transparency, and access to information in terms of the process,</li> <li>ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge</li> </ul>	<p>Documents for public review have <u>been</u> made available electronically (via <u>WeTransfer</u>) and in hard copy. I&amp;APs will be kept informed of the process and any developments/meetings/report availability via e-mail and SMS communication.</p> <p>I&amp;AP comments have <u>been</u> incorporated in to the reports, and into the comment and response report (Appendix E) along with the EAP's response to each comment or question. This process ensures that all I&amp;AP comments are addressed in <u>the BAR and</u> EMPr.</p>
	<p>Considering the interests, needs and values of all the I&amp;APs, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?</p>	<p>Forzando Coal Mines (Pty) Ltd employs people of varying skills levels and also offers skills development programs as part of their S&amp;LP commitments. Where the necessary skills are available in local communities, preference will be given to employ local people.</p>
	<p>What measures have been taken to ensure that workers will be informed of work that might be harmful to human health or the environment or dangerous, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?</p>	<p>The Environmental Awareness Plan as part of the EMPr will continue to be implemented. The Mine has a full-time Health and Safety Manager who is responsible to inform workers of the risks associated with their work, as well as their obligations and rights in terms of the MHSA and Basic Conditions of Employment Act and other relevant legislation and best practice guidelines.</p>
	<p>Describe how the development will impact on job creation in terms of, amongst other aspects:</p> <ul style="list-style-type: none"> <li>the number of temporary versus permanent jobs that will be created;</li> <li>whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area);</li> <li>the distance from where labourers will have to travel;</li> </ul>	<p>Currently one hundred and seventy one (171) people are permanently employed at Forzando North. The proposed Project is not expected to contribute to job creation, but rather focus on the retention of jobs by prolonging the remaining LoM.</p> <p>Should any new positions become available in the future, these should be advertised locally, to ensure that the communities that are most affected also benefit the most from the Project.</p>

Theme	Specific Questions	Answer related to this Application
	<ul style="list-style-type: none"> <li>- the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits); and</li> <li>- the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).</li> </ul>	<p>Where possible, skills transfer and skills development programmes will be implemented to train local job seekers and develop those skills that are not available locally yet.</p> <p>Due to preference of employment being given to locals, travel distance from labourer's homes to the mine will be as little as possible.</p> <p>Agricultural activities in the area provide employment to some members of the local communities. As the operations will be mined via underground methods, and the area of disturbance will be limited to the new plant and the ventilation shafts, the Mine will not exclude other land uses from occurring on the remainder of the portions included in the MRA.</p>
	<p>What measures were taken to ensure:</p> <ul style="list-style-type: none"> <li>• that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and</li> <li>• that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?</li> </ul>	<p>Various government departments at different levels were informed of the proposed project and requested to participate in the PPP.</p> <p>Please refer to Section 5 for a discussion on the policy and legislative context of the Project.</p>
	<p>What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?</p>	<p>The BAR process, and development of the EMPr Report aims to achieve environmental protection (where relevant) and restoration of the environment. Closure and rehabilitation are discussed in Section 13.</p>
	<p>Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?</p>	<p>The mitigation measures contained in the EMPr have been reviewed and approved by Forzando Coal Mines (Pty) Ltd, the Applicant, who has committed by their approval to implement these measures. The long-term environmental monitoring and remediation requirements are detailed in the rehabilitation plan.</p>

Theme	Specific Questions	Answer related to this Application
	<p>What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?</p>	<p>Please refer to Section 13 of this report which addresses the rehabilitation, closure and financial provision.</p> <p>Forzando Coal Mines (Pty) Ltd has to update their rehabilitation, closure and financial provision reports on an annual basis, to ensure the availability of sufficient funds, to implement rehabilitation plans. This must be done in accordance with the Financial Provision Regulations promulgated in terms of NEMA.</p>

## 7 ALTERNATIVES ASSESSMENT

Meaningful consideration should be given to alternative processes or practices which can be employed to meet the requirements of mine development, operation and closure (DEA, 2018).

Consideration of alternatives is one of the most critical elements of the environmental assessment process (DEAT, 2004). Key criteria that must be considered when identifying alternatives are that they should be “practicable, feasible, relevant, reasonable and viable.”

This section discusses the various alternatives that have been considered by Forzando Coal Mines (Pty) Ltd, and explains how the Applicant decided on the preferred option.

### 7.1 Process to Assess Alternatives

The concept of an “alternative” can be defined as a possible course of action, in place of another, that would meet the same purpose and need as the development proposal. The starting point for the identification and evaluation of alternatives to the proposed Project is the clear identification of the purpose and need for the Project.

The purpose of the Project is to mine the economically viable coal reserves for local and/or export markets, for the business to be profitable and to contribute to the local economy. The Need and Desirability of the Project has been assessed in Section 6.

DEA (2018) identifies six potential categories of alternatives and emphasises that “the number of alternatives that are selected for an assessment should be determined by the range of potential alternatives that could be reasonable and feasible” (DEA, 2018). The alternatives that have been considered are discussed in these terms and grouped according to the categories defined by DEA.

### 7.2 The Property or Location

The properties selected for mining are limited to those for which the Applicant holds a valid right in terms of the MPRDA, the results of the coal resource determination and finally the economic feasibility of mining these reserves. Thus no property/location alternatives will be considered for the underground mine areas.

Similarly, the location of the ventilation shafts are determined based on the mine plan, geology and topography and there is little flexibility in their placement and no site alternatives are being considered. It is noted however, that the sites assessed are much larger than required and will allow for micro siting of the shafts to some extent.

The processing plant will be located at the existing Forzando North infrastructure area thus limiting the area of disturbance. No alternative sites are being considered however, alternative layouts for the plant were assessed during the design phase.

### 7.3 The Type of Activity to be Undertaken

Underground mining - The mining method is dictated by the location and nature of the resource. The applicant has undertaken an extensive drilling programme, the results of which indicate that the reserves can be mined via underground methods and accessed via the existing Forzando North workings. From an environmental point of view this is considered the preferred option as no new boxcut, adits or inclines will be required and thus alternative mining methods will not be considered further.

#### **7.4 Technology to be Used**

Mechanised bord-and-pillar methods, using continuous miners is proposed for the Project. Continuous miners will ensure a constant flow of ore from the working face of the mine and is different from conventional or cyclical mining methods which halt the extraction process in order to load ore. This will result in an optimal balance of production rate and cost per ton.

The processing plant has been selected based on mineable tonnages and coal quality being mined, as well as market requirements. No technology alternatives with regards to the beneficiation process have been assessed.

It is proposed that the ventilation shafts be raise bored by typical up-reaming. Compared to conventional or long-hole raises, raise boring offers several significant advantages. These include:

- Minimal labour requirements;
- Safe;
- No blasting required;
- Minimal dust is generated and drill chips (rock) are handled underground;
- Smooth wall surfaces that don't require finishing or reinforcement, thereby reducing turbulence in air ultimately resulting in a significant energy savings over the LoM (DMC Mining Services, 2023).

As such, no technology alternatives have been considered with regards to the construction of the ventilation shafts.

#### **7.5 Operational and Scheduling Alternatives**

Project timing can have substantial influence on impacts and management of those impacts. For example, to limit construction activities to the dryer, winter months will almost certainly limit the impacts on water resources as runoff is reduced and the risk of erosion from surface runoff almost negated. However, this could in turn exacerbate impacts on air quality and dust deposition. Dust suppression via watering cart is recommended on gravel road areas, the use of dust binding agents should be considered where dust generation is significant. This is considered a mitigation measure and has not been discussed further under Alternatives.

#### **7.6 Design or Layout of Activity**

A number of layouts were considered for the proposed plant during the pre-feasibility phase, with the final two layouts depicted overleaf (Figure 13 and Figure 14). Both alternatives have considered the location of the existing plant and stockpile area, so as to limit conveyance distance and infrastructure requirements.

From an environmental point view Alternative 1 is preferred as the majority of the infrastructure associated with the plant will be located within the existing dirty water footprint. The expansion of the RoM stockpile area will affect an additional ~2 Ha. This area has been mapped as having a Medium – High SEI.

Alternative 2 affects a much larger footprint area and would result in an additional ~8 Ha being affected. This area has largely been mapped as having a High SEI.

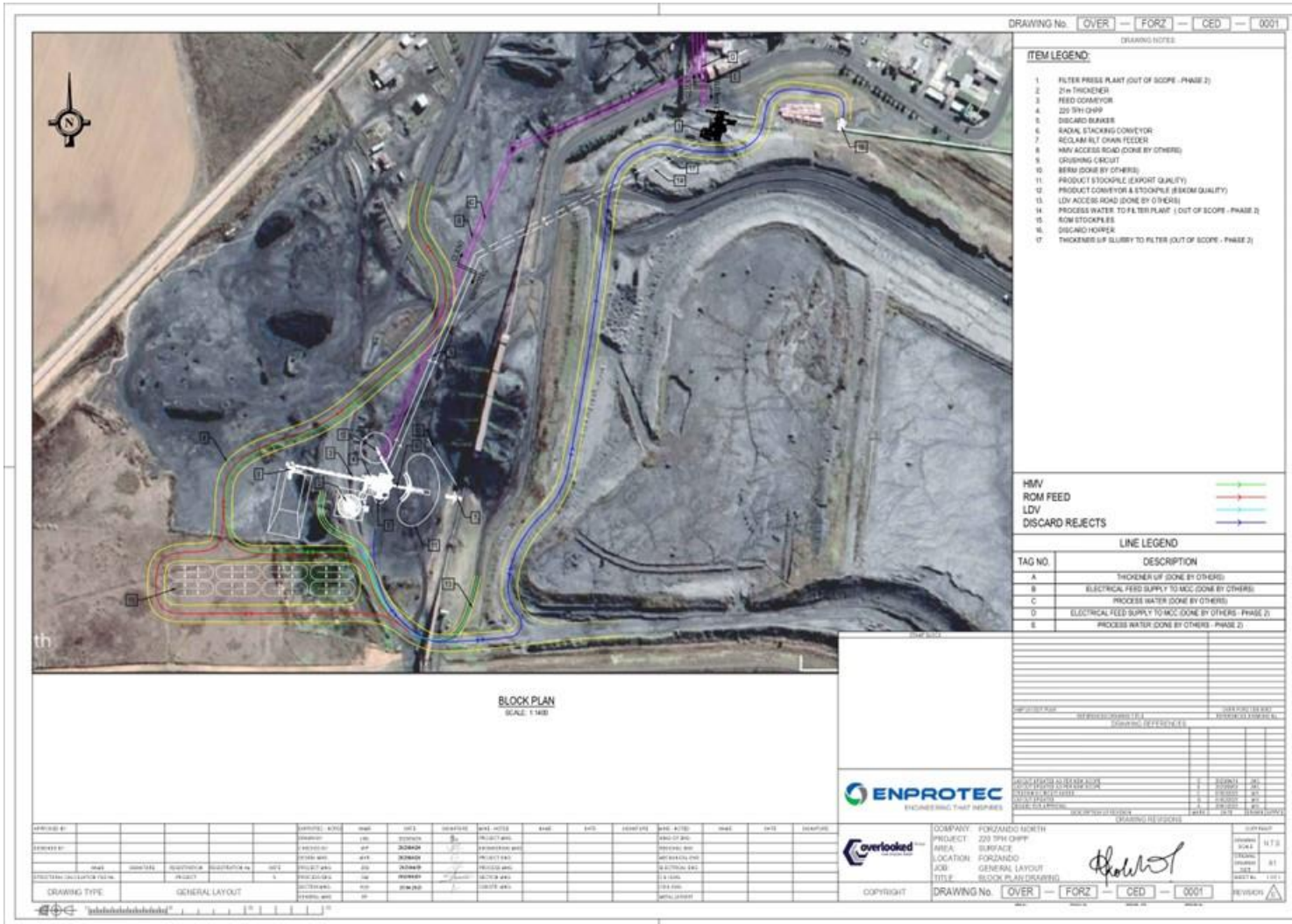


Figure 13: Layout Alternative 1 (preferred Alternative) (Enprotec, 2023)



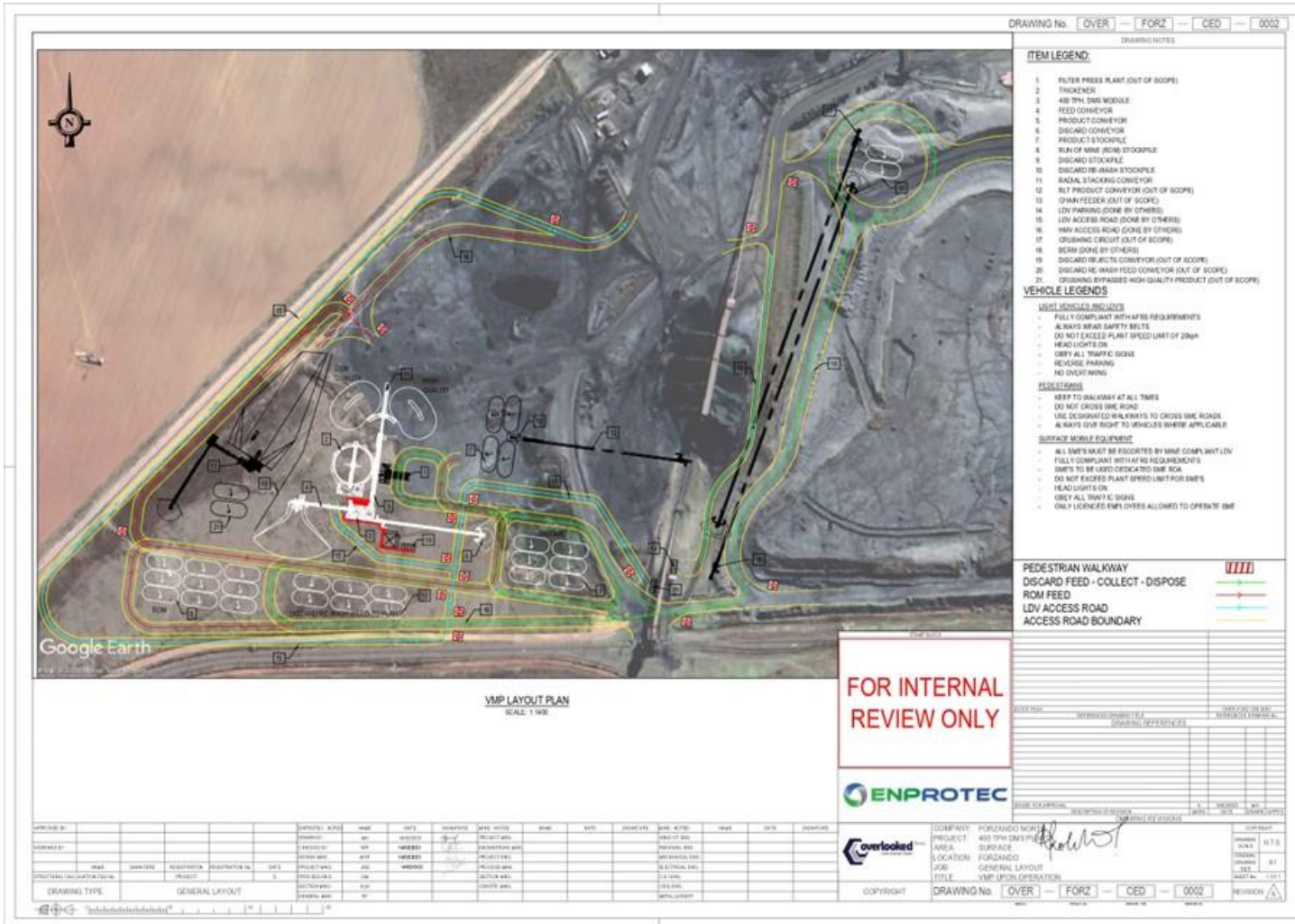


Figure 14: Layout Alternative 2 (Enprotec, 2023)

## 7.7 No-Go Alternative

The option of not proceeding with the Project. This alternative will entail the site retaining its current *status quo* and eliminate all of the negative impacts associated with the proposed Project. It would also mean that none of the socio-economic benefits associated with the extended LoM will be realised. Furthermore this will result in the sterilisation of the resource OR abandonment of the Prospecting Rights by the current Holder, who can access the reserves from their existing workings. If another party were to apply for these rights, this would result in additional surface disturbance and associated environmental impacts.

## 7.8 Confirmation of the Preferred Layout

The preferred layout of the Plant is Alternative 1, as illustrated in Figure 13.

# 8 PUBLIC PARTICIPATION PROCESS

The latest Public Participation Guideline in terms of the NEMA was published by the Department of Environmental Affairs in 2017 (DEA, 2017b). The NEMA requires the participation of all Interested and Affected Parties (I&APs) in environmental governance (Section (2)(4)) and holds that the beneficial use of environmental resources must serve the public interest. Decisions that may affect the environment, have to include sufficient opportunity for public participation.

The public participation process (PPP) related to this Project is detailed in Appendix E. The below serves as a summary only.

## 8.1 Details of the PPP followed to date

### 8.1.1 Identification and Notification of Stakeholders

The competent authority for the applications in terms of the MPRDA, NEMA and NEMWA is the DMRE. A number of other Regulatory Authorities, Organs of State and Key Stakeholders were identified and invited to comment on the Project, these include:

- Department of Water and Sanitation (DWS);
- Department of Forestry, Fisheries and Environment (DFFE);
- Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET);
- Department of Agriculture, Land Reform and Rural Development;
- Steve Tshwete Local Municipality;
- Govan Mbeki Local Municipality;
- Gert Sibande District Municipality;
- Nkangala District Municipality;
- South African Heritage Resource Agency (SAHRA);
- Mpumalanga Tourism and Parks Agency (MTPA);
- Department of Defence;
- Department of Public Enterprises;
- Department of Labour;
- Land Claims Commission;
- SA Weather Service;

- South African National Roads Agency (SANRAL);
- Eskom;
- South African National Parks;
- Mpumalanga Landbou / Agriculture;
- Endangered Wildlife Trust; and
- Birdlife SA.

The I&AP database further includes occupiers and owners of the affected property and adjacent properties, the relevant municipal ward councillor, the local and district municipalities, and various organisations and interest groups. The I&APs were notified of the proposed Project through the following means:

- Notice boards in English, Afrikaans and Zulu (erected on 10 May 2023);
- Written notices in the form of Background information documents (BID) in English, Afrikaans and isiZulu (distributed between 09 – 10 May 2023);
- SMS; and
- Advertisements in two local Newspapers:
  - English and Zulu adverts published in the Ridge Times on 19 May 2023; and
  - English and Afrikaans adverts published in the Middelburg Observer on 19 May 2023.

#### **8.1.2 Micro-Consultation / Focus Group Meetings**

Micro-consultation was undertaken with the landowners on 19 May 2023, the purpose of the micro-consultation was to make the landowners aware of the application and associated application for Environmental Authorisation, and to hand deliver the Background Information Document (BID).

#### **8.1.3 Document Review**

The BAR was made available for public review and comment for a period of thirty (30) days, from 17 July to 17 August 2023. Registered I&APs were notified of the report's availability by e-mail and SMS. The report was made available at the following locations:

- Hard copy at the Hendrina Public Library;
- Hard copy at the Bethal Public Library; and
- Electronically via WeTransfer.

#### **8.1.4 Public Meetings**

Two public meetings were hosted for the Project, these were held as follows:

- Bethal Public Library Auditorium on the 2 August 2023, 10:00am; and
- The NG Gemeente Kerk in Hendrina on the 3 August 2023, 09:00am.

Furthermore, one focus group meeting was held with the surface rights owners of Portion 8 of the farm Bankpan 225 IS on the 2 August 2023.

Minutes of the relevant meetings, attendance registers and a copy of the presentation given are included in Appendix E. The purpose of these meetings was to provide feedback on the specialist studies and to assist I&APs with any queries and/or concerns that they may have with regards to the BAR and EMPr.

## **8.2 PPP still to be Undertaken**

The BAR has been updated with all comments received and the final report submitted to DMRE for consideration. Once a decision has been reached by the DMRE, all registered I&APs will be notified of the record of decision and the relevant appeals procedure.

## **8.3 Summary of issues raised by I&APs**

All comments and concerns received to date have been included in the table overleaf. Please refer to Appendix E for the full PPP Report.

**Table 12: Issues & Response Table**

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
<b>AFFECTED PARTY</b>				
<b>Landowner/s</b>	<b>X</b>			
Paul & Trevor Friedman, Edmar Farms cc, Portion 8 Bankpan 225 IS	09-05-2023 Micro consultation	Concerned about the potential groundwater impacts associated with undermining the farm Bankpan. Has a hydrocensus been completed? There are 4 boreholes and 1 fountain, feeding a dam, located on Portion 8 of Bankpan. Requested that the posters/notices be removed from the farm boundary once the consultation process is complete.	A hydrocensus was recently completed for the Forzando Complex, will confirm whether Portion 8 of Bankpan was included.	The hydrocensus was updated on 18th May to include the affected properties. Refer to Appendix F 6 for a copy of the Groundwater Study. The study concluded that the cumulative dewatering impacts of the historical mining and areas under application will result in a cone of depression extending to the north and south potentially affecting several privately owned boreholes and the fountain located on Portion 8 of the farm Bankpan 225 IS (see Table 45). Forzando Coal Mines (Pty) Ltd will need to ensure that alternate water supply (equal in quality and quantity) is provided to the affected water uses.
Lodewyk van der Merwe, M.L.G.W van der Merwe Trust	09-05-2023 Micro consultation	Stated that no land use agreements had been negotiated to date. Compensation would need to be	Cabanga understands that negotiations between the Application and the Land	Land Tenure of the affected properties is indicated in Plan 4. Employees and contractors

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		agreed upon before any surface activities can commence. Concerned that the proposed ventilation shaft on his property would lead to security issues i.e. Cattle theft, gates being left open etc. Does not want traffic passing through his farm.	Owner are still ongoing. We will note your concerns in the BAR.	will undergo induction and environmental awareness (Appendix G). Forzando Coal Mines (Pty) Ltd has a zero tolerance policy on theft, any employees or contractors found to be involved in stock theft will be dealt with accordingly. Traffic related to the construction and operation of the ventilation shaft is expected to be limited (see Section 4.1.1). <u>An access agreement must be reached prior to any surface activities commencing on the said property.</u>
Phillip Hattingh, SARNIA Trust	26-05-2023 E-mail in response to the BID	Thank you I have received it.	No response required.	Proof of correspondence included in the PPP Report (Appendix E).
<u>Paul Friedman,</u> <u>Edmar Farms cc,</u> <u>Portion 8 Bankpan</u> <u>225 IS</u>	<u>02-08-2023 Focus Group Meeting</u>	<u>Concerned about groundwater and surface water quality and quantity.</u>	<u>Dewatering activities during the Operational phase will result in a cone of depression and a potential decline in water levels. It is expected that the deeper aquifer will be drawn down to the bottom of No. 4 Seam.</u> <u>No hydrocensus boreholes are drilled down to this depth</u>	<u>Refer to Appendix F 6 for a copy of the Groundwater Study. The study concluded that the cumulative dewatering impacts of the historical mining and areas under application will result in a cone of depression extending to the north and south potentially affecting</u>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
			<p><u>however, due to leakage in the aquifer, the mining activities at Forzando North Coal Mine has the potential to affect several privately owned boreholes located in the area, including those on Portion 8 of Bankpan.</u></p> <p><u>It is not anticipated that the surface water will be significantly affected by the underground mining activities as these are isolated from the deeper aquifer that will be dewatered during the Operational Phase of the Mine.</u></p> <p><u>In terms of quality no receptor boreholes will be impacted on during the Operational phase.</u></p> <p><u>On decommissioning and closure dewatering activities will cease and the underground voids will fill with groundwater.</u></p> <p><u>The water levels are expected to take a considerable time to recover and pollution movement away from the mine will only start to occur once the mine has filled to pre-mining elevations.</u></p> <p><u>The pollution plume was modelled for 100 years and it is</u></p>	<p><u>several privately owned boreholes and the fountain located on Portion 8 of the farm Bankpan 225 IS (see Table 45). Forzando Coal Mines (Pty) Ltd will need to ensure that alternate water supply (equal in quality and quantity) is provided to the affected water uses.</u></p>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
			<p><u>evident that it remains mostly within the Mining Right Area with little migration outwards. As the majority of receptor boreholes are drilled shallower than the coal seams, it is not expected these will be impacted on with regards to quality.</u></p> <p><u>Based on the results of the geohydrological model no direct decant from the underground mine workings is predicted. However, this prediction does not take into account the possibility of unknown pathways that connect the mine workings to the surface such as unsealed exploration boreholes, or large cracks or fractures. These fractures can potentially become conduits for decant to occur, in which case the water would need to be treated prior to release.</u></p>	
		<p><u>What was the quality of the water sampled on our property (Farm Bankpan 225 IS: Ptn 8)?</u></p>	<p><u>Cannot recall off-hand, water quality samples were taken from a number of boreholes in the Mining Right Area. The laboratory certificates are</u></p>	<p><u>Refer to Appendix F 6 for a copy of the Groundwater Study and relevant laboratory certificates.</u></p>



Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		<p><u>If the boreholes on our property are dewatered then how will this be mitigated?</u></p>	<p><u>attached to the Geohydrology report and are available for download.</u></p> <p><u>The Mine will need to provide you with an alternative water supply of equal quality and quantity. This is a condition that is generally included in the water use license, when issued by the Department of Water Affairs. It is also included in the EMPr. Both of these documents are legally binding.</u></p> <p><u>It is recommended that the boreholes on Portions 0 (RE), 8 of the farm Bankpan and Ptn 0 (RE) of the farm Killowen be pump tested and the yields recorded. This can be included in the Basic Assessment Report and EMPr as a specific condition.</u></p>	<p><u>This has been included in Section 15.3: Specific Aspects to be Included in the Environmental Authorisation.</u></p>
		<p><u>What impact will blasting have on surface infrastructure? We often feel the vibration of blasts and the windows rattle.</u></p> <p><u>There is one farm house located on Portion 8 that could be affected.</u></p>	<p><u>Mining will be undertaken by means of mechanised underground methods, using continuous miners which cut the coal. Blasting will only be required when mining through dykes and faults. As such there are no surface influences</u></p>	<p><u>This recommendation has been included in the Section 9 of the EMPr (Appendix G).</u></p>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
			<p><u>pertaining to air blast and fly rock.</u></p> <p><u>When the windows rattle this is due to air blast and would be from a blast on surface (likely one of the nearby opencast operations) and not underground.</u></p> <p><u>Similarly, based on studies completed for the existing operations no specific impact is expected regarding ground vibration from the underground mining.</u></p> <p><u>We can however include a recommendation that a photographic record be undertaken of the farm house prior to undermining, and that they communicate any blasting to the landowners / users beforehand.</u></p>	
		<p><u>Are any bays / vent shafts proposed on our property? Should the Mine want to include one, can we say no?</u></p>	<p><u>Not that we are aware of. The application does include two vent shafts but these are not on your properties. Based on the Project description and information provided by the Client no surface disturbance is proposed for Portion 8 of the farm Bankpan. Possibly the Mine</u></p>	<p><u>The Project Description is detailed in Section 4, this includes information on existing and proposed infrastructure.</u></p> <p><u>Minutes of the Meeting are included in the PPP Report (Appendix E).</u></p>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		<p><u>Any drilling / exploration would need to be negotiated ahead of time and compensated.</u></p>	<p><u>may want to conduct some infill drilling later on.</u></p> <p>Noted.</p>	<p><u>The Project Description is detailed in Section 4, this includes information on existing and proposed infrastructure.</u></p> <p><u>Minutes of the Meeting are included in the PPP Report (Appendix E).</u></p>
		<p><u>Is there any arable land available in the Mining Right Area, and owned by the Overlooked Group, available for rent?</u></p>	<p><u>Cabanga Environmental is not involved with any of the land use agreements at the Overlooked Group. Perhaps the Mine's Environmental Specialist can follow up with Head Office in this regard.</u></p>	<p><u>Plan 4 depicts the Land Tenure within the MRA.</u></p>
<p><u>Anton Pelser</u> <u>Farms Killowen 465 IS:</u> <u>Ptn 0(RE); Bankpan</u> <u>225 IS: Ptn 0(RE);</u> <u>Weltevreden 193 IS:</u> <u>Ptns 0(RE), 2, 10, 11</u></p>	<p><u>03-08-2023 Hendrina</u> <u>Public Meeting</u></p>	<p><u>What will happen if subsidence does occur?</u></p> <p><u>If the boreholes on my property are dewatered then what will happen to rectify this?</u></p>	<p><u>In the unlikely event that pillar failure occurs, the subsidence profile will be Class C which is noticeable on flat terrain, smooth, with some cracks and compression ridges. Remedial measures can include filling the cracks and profiling the area to be free draining.</u></p> <p><u>The Mine will need to provide you with an alternative water supply of equal quality and quantity. This is a condition that</u></p>	<p><u>The various Subsidence Classes, as well as the surface profile which can be expected are depicted in Figure 41 for illustrative purposes</u></p> <p><u>This has been included in Section 15.3: Specific Aspects</u></p>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
			<u>is generally included in the water use license, when issued by the Department of Water Affairs. It is also included in the EMPr. Both of these documents are legally binding.</u>	<u>to be included in the Environmental Authorisation.</u>
		<u>How can we be sure that this will be enforced, especially when the Mine's have closed down?</u>	<u>The water use license and EMPr requires that the Mine make financial provision for latent impacts.</u> <u>You can contact the Monitoring and Compliance divisions at the DMRE and DWS for enforcement issues.</u>	<u>Financial Provision is discussed in Section 13.</u>
		<u>Can you please provide the relevant contact details?</u>	<u>Yes, these can be shared.</u>	<u>Cabanga is currently sourcing the relevant contact details, these will be forwarded in due course.</u>
<b>Lawful occupier/s of the land</b>	X			
<i>No comments received to date.</i>				
<b>Communities</b>	X			
<i>No comments received to date.</i>				
<b>OTHER AFFECTED PARTIES</b>	X			
<i>No comments received to date.</i>				

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
Landowners or lawful occupiers on adjacent properties	X			
Ludolf Uys, Rietkuil 224 IS: Ptn 10	26-04-2023 E-mail in response to query re: Land Ownership	Yes, this portion belongs to me and I am the trustee of Regen Waters Trust. You are welcome to contact me direct for any further information.	Thank you for coming back to me, much appreciated. I will add your details to the database. At the moment we are still putting together the Background Information Document for the proposed project. I will be in touch with you in the next week or so.	BID e-mailed on 09-05-2023. Proof of correspondence included in the PPP Report (Appendix E).
Sandhisha JayNarain, ENERTRAG SA	10-05-2023 E-mail in response to the BID	Thank you for the email. Please can we have a kmz of the project?	Please see attached KMZ. It is located to the South of South WEF and shouldn't conflict with your projects. The red polygon indicates their existing Mining Right, and the yellow shows the prospecting right areas to be annexed. The white polygons show the areas being assessed for the 2 x ventilation shafts, and the proposed plant will be located at their existing infrastructure area (adjacent to the current plant).  Please let me know if you	KMZ e-mailed on 11-05-2023. Proof of correspondence included in the PPP Report (Appendix E).

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
			require any additional information.	
<u>Gideon Raath</u> <u>ENERTRAG SA</u>	<u>18-07-2023 E-mail in response to the Notification of documents for public review and comment</u>	<u>Please will you send me the cadastral portions for these projects as kml?</u>	<u>I trust you are well. Please see attached, the project is to the south of the proposed South WEF.</u>	<u>KMLZ e-mailed on 19-07-2023. Proof of correspondence included in the PPP Report (Appendix E).</u>
<u>Gideon Raath</u> <u>ENERTRAG SA</u>	<u>19-07-2023 E-mail in response to the KMZ file</u>	<u>Thanks, please will you register me as an I&amp;AP.</u> <u>What general infrastructure is proposed under the secondary processing plant application?</u>	<u>I have registered you as an Interested &amp; Affected Party.</u> <u>General infrastructure associate with the plant is described in the BAR, and includes internal roads, slurry and water reticulation pipelines (between the mine's existing water and waste management facilities and the proposed plant) as well as an 11kV mini-substation. The plant itself will have a crusher and screener, dense medium separator and conveyor system – similar to their existing plant.</u> <u>Please let me know you if you need any additional information.</u>	<u>The Project Description is detailed in Section 4, this includes information on existing and proposed infrastructure.</u> <u>Proof of correspondence included in the PPP Report (Appendix E).</u>
<u>Andrea Gibb,</u> <u>ENERTRAG SA</u>	<u>21-07-2023</u>	<u>Please can you register me as an I&amp;AP for the below mentioned project.</u>	<u>I trust you are well. I have added you to the I&amp;AP register.</u>	<u>Proof of correspondence and I&amp;AP Register included in the PPP Report (Appendix E).</u>
<b>Municipal Councillor</b>	<b>X</b>			

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
Ivan Fukula, Representing the Local Councillor	03-08-2023, Hendrina Public Meeting	How will the community benefit from the Project?	The Project relates to the expansion of the Mining Right Area at an existing operation. These additional reserves will extend the life of mine by 11 years to 2039. The Project is not expected to contribute to job creation but will focus on the retention of jobs by the current workforce. Without these reserves, the current life of mine for Forzando North is 2028.	Section 4.11 discusses employment.
		If any new jobs or procurement opportunities become available, how will the community be notified?	These will be advertised as per the Mine's procurement and employment policies and in line with the approved Social and Labour Plan (S&LP).	Section 4.11 discusses employment.
		Can you please e-mail the contact details for the relevant contact person at the Mine?	Please can you confirm your e-mail address at the end of the meeting, and we will send this information through.	Contact details were shared via e-mail on 17-08-2023. Proof of correspondence included in the PPP Report (Appendix E).
<b>DEPT. OF MINERAL RESOURCES</b>				
Azwihangwisi Nemulodi, DMRE	11-07-2023 E-mail in response to the Request for Extension Letter	Please note that the extension has been granted.	Thank you for your confirmation.	Proof of correspondence included in the PPP Report (Appendix E).
<b>ORGANS OF STATE</b>	<b>X</b>			

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
Ria Barkhuizen, SANRAL	22-05-2023 E-mail in response to the BID	This email is an acknowledgement of receipt for your enquiry. Please note that in line with requirements of Section 29 of the Spatial Planning and Land Use Management Act (Act No 16 of 2013) read with Section 3 of the Promotion of Administrative Justice Act (Act No 3 of 2000) SANRAL have 30 days to acknowledge receipt of your application and 90 days to evaluate and provide response within 90 days. Should you not receive any response within 120 days, kindly follow up on the enquiry by responding to Nyandano Ndou who will be dealing with it and will convert back to you. She can be contacted on (012) 426-6228.	No response required.	Proof of correspondence included in the PPP Report (Appendix E).
Ria Barkhuizen, SANRAL	09-06-2023 Letter via e-mail	<b>Mining Right and Associated Application for Environmental Authorisation to include Portion 8 &amp; RE of the Farm Bankpan 225 IS &amp; the Farm Killowen 465, Bethal Magisterial District Mpumalanga.</b> The above-mentioned report prepared by Forzando Coal Mines submitted to SANRAL for review and comment has reference. Prior to mining commencement, the access to National Road R38 shall be upgraded according to SANRALs typical intersection layout. Please note for any new applications	Thank you, comments received. Please note that no entrances or roads from the R38 are proposed. The project relates to changes at an existing mine – where the majority of the coal is conveyed to a rail siding for transportation to Richards Bay rail.  I will let you know when the environmental reports are available for review and comment.	<u>All registered I&amp;APs were notified of the Reports' availability for review and comment via e-mail and SMS.</u> Proof of correspondence included in the PPP Report (Appendix E).



Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		and request for comments, use NRStat@nra.co.za email address.		
<u>John Geeringh Eskom</u>	<u>17-07-2023 E-mail in response to the Notification of documents for public review and comment</u>	<u>I cannot access the file and have no clue from the e-mail what type of project this is? Please send me a BID and KMZ file</u>	<u>I hope you are well. I think some firewalls may block WeTransfer files – please let me know if I could send you the files via Dropbox or One Drive rather? I have attached a copy of the Background Information Document as well as a kml of the project area. Please let me know if you need any further information.</u>	<u>Proof of correspondence included in the PPP Report (Appendix E).</u>
<u>John Geeringh Eskom</u>	<u>19-07-2023 E-mail in response to the Notification of documents for public review and comment</u>	<u>Please find attached Eskom requirements for work at or near Eskom infrastructure and servitudes. You do not need to send me the other files.</u>	<u>Received, thank you.</u>	<u>Proof of correspondence included in the PPP Report (Appendix E).</u>
<u>Ria Barkhuizen, SANRAL</u>	<u>27-07-2023 E-mail in response to invitation to the Public Meetings</u>	<u>Please note that SANRAL does not attend meeting for proposed applications. Formal application needs to be sent via courier to SANRAL at 38 Ida street, Menlo Park, Pretoria.</u>	<u>No applications are being made to SANRAL. SANRAL was identified as an Organ of State as per the National Environmental Management Act and its EIA Regulations and has therefore been included in the Interested and Affected Parties (I&amp;APs) Register for the Project. Invitations were sent out to all registered I&amp;APs.</u>	<u>Proof of correspondence included in the PPP Report (Appendix E).</u>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
Dept. of Land Affairs	X			
Jan Venter, DARDLEA	03-08-2023 Hendrina Public Meeting	<u>Did the soil and agricultural study use the new Gazetted Classes, of which there are 15?</u>	<u>Cannot recall off hand. We will confirm and revert back on this.</u>	<u>Cabanga confirms that the 2017 Land Capability Values were used. A copy of the Soils and Agricultural Potential Assessment is attached as Appendix F 2.</u>
		<u>Also was the Draft Preservation and Development of Agricultural Land (PADALA) Bill considered?</u> <u>The Natural Agricultural Resources Atlas of South Africa should also be considered when undertaking soil and agricultural studies.</u>	<u>No, only promulgated legislation was considered.</u> <u>The only agricultural land that will be affected by the Project, are the areas earmarked for the ventilation shafts. These will disturb a maximum area of 2,500m2 each, and the existing land use will be able to continue. These ventilation shafts have been placed to avoid sensitives as far as possible however, alternatives are limited as these are sited based on the mine plan and geology, and are required for health and safety purposes.</u>	<u>Section 9.4 summarises the baseline Soils, Land Use and Land Capability, and references the Natural Agricultural Resources Atlas of South Africa.</u>
		<u>Will there be sufficient space for the stockpiles for the life of mine?</u>	<u>No new Adits or boxcuts are required, the underground will be accessed via the existing workings. Therefore stripping of topsoil will be limited to the proposed infrastructure, being</u>	<u>Section 4 details the Project Description, including existing and proposed infrastructure.</u>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
			<p><u>the ventilation shafts, plant and associated coal stockpile area.</u></p> <p>No new overburden stockpiles are associated with the Project.</p> <p><u>So, yes there will be sufficient space.</u></p>	
		<p><u>The co-ordinates, quality and quantity of private owned boreholes must be recorded.</u></p>	<p><u>The hydrocensus has detailed the co-ordinates of the identified boreholes. Water quality samples were taken from a number of boreholes in the Mining Right Area and the laboratory certificates have been included in the Geohydrology study.</u></p> <p><u>It is recommended that the boreholes on Portions 0 (RE), 8 of the farm Bankpan and Ptn 0 (RE) of the farm Killowen be pump tested and the yields recorded. This can be included in the Basic Assessment Report and EMPr as a specific condition.</u></p>	<p><u>This has been included in Section 15.3: Specific Aspects to be Included in the Environmental Authorisation.</u></p>
		<p><u>What prescriptions were used for the rehabilitation in terms of topsoil replacement (i.e. mm of topsoil to be replaced)? If affected areas are not rehabilitated properly then the end land use cannot be sustainable.</u></p>	<p><u>Again, we will need to confirm this and revert.</u></p>	<p><u>The Preliminary Rehabilitation Plan is attached as Appendix G 4.</u></p>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		<u>Cut-off drains need to be installed around the plant and dirty footprint area.</u>	<u>Concrete cut off drains are in place at Forzando North's infrastructure area. Where necessary these will be extended to cater for the proposed plant and coal stockpile area.</u>	<u>Figure 11-Figure 12 shows the existing water management facilities onsite. The proposed processing plant and stockpile extension area, associated with this application, will be developed within the catchment area of PCDs 4 and 5.</u>
		<u>Please can you share the shapefiles for the project?</u>	<u>Yes, these can be e-mailed. The block plan for the plant was a CAD file converted to kmz and is very big.</u>	<u>The relevant shapefiles were sent via e-mail on 17-08-2023. Proof of correspondence included in the PPP Report (Appendix E).</u>
		<u>Is it possible for the Mine to share the face progress reports with the DARDLEA? Sometimes underground operations exceed their Mineral Right boundary, or pump slurry into the workings. The minerals from this affect the Livestock.</u>	<u>Will need to confirm with Mine Management if this is possible.</u>	<u>Rebone Modipa to follow up with Mine Management and revert.</u>
<b>Traditional Leaders</b>	<b>X</b>			
<i>No comments received to date</i>				
<b>Dept. of Environmental Affairs</b>	<b>X</b>			
<u>Kamogelo Mathetja DFFE</u>	<u>21-07-2023 E-mail in response to the Notification of documents</u>	<u>DFFE Directorate: Biodiversity Conservation hereby acknowledge receipt of the invitation to review and</u>	<u>Please see attached kml of the areas being assessed.</u>	<u>KML e-mailed on 21-07-2023. Proof of correspondence</u>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
	<u>for public review and comment</u>	<u>comment on the project mentioned on the subject line. Kindly note that the project has been allocated to Mrs. P Makitla (Copied on this email). In addition, kindly share the shapefiles of the _____ development footprints/application site with the Case Officer.</u>  <u>Please note: All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for the attention of Mr. Seoka Lekota.</u>		<u>included in the PPP Report (Appendix E).</u>
<u>Kamogelo Mathetja DFFE</u>	<u>21-07-2023 E-mail in response to KML files sent</u>	<u>Well received.</u>	<u>No response required.</u>	<u>Proof of correspondence included in the PPP Report (Appendix E).</u>
<b>Other Competent &amp; Commenting Authorities</b>	<b>X</b>			
Natasha Higgitt, SAHRA	09-05-2023 E-mail in response to BID	Thank you for the notification. Please note that an application fee is now required to be paid for development applications to SAHRA. Please see the following link:  <a href="https://sahris.sahra.org.za/content/what-are-sahra-processing-fees-and-">https://sahris.sahra.org.za/content/what-are-sahra-processing-fees-and-</a>	Thank you. The fee is noted.	<u>Case ID 21900 registered on SAHRIS, and the relevant fee paid. A copy of the Heritage Impact Assessment (HIA) and Palaeontological Assessment are attached as Appendix F 8 and Appendix F 9.</u>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		<p>banking-details</p> <p>A payment of R 2000 is required for this application. Please take special note of the payment instructions regarding payment reference numbers.</p> <p>Please note: Due to high meeting and task load, I may not be able to respond to your email immediately. If you do not receive a response within 5 working days, please resend your query.</p>		
<p><u>Natasha Higgit, SAHRA</u></p>	<p><u>17-07-2023 E-mail in response to the Notification of documents for public review and comment</u></p>	<p><u>Please note that all development applications are processed via our online portal, the South African Heritage Resources Information System (SAHRIS) found at the following link: <a href="http://sahra.org.za/sahris/">http://sahra.org.za/sahris/</a>. We do not accept emailed, posted, hardcopy, faxed, website links or DropBox links as official submissions.</u></p> <p><u>Please create an application on SAHRIS for each EA application and upload all documents pertaining to the Environmental Authorisation Application Process. As per section 24(4)b(iii) of NEMA and section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage resources must form part of</u></p>	<p><u>Thank you for your e-mail. I confirm that a Case has been opened on SAHRIS (Case ID 21900) and the relevant documents uploaded.</u></p>	<p><u>Case ID 21900 registered on SAHRIS, and the relevant fee paid. A copy of the Heritage Impact Assessment (HIA) and Palaeontological Assessment are attached as Appendix F 8 and Appendix F 9.</u></p>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		<p><u>the process and the assessment must comply with section 38(3) of the NHRA. If a case already exists on SAHRIS regarding the development, please upload the documents to that case.</u></p> <p><u>Once all documents including all appendices are uploaded to the case applications, please ensure that the status of the case is changed from DRAFT to SUBMITTED. Please ensure that all documents produced as part of the EA process are submitted as part of the application.</u></p> <p><u>*PLEASE NOTE**</u></p> <p><u>An application fee is now required for all section 38 applications. Please ensure that the SAHRIS application contains a proof of payment as per the notice at the following link: <a href="https://sahris.sahra.org.za/content/wh-are-sahra-processing-fees-and-banking-details">https://sahris.sahra.org.za/content/wh-are-sahra-processing-fees-and-banking-details</a>. A payment of R2,000.00 for each application is required. Please make separate payments with the specific reference numbers. Applications that do not include a proof of payment will be considered incomplete and will not be processed until proof of payment is provided.</u></p>		

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		<p><u>Please note: Due to high meeting and task load, I may not be able to respond to your email immediately. If you do not receive a response within 5 working days, please resend your query.</u></p>		
<p><u>SAHRIS Admin</u></p>	<p><u>18-07-2023 Automated E-mail</u></p>	<p><u>The status of case "Forzando North Coal Mine Expansion of Underground &amp; Additional Infrastructure" was updated.</u></p>	<p><u>No response required.</u></p>	<p><u>Proof of correspondence included in the PPP Report (Appendix E).</u></p>
<p><u>Cecilia de Waal</u> <u>MTPA</u></p>	<p><u>19-07-2023 E-mail in response to the Notification of documents for public review and comment</u></p>	<p><u>Kindly send a hard copy for the application to the following physical address:</u> <u>Attention: Cecilia de Waal</u> <u>MTPA Main Office Building</u> <u>(Old Lydenburg Fisheries)</u> <u>End of Morgan street</u> <u>Lydenburg</u> <u>1120</u></p>	<p><u>I will send through a hard copy.</u></p>	<p><u>A hard copy was couriered on 21-07-2023. Proof of delivery included in the PPP Report (Appendix E).</u></p>
<p><u>SAHRIS Admin</u></p>	<p><u>17-08-2023 Automated E-mail</u></p>	<p><u>The status of case "Forzando North Coal Mine Expansion of Underground &amp; Additional Infrastructure" was updated.</u> <u>Please login to SAHRIS to view updates</u> <u>Case ID - 21900</u> <u>Status - Closed (Approved)</u> <u>Link _____ to _____ case _____ -</u> <u><a href="https://sahris.sahra.org.za/cases/forza">https://sahris.sahra.org.za/cases/forza</a></u></p>	<p><u>No response required.</u></p>	<p><u>Proof of correspondence included in the PPP Report (Appendix E).</u></p>



Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
<p>Natasha Higgitt, <u>SAHRA</u></p>	<p>17-08-2023 Letter via the <u>SAHRIS portal</u></p>	<p><u><del>ndo-north-coal-mine-expansion-underground-additional-infrastructure</del></u></p> <p><b>Final Comment</b></p> <p>The following comments are made as a requirement in terms of section 38(8) of the NHRA in the format provided in section 38(4) of the NHRA and must be included in the Final BAR Report and EMPr:</p> <ul style="list-style-type: none"> <li>• <u>38(4)a – The SAHRA Development Applications Unit (DAU) has no objections to the proposed amendment to the development;</u></li> <li>• <u>38(4)b – The recommendations of the specialists are supported and must be adhered to. Further additional specific conditions are provided for the development as follows:</u></li> <li>• <u>No-go buffers of 50 m must be adhered to around all identified burials;</u></li> <li>• <u>The graves must be monitored every 3 months while mining is occurring beneath the sites. Any changes to the status quo of the graves must be reported to SAHRA for further action;</u></li> </ul>	<p>=</p>	<p>The EMPr (Appendix G) has been updated to include the 50m buffer, and quarterly monitoring requirement. The contact details for the DAU unit have been included in Section 12 of the EMPr: <u>Emergency Response.</u></p>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		<ul style="list-style-type: none"> <li>• <u>38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA DAU (Natasha Higgitt 021 202 8660/ nhiggitt@sahra.org.za) must be alerted as per section 35(3) of the NHRA. Non-compliance with this section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;</u></li> <li>• <u>38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA DAU (Natasha Higgitt 021 202 8660/ nhiggitt@sahra.org.za) must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with this section of the NHRA is an offense in terms of section</u></li> </ul>		

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		<p><u>51(1)e of the NHRA and item 5 of the Schedule:</u></p> <ul style="list-style-type: none"> <li>• <u>38(4)d – See section 51(1) of the NHRA regarding offences;</u></li> <li>• <u>38(4)e – The following conditions apply with regards to the appointment of specialists:</u> <ul style="list-style-type: none"> <li>○ <u>If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;</u></li> </ul> </li> <li>• <u>The Final BAR and EMPr must be submitted to the SAHRIS</u></li> </ul>		

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		<p><u>application for record purposes:</u></p> <ul style="list-style-type: none"> <li>The decision regarding the EA Amendment application must be submitted to the SAHRIS application for record purposes.</li> </ul>		
<b>INTERESTED PARTIES</b>	<b>X</b>			
Abe Mkhize	09-06-2023 E-mail in response to Public Notices	<p>Just noticing now at the Bethal Library about environmental consultation regarding some expansion of the mining activities of Forzando Coal mine.</p> <p>Please keep me posted about the process.</p>	I hope you are well. I have registered you as an Interested & Affected Party and will keep you informed of the process going forward.	BID e-mailed on 09-06-2023. Proof of correspondence included in the PPP Report (Appendix E).
Abe Mkhize	09-06-2023 E-mail in response to the BID	<p>Thank you for the information.</p> <p>I will go through it. Wishing you all the best in work.</p>	No response required.	Proof of correspondence included in the PPP Report (Appendix E).
<u>Dr Melissa Whitecross</u> <u>BirdLife SA</u>	<u>17-07-2023 E-mail in response to the Notification of documents for public review and comment</u>	<p><u>Thank you for your email.</u></p> <p><u>Please note that I have resigned from BirdLife South Africa.</u></p> <p><u>For any urgent queries please contact Dr Hanneline Smit-Robinson hanneline.smit-robinson@birdlife.org.za.</u></p> <p><u>You can reach me via: mwhitecross@gmail.com.</u></p>	<u>Thank you, much appreciated.</u>	<u>Notification of the documents for public review and comment was sent to Dr Hanneline Smit-Robinson on 17-07-2023. Proof of correspondence included in the PPP Report (Appendix E).</u>

Interested and Affected Parties	Date Comments Received	Issues raised	Initial Response	EAP Response & Reference to Section in Report
		<u>Kind regards,</u> <u>Dr Melissa Whitecross</u> <u>Landscape Conservation Programme</u> <u>Manager</u>		

## 9 EXISTING SITE ATTRIBUTES

Just as a project is associated with certain impacts on the environment where it is undertaken, the existing environment can also influence a proposed development in terms of design, location, technology and layout. It is therefore important to define the environmental baseline conditions (*status quo*) or context of a proposed development project.

This section describes the environmental attributes associated with the affected sites focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects. Information is presented on different scales as relevant to the information that is available:

- Regional scale – the areas, land uses and communities surrounding the site including, in some cases, the larger municipal area;
- Immediate surroundings; and
- Site-specific.

A number of specialist assessments have been completed for the projects, these have been attached as Appendix F, the findings of which are summarised below.

### 9.1 Climate and Meteorology

The Project Area is located in the Mpumalanga Province of South Africa, which is characterised by a mild to warm summers and cool to cold winters. Rainfall primarily occurs from October to March and almost exclusively as showers and thunderstorms. Severe lightening, strong winds and hail often accompany these thunderstorms. Mean annual precipitation (MAP) for the Project area is ~700 mm whilst the mean annual evaporation (MAE) is 1,552mm (s-pan) (see Table 13 and Figure 15).

Monthly average temperatures and relative humidity profiles at the Project area for the period January 2020 to December 2022 are presented in Figure 16 (Rayten, 2023).

**Table 13: Mean Annual Evaporation (Bailey & Pitman, 2016)**

Month	S-Pan Evaporation (mm)	Evaporation Factor	Open Water Evaporation (mm)
January	171	0.80	137
February	142	0.79	112
March	140	0.79	111
April	108	0.76	82
May	91	0.74	67
June	74	0.71	53
July	81	0.58	47
August	107	0.61	65
September	139	0.63	88
October	167	0.64	107
November	158	0.80	126

Month	S-Pan Evaporation (mm)	Evaporation Factor	Open Water Evaporation (mm)
December	174	0.81	141
<b>Annual</b>	<b>1552</b>		<b>1136</b>

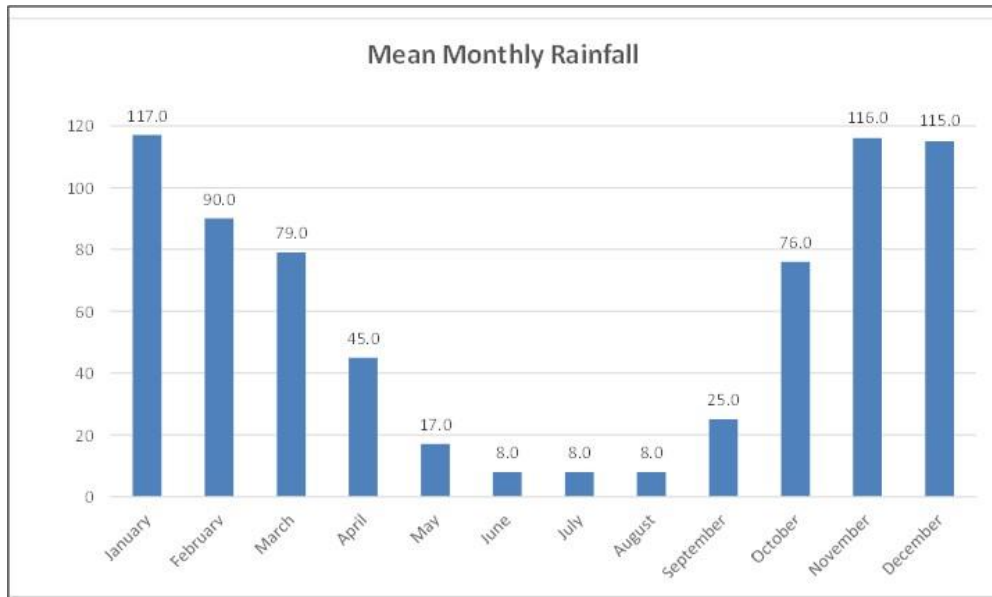


Figure 15: Mean monthly rainfall in the project area (Bailey & Pitman, 2016)

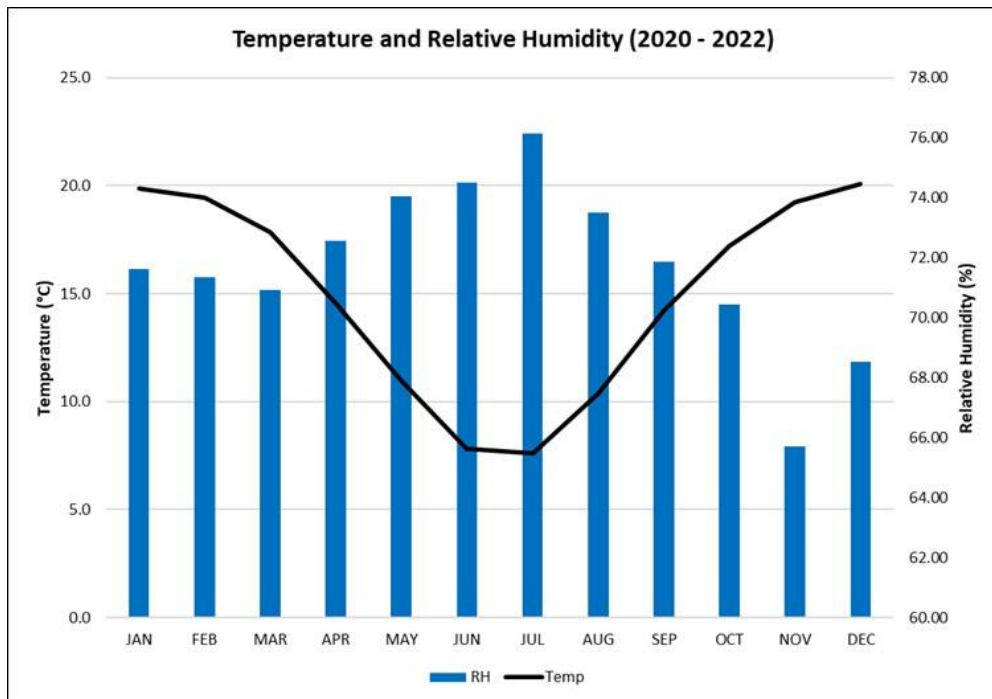


Figure 16: Monthly Average Temperature and Relative Humidity profiles at the Project area for the period January 2020 - December 2022 (Rayten, 2023)

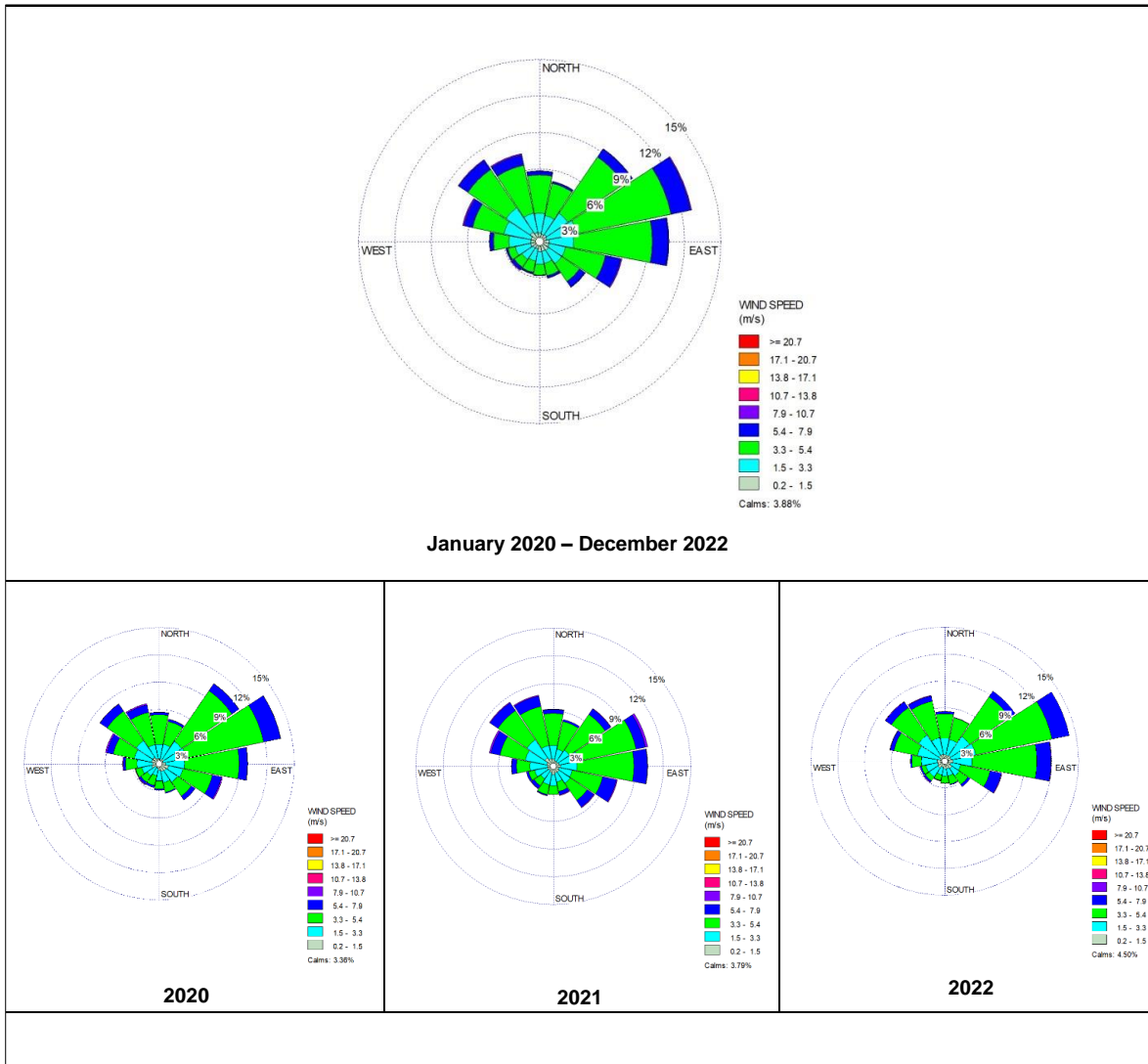
MM5 meteorological data was obtained from Lakes Environmental for the period January 2020 to December 2022. MM5 is a PSU/NCAR meso-scale model used to predict meso-scale and regional-scale atmospheric circulation. Figure 17 below provides the period wind rose plot for the Project area for the period January 2020 to December 2022. The predominant wind directions for the period are observed from the east-northeast (12.5% of the time), east (10% of the time) and northeast (9% of the time). Wind speeds for the three- year period were mostly gentle breezes (3.3 - 5.4 m/s), ranging between calm to fresh breezes (0 – 10.7 m/s). Calms are defined as wind speeds with less than 0.2 m/s, which were observed for 3.88% of the time (Rayten, 2023).

Figure 18 presents wind rose plots for the morning (AM) and evening (PM) periods from January 2020 to December 2022, demonstrating minor changes in wind patterns between the two. In the morning (AM), generally winds come from the east-northeast, east, and northeast, while the evening (PM) mostly sees winds from the east-northeast, with additional winds from the northwest and east. The overall number of variations in wind directions is similar in both periods (Rayten, 2023).

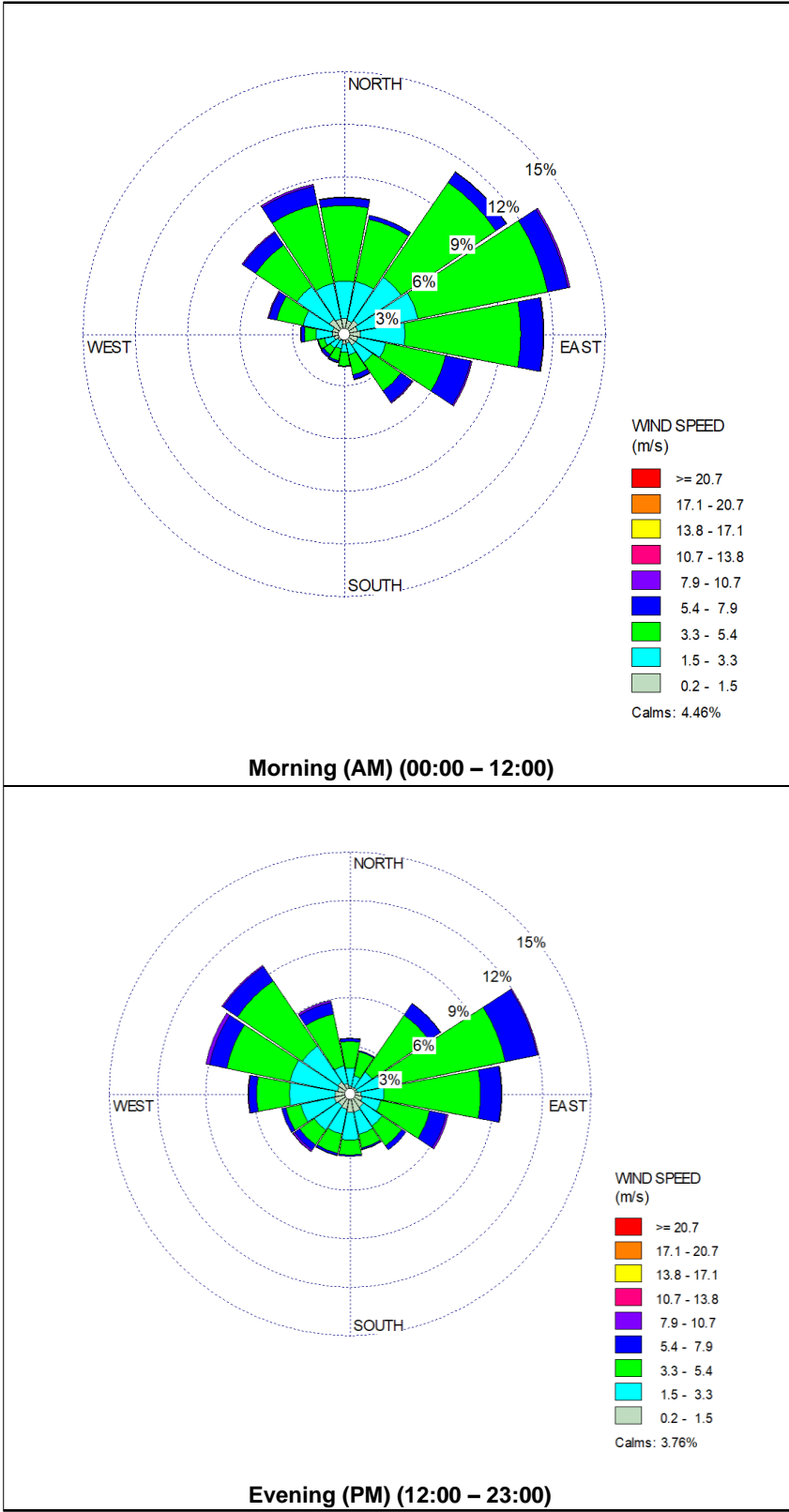
Figure 19 displays the seasonal variation in winds at the Project area. In summer and spring, prevailing winds come from the northeast, while additional north-westerly winds are observed in spring. Autumn experiences prevailing winds from the northeast and east, while winter sees winds from the east, east-northeast, and southeast. South-westerly and southeasterly winds are less frequent in both autumn and winter. Throughout all seasons, wind speeds range from gentle to fresh breezes, indicating a lower likelihood of dust emissions caused by wind (Rayten, 2023).

According to the prevailing wind patterns from January 2020 to December 2022, emissions from activities at the mine are expected to be carried towards the west-southwest, west, and southwest directions. The wind speeds during this period generally do not exceed 10.7 m/s, which means that fugitive dust emissions and effective dispersion from mining activities may occur less frequently. However, it is important to note that higher wind speeds can lead to dust emissions from open areas like stockpiles (Rayten, 2023).





**Figure 17: Period Wind Rose Plots for the Project area for the period January 2020 - December 2022 (Rayten, 2023)**



**Figure 18: Morning (AM) (00:00 - 12:00) and Evening (PM) (12:00 - 23:00). Period Wind Rose Plots for the Project area for the Period January 2020 - December 2022 (Rayten, 2023)**

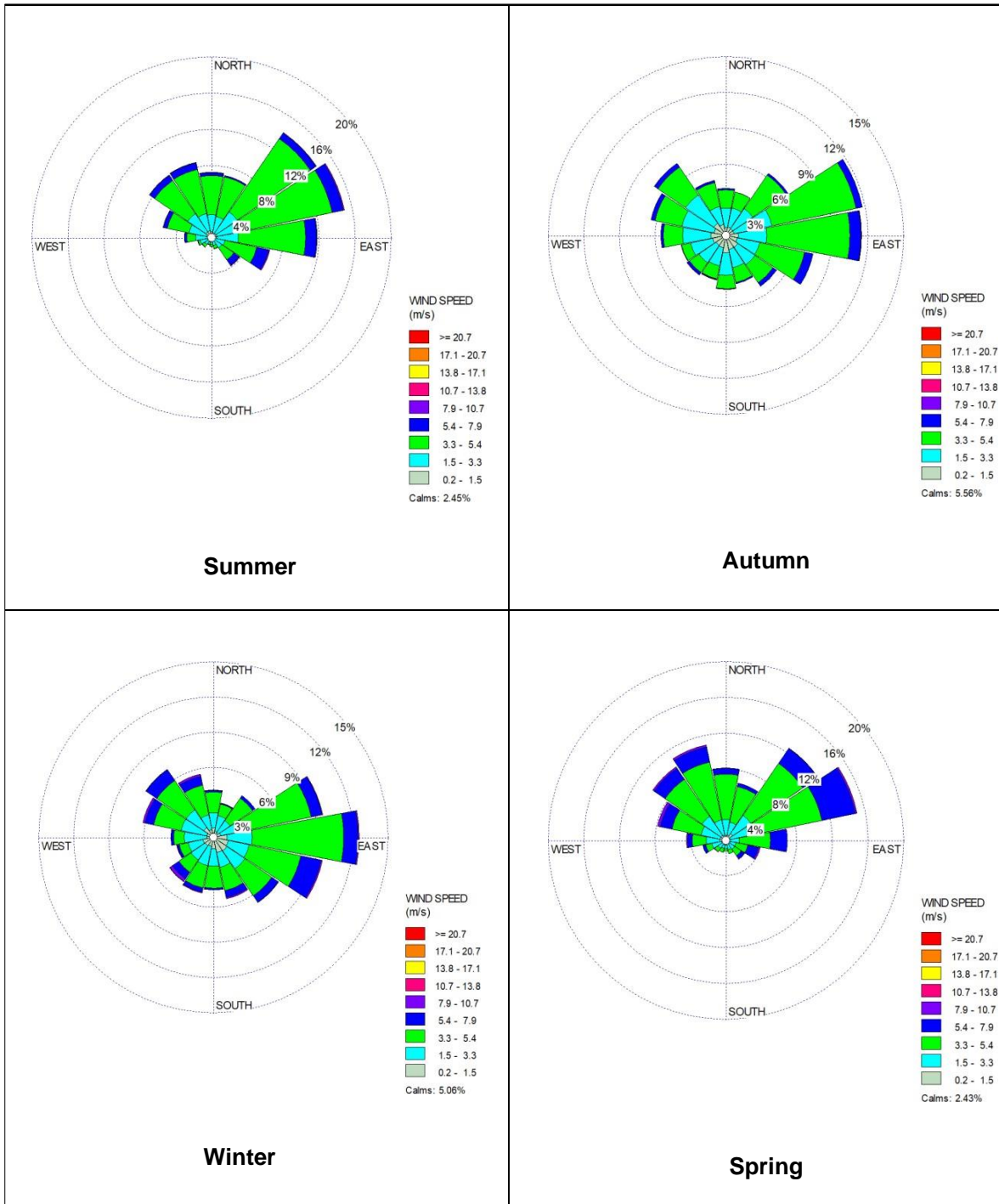
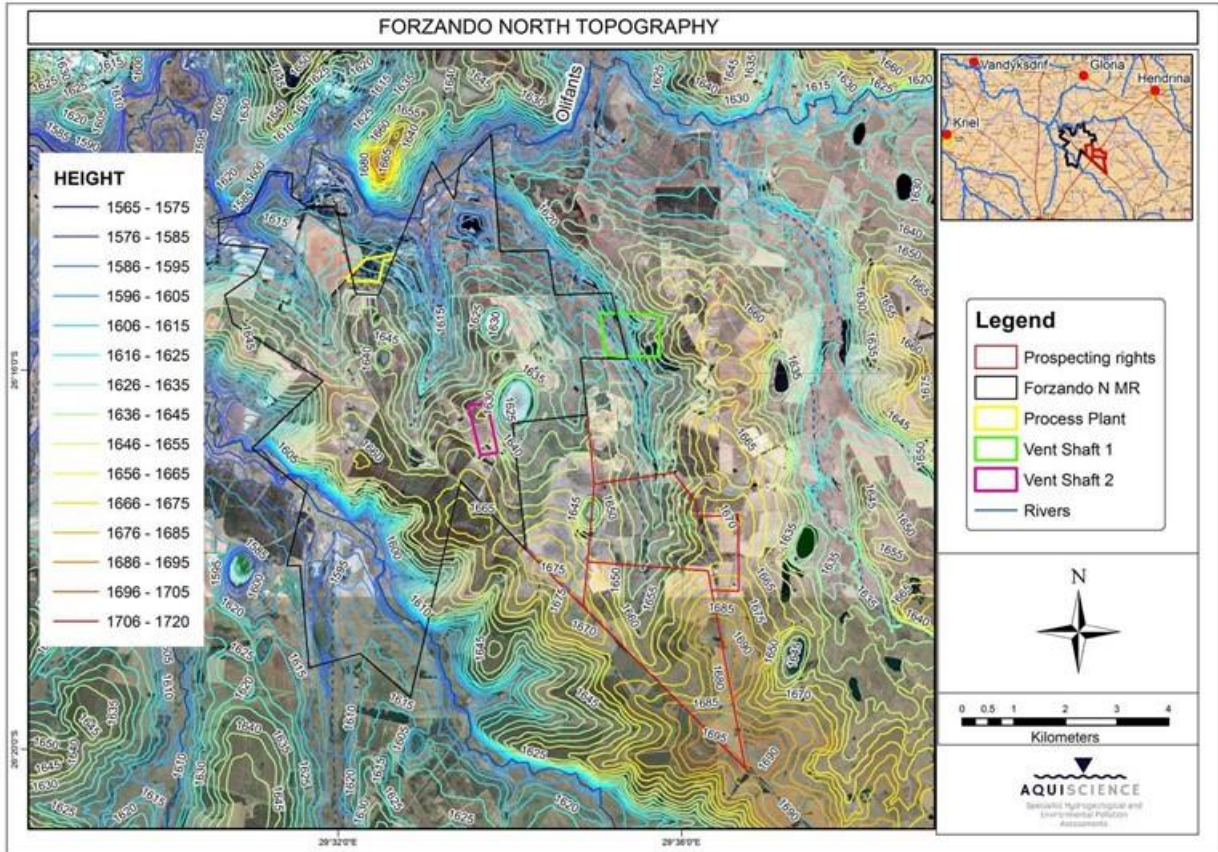


Figure 19: Seasonal Variation of Winds for the Project area for the Period January 2020 - December 2022 (Rayten, 2023)

## 9.2 Topography

The Project area is characterised by gently undulating topography. Surface elevations at the boundaries range from ~1600 meters above mean sea level (mamsl) on the higher lying areas to approximately 1595 mamsl at the drainages (Plan 9).



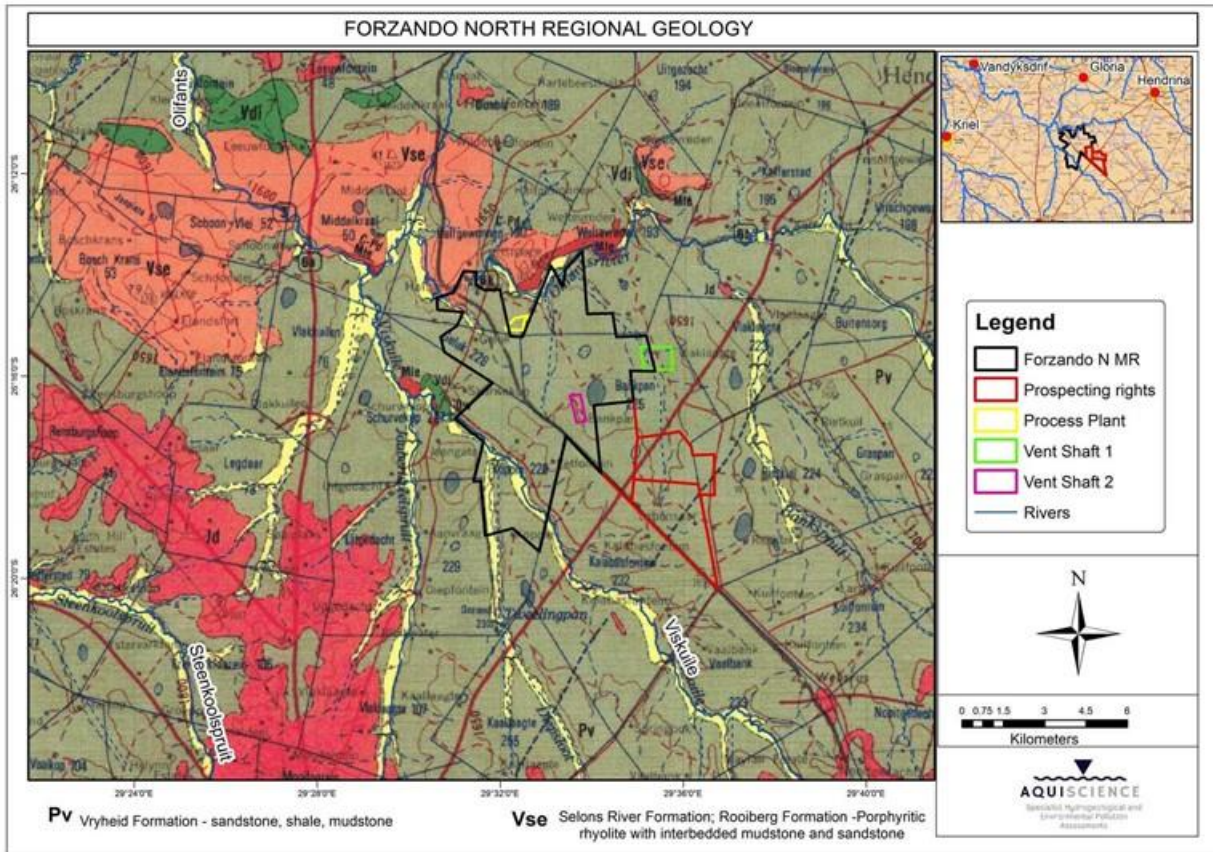
Plan 9: Topography (Aquiscience, 2023)

## 9.3 Geology

The 2628 East Rand 1:250 000 geological map showing the regional geology is shown Plan 10 . The majority of the project area is composed of Karoo-aged Vryheid Formation (Pv), consisting of sandstone, shale, and coal. A small section in the northwest is made up of Vaalium-aged Selons River rhyolite (Vse). Along the Olifants River and Viskulle River, there are alluvial deposits that have high transmissivity and storage capacity due to being river deposits. Depending on their interconnection with underlying hard rock aquifers, the alluvial material can significantly contribute to the underlying aquifers (Aquiscience, 2023).

The area has a weathered zone that ranges from 5 to 24 meters with an average of 10.8 meters, followed by fractured sandstone and shale. Two mineable coal seams, 2- and 4 Seam, are located beneath the weathered and fractured zones. The No. 4 Seam is relatively consistent in most of the area but thins out towards the south, with a thickness ranging from 2.5 to 5 meters and located approximately 50.1 meters below the roof. There is an interburden of sandstone averaging 21 meters between the 4 Seam floor and 2 Seam roof elevation. The thickness of 2

Seam ranges from 0.9 to 4.9 meters with an average of 2.83 meters, and it is less developed to the south due to dolerite intrusions. The area has numerous dolerite sills and dykes, with felsite expected to occur at depths greater than or equal to 130 meters below the surface (Aquiscience, 2023).



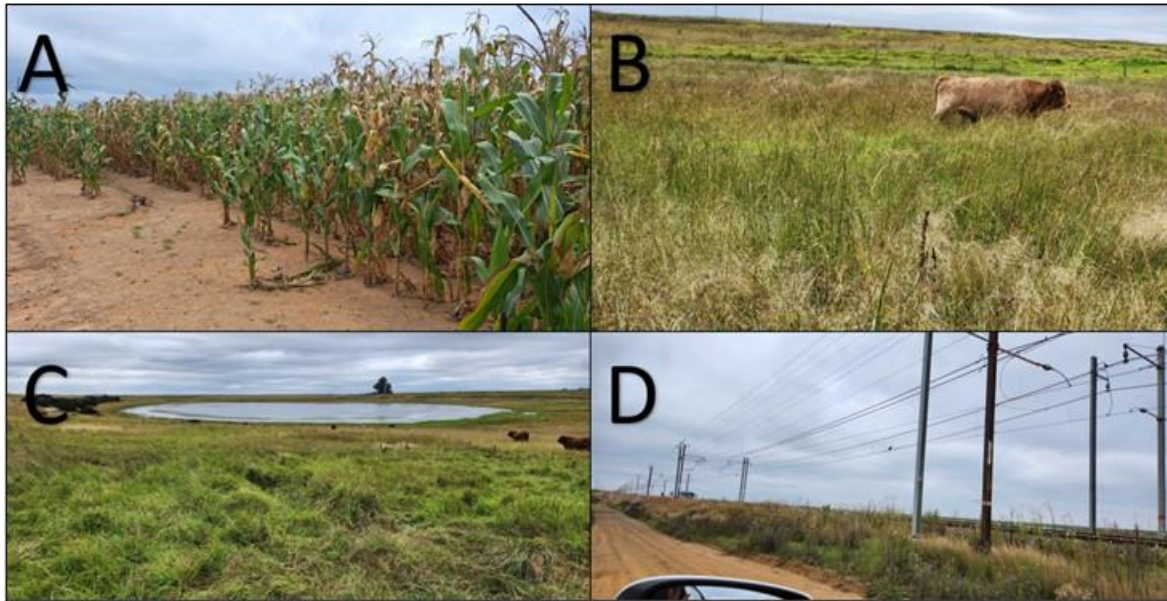
**Plan 10: Geological Setting (Aquiscience, 2023)**

#### 9.4 Soils, Land Use and Land Capability

The Project area can be classified as rural in nature, with a few informal residential settlements and farmsteads located in close proximity. Surrounding land use includes agriculture (cultivation and grazing), waterbodies and mining (coal). Servitudes are associated with the existing powerlines, farm roads and the Usuthu bulk water supply pipeline which runs parallel to the D622 road.

The following land uses were identified using aerial imagery and ground-truthed during the soil and agricultural potential assessment (TBC, 2023a):

- Mining;
- Bare areas;
- Agriculture crops;
- Natural veld;
- Grazing lands;
- Plantation;
- Urban;
- Built-up;
- Waterbodies; and
- Wetlands.



**Figure 20: Land uses identified within the Project area (TBC, 2023a)**

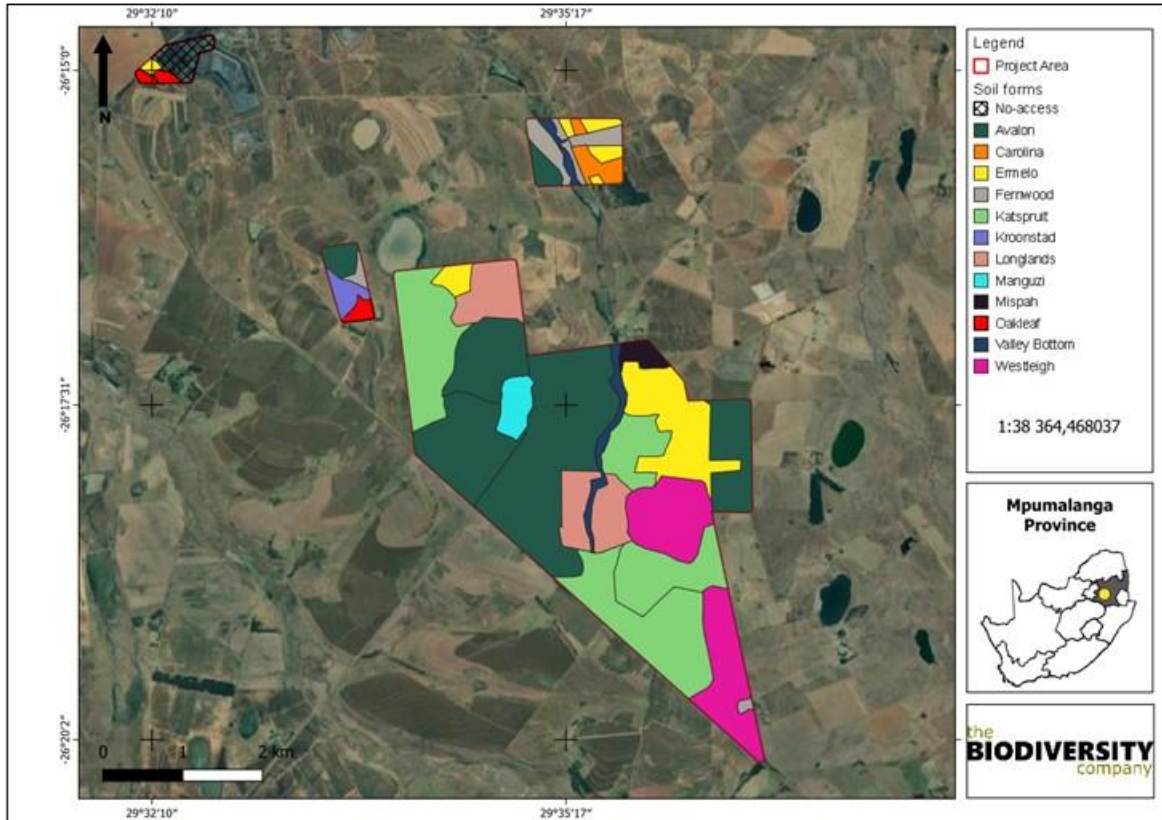
The Natural Agricultural Resources Atlas identifies the Project site as falling within the Central Mpumalanga Protected Agricultural Area (Type: Rainfed; Rating B) (<https://ndagis.nda.agric.za/portal/apps/webappviewer/index.html?id=cf56d2431dd8437da173144811d89ef7>). The assigned priority ratings range from A to F, with A being the highest priority for conservation of agricultural resources (DALRRD, 2020).

The Project area falls within the Bb 4 land type. The Bb 4 land type is characterised with Avalon, Glencoe, Longlands and Rensburg soil forms following the Soil Classification Working group (2018) with the occurrence of other soils also in the landscape. The Bb 4 land type is also characterised by plinthic catena with upland duplex and rare marginalitic soils. The expected soils can be dystrophic and/or mesotrophic (TBC, 2023a).

The Soil and Agricultural Potential Assessment identified ten representative soil forms within the Project area, including Ermelo, Carolina, Avalon, Westleigh, Fernwood, Kroonstad, Oakleaf, Didema, Katspruit and Mispah soil forms. These soil forms have been delineated and illustrated in Plan 11 and described according to depth, clay percentage, indications of surface crusting, signs of wetness and percentage rock (Table 14) (TBC, 2023a).

The delineated soil forms were clipped into the seven different slope classes (0-5%, 5-10%, 10-15%, 15-20%, 20-25%, 25-30% and >30%) to determine the land capability of each soil form. Accordingly, the most sensitive soil forms associated with the project area are restricted to land capability 2, 3 and 4 classes and the non-sensitive soil forms are restricted to land capability 6 (Table 15 - Table 16). From the land capability classes, the land potential levels have been determined as per the methodology detailed in the Report (Appendix F 2). Where land capability 2 has been reduced to land potential level 3, land capability 3 and 4 have been reduced to a land potential level 4 and land capability 6 has been reduced to land potential level 5 due to climatic limitations (TBC, 2023a).

The classified land potential classes (Table 17) are associated with arable lands and can be used for rotation crops and long-term leys. The overall sensitivity of the Project area can be categorised as “Moderately High” which also concurs with the agricultural themes for the DEA Screening Tool (Appendix B).



Plan 11: Soil Forms (TBC, 2023a)

**Table 14: Summary of soil forms identified in the Project area**

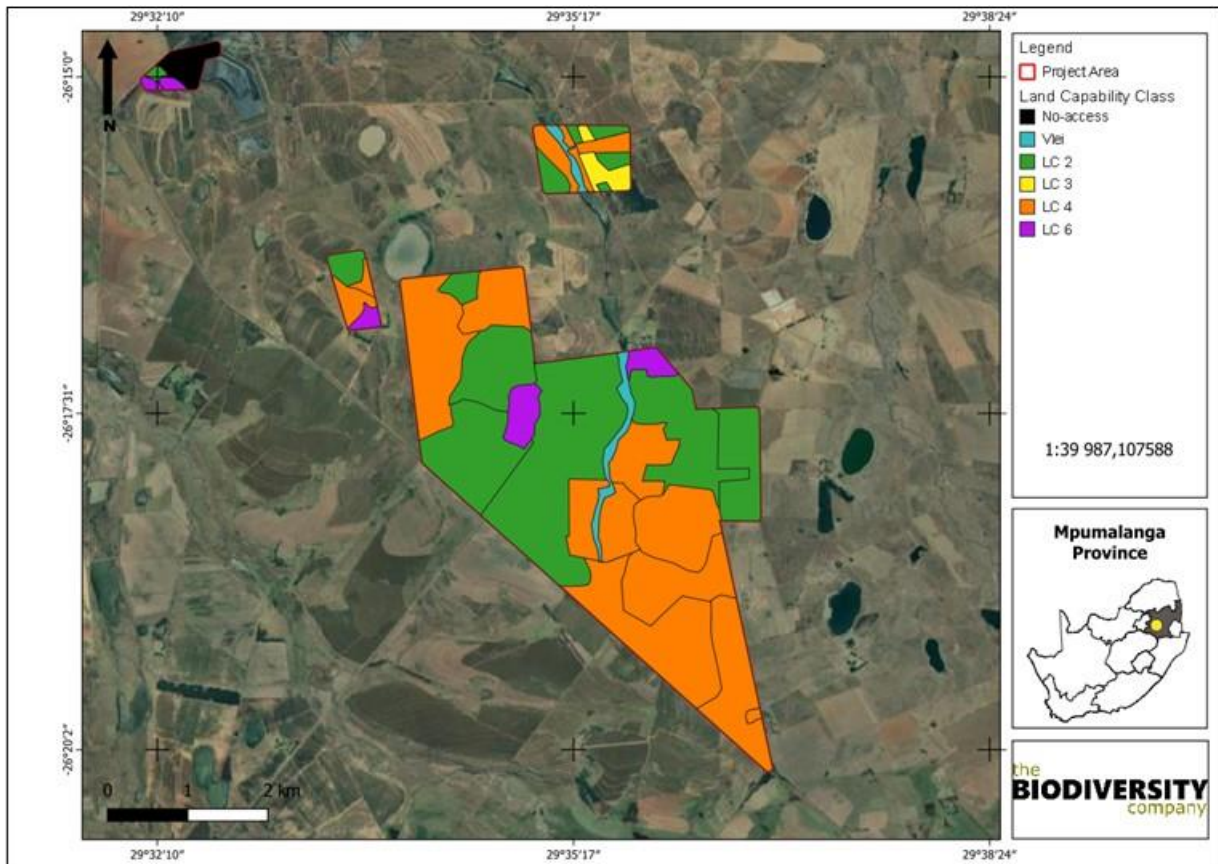
	A-horizon					B-horizon				B-horizon/C-horizon			
	Depth (mm)	Clay (%)	Signs of wetness	Rock %	Surface crusting	Depth (mm)	Clay (%)	Signs of wetness	Rock %	Depth (mm)	Clay (%)	Signs of wetness	Rock %
<b>*Ermelo</b>	400	0-15	None	0	None	400 – 1200	0-15	Present	0	N/A			
<b>*Carolina</b>	300	0-15	None	0	None	300 - 1200	0- 15	None	0	N/A			
<b>*Avalon</b>	250	0-15	None	0	None	250 - 500	0-15	Present	0	500-1200	0-15	W2	Only plinthic
<b>*Westleigh</b>	300	0-15	None	0	None	300 - 1200	0-15	W2	Only plinthic	N/A			
<b>*Fernwood</b>	200	0-15	None	0	None	200 – 1200	0-15	W4	0	N/A			
<b>Kroonstad</b>	300	0-15	W4	0	None	300 – 550	0-15	W4	0	>550	>35	W4	0
<b>*Oakleaf</b>	200	0-15	None	0	None	>200	0-15	None	0	N/A			
<b>Didema</b>	300	0-15	W4	0	None	>300	N/A	None	100				
<b>*Katspruit</b>	300	0-15	W4	0	None	300 - 1200	>35	W4	0	N/A			
<b>Mispah</b>	200	0-15	None	0	None	>200	N/A	None	100	N/A			

W4- Semi-permanently or permanently wet with water visible on surface.

W2- Temporarily wet during wet season. No mottling within top 200 mm with signs of wetness between 200 and 500 mm.

(\*)- The delineated soil forms differ significantly in terms of depths. The value illustrated in the above-mentioned table represents the average depth between all identified soils for the specific soil form.





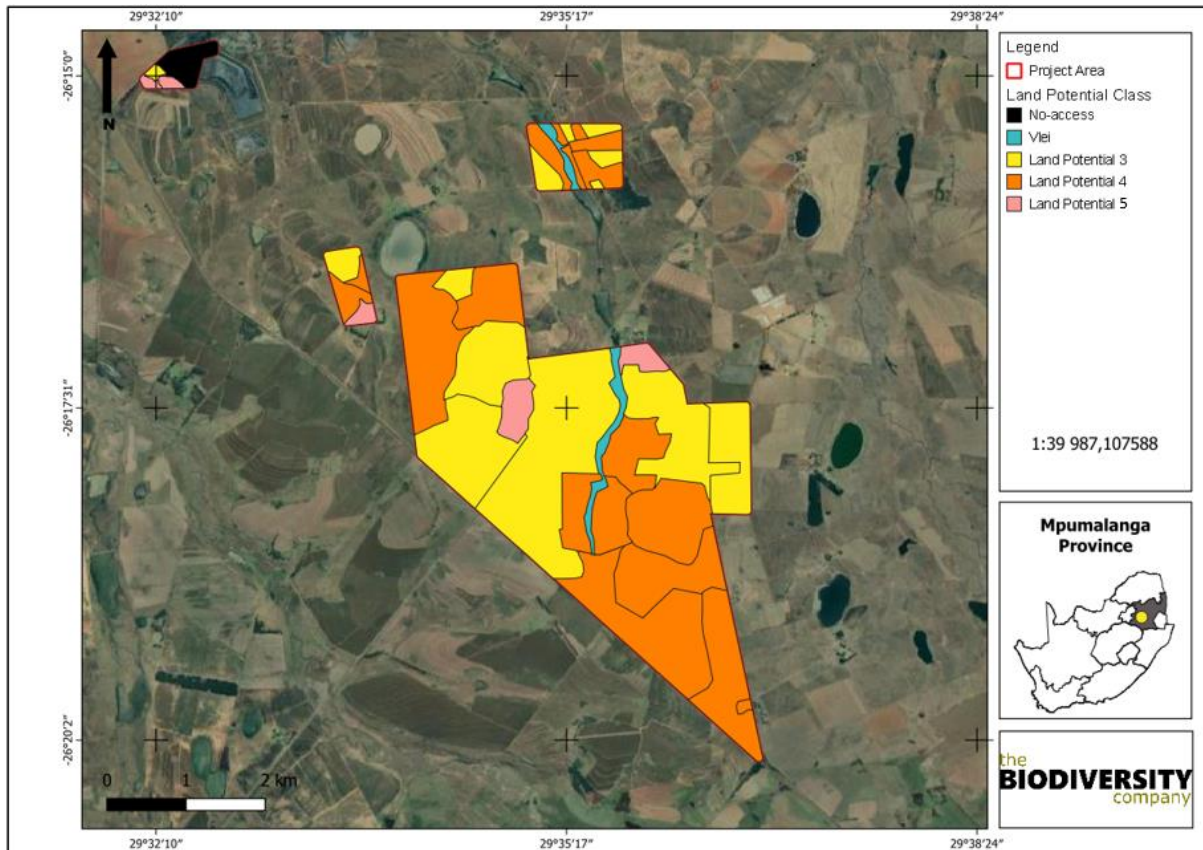
**Plan 12: Land Capability (TBC, 2023a)**

**Table 15: Land Capability for the soils within the Project Area (TBC, 2023a)**

Land Capability Class	Definition of Class	Conservation Need	Use-Suitability	Land Capability Group	Sensitivity
2	High potential: Very infrequent and/or minor limitations due to soil, slope, temperatures or rainfall.	Appropriate contour protection must be implemented and inspected.	Rotation crops and ley (50%)	Arable	High
3	Moderate limitations. Some erosion hazard	Special conservation practice and tillage methods	Rotation crops and ley (50%)	Arable land	High
4	Severe limitations. Low arable potential. High erosion hazard.	Intensive conservation practice	Long-term leys (75%)	Arable land	Moderate
6	Limitations preclude cultivation. Suitable for perennial vegetation.	Protection measures for establishment, e.g., sod-seeding.	Veld, pasture, and afforestation.	Grazing land	Low

**Table 16: Land Capability classes and Land Potential classes of the identified soil forms (TBC, 2023a)**

Soil Forms	Land Capability Classes	Land Potential
Avalon	2	L3
Carolina	3	L4
Ermelo	2	L3
Fernwood	4	L4
Katspruit	4	L4
Kroonstad	4	L4
Longlands	4	L4
Manguzi	6	L5
Mispah	6	L5
Oakleaf	6	L5
Westleigh	4	L4



**Plan 13: Land Potential (TBC, 2023a)**

**Table 17: Land potential for the soils within the project area (TBC, 2023a)**

Land Potential	Description of Land Potential Class	Sensitivity
3	<b>Good potential.</b> Infrequently and/or moderate limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implementation and inspected.	High
4	<b>Moderate potential.</b> Moderately regular and/or severe to moderate limitations due to soil, slope, temperatures or rainfall. Appropriate permission is required before ploughing virgin land.	Moderate
5	<b>Restricted potential.</b> Regular and/or moderate to severe limitations due to soil, slope, temperatures or rainfall.	Low
Disturbed	N/A	None

## 9.5 Surface Water

### 9.5.1 Water Management Area (WMA)

The proposed Project area falls within the Water Management Area 2: Olifants and in the B11A quaternary catchment (Plan 14).

Formal economic activity in the Olifants WMA is highly diverse and is characterised by commercial and subsistence agriculture (both irrigated and rain fed), diverse mining activities, manufacturing, commerce and tourism. Large coal deposits are found in the Emalahleni and Middelburg areas (Upper Olifants) and large platinum group metal deposits are found in the Steelpoort, Polokwane and Phalaborwa areas. The WMA is home to several large thermal power stations, which provide energy to large portions of the country. Extensive agriculture can be found in the Loskop Dam area, the lower catchment near the confluence of the Blyde and Olifants Rivers as well as the in the Steelpoort Valley and the upper Selati catchment.

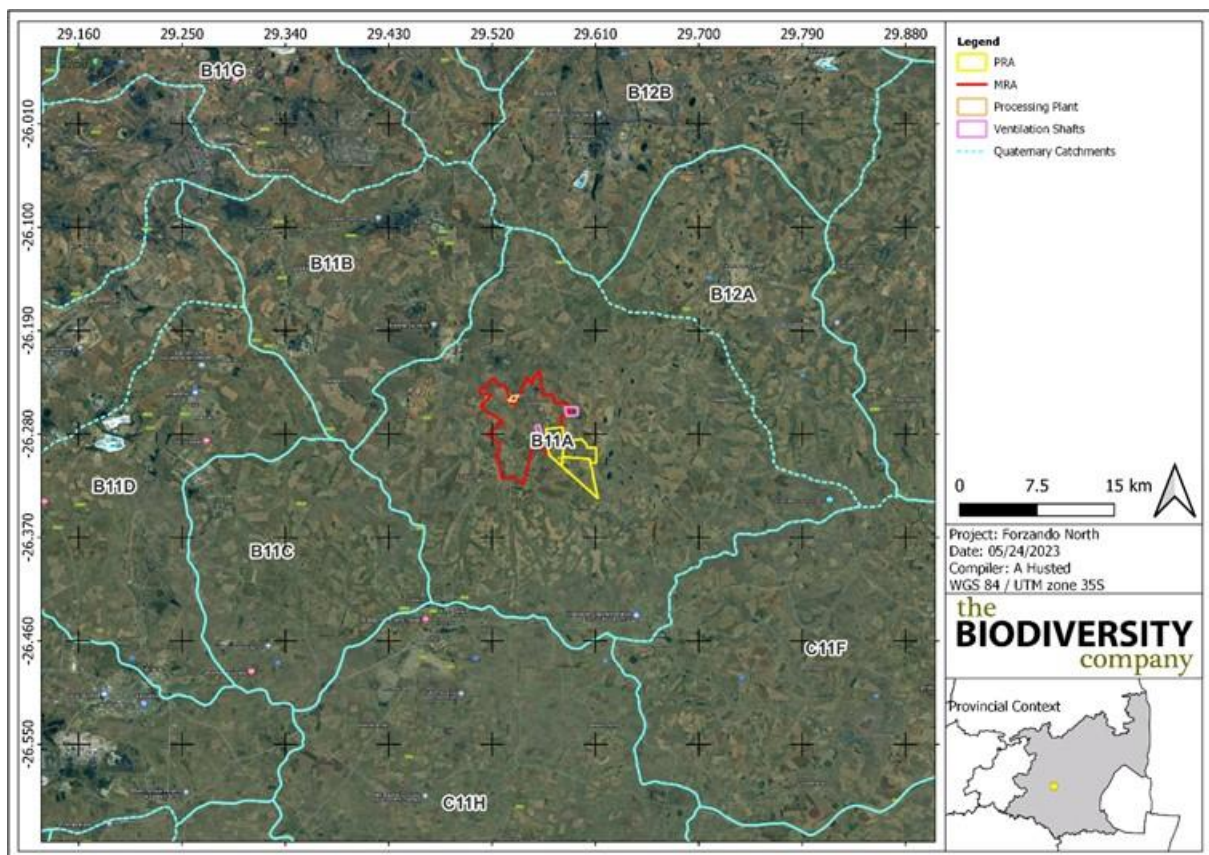
The Olifants Catchment Management Agency (CMA) was officially established by Regulation 168 of 2015 following the evaluation of the CMA business case published by the Department of Water Affairs (DWA, October 2013). At the time of writing this report, no governing board for the Olifants CMA has been appointed and no Catchment Management Strategy (CMS) for the Olifants WMA has been published. A regional steering committee (Upper Olifants Catchment Technical Working Group) is operational.

Quaternary Catchment information is summarised in Table 18.

**Table 18: Quaternary Catchment Information (DWA, 2010)**

Attribute/Catchment	B11A
Quaternary catchment area (km <sup>2</sup> )	954.4
Mean annual rainfall (mm/a)	699
Mean annual runoff (mm/a)	39
Baseflow (mm/a)	7
Mean annual evaporation (mm/a)	1500 - 1600
Total groundwater use (Mm <sup>3</sup> /a)	0.05

Attribute/Catchment	B11A
Ecoregion	Highveld
Present Eco Status Category	B
Recharge (mm/a)	42
Exploitation potential (Mm <sup>3</sup> /a)	10
Vegetation type	Moist Sandy Highveld Grassland
Soil	SaCILm
Groundwater General Authorisation m <sup>3</sup> /ha/a	75



**Plan 14: Quaternary Catchments (TBC, 2023b)**

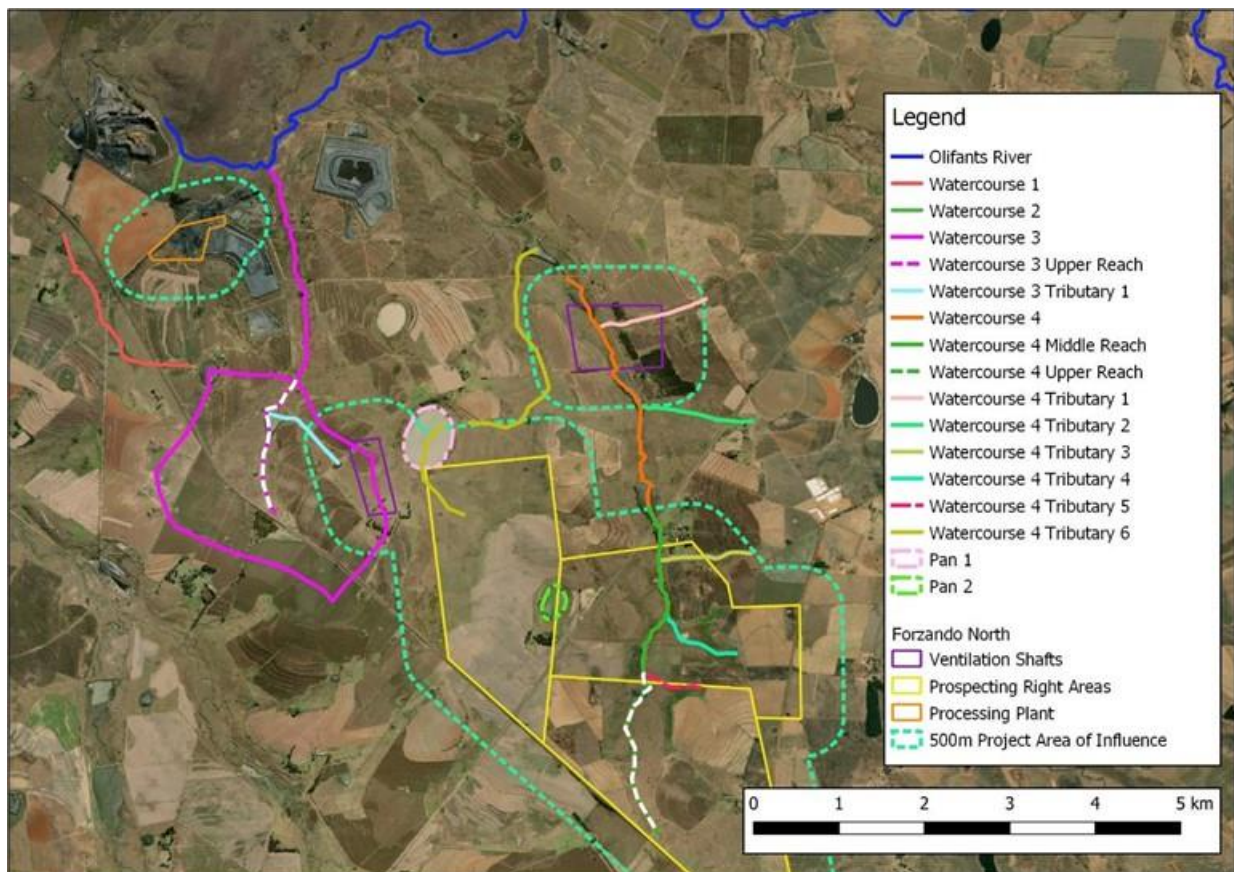
### 9.5.2 Hydrology

Five major watercourses were delineated for the project, along with seven tributaries. There were also two water collection pans (or depressions) identified in the area (see Figure 21).

Surface water drainage will occur towards the main drainage lines, being the Olifants River to the north and Viskulle River to the west and south. The Olifants River flows in a western direction along the northern boundary of Forzando North MRA. The Viskulle River flows north towards the Olifants River (Aquiscience, 2023).

All other watercourses on the site had no name specified on the topographical map and consequently they were designated a number in the Flood line Assessment Report (H&H, 2023). For the purposes of calculation of peak flows, Watercourse 3 was divided into two reaches and Watercourse 4 was divided into three reaches (as indicated in Figure 21). The reason for this division of watercourses into reaches was to obtain separate flow rates, such that the flood lines could be more accurately estimated in the flood routing calculations (H&H, 2023).

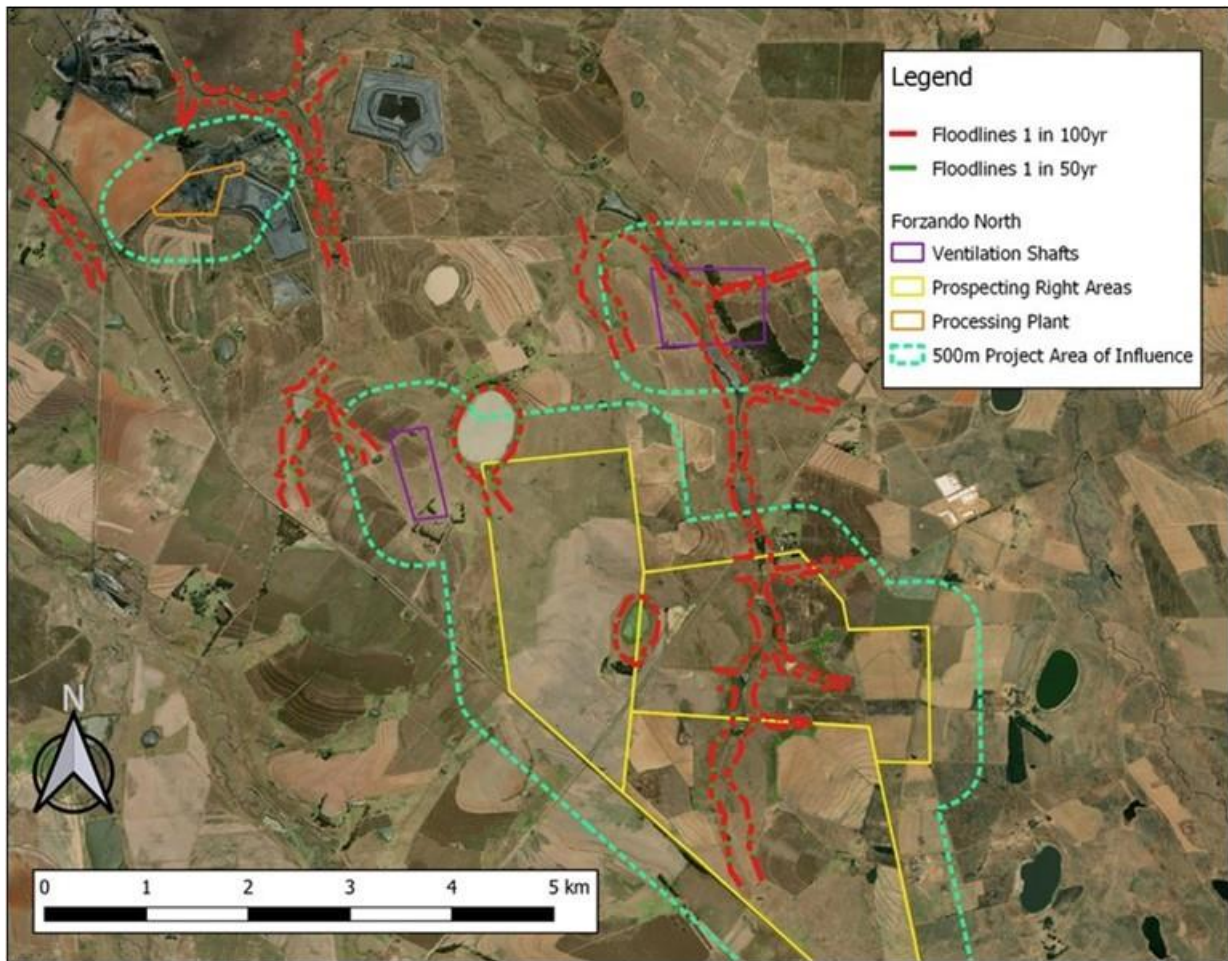
The land cover for catchments in the Project area is primarily agricultural use. The results of the probable 1:50 and 1:100 year flood events as determined are shown in Table 19. For the Olifants River and Watercourse 4, the standard design flood method produced larger peak floods than the rational method. A conservative approach is always favoured given the variables and consequently, the standard design flood method was therefore chosen to be used for the flood routing calculations for these catchments (see Figure 22) (H&H, 2023). A copy of the flood line assessment report is included as Appendix F 3.



**Figure 21: Watercourses identified in the Project area (H&H, 2023)**

**Table 19: Calculated Peak Flows (H&H, 2023)**

Detail	Catchment Area (km <sup>2</sup> )	C (avg'd)	Tc (hr)	Q50 (m <sup>3</sup> /s)		Q100 (m <sup>3</sup> /s)	
				Alt Rat	Std. design flood method	Alt Rat	Std. design flood method
Olifants River	427.35	0.42	15.04	386.25	387.17	436.93	488.53
Watercourse 1	3.87	0.41	1.15	44.83		50.71	
Watercourse 2	0.56	0.41	0.71	10.52		11.90	
Watercourse 3	10.45	0.41	1.95	71.85		81.28	
Watercourse 3 Upper Reach	5.02	0.41	1.19	56.18		63.55	
Watercourse 3 Tributary 1	1.11	0.41	1.19	12.43		14.06	
Watercourse 4	21.86	0.41	3.09	93.93	109.36	106.25	139.42
Watercourse 4 Mid Reach	13.84	0.41	2.09	88.07		99.63	
Watercourse 4 Upper Reach	5.93	0.41	1.59	49.59		56.10	
Watercourse 4 Tributary 1	1.44	0.41	1.02	18.84		21.32	
Watercourse 4 Tributary 2	2.25	0.41	1.10	27.30		30.88	
Watercourse 4 Tributary 3	1.03	0.41	0.95	14.34		16.23	
Watercourse 4 Tributary 4	1.76	0.41	1.12	20.77		23.50	
Watercourse 4 Tributary 5	0.71	0.41	1.00	9.46		10.70	
Watercourse 4 Tributary 6	9.48	0.41	2.88	43.79		49.53	
Pan 1	4.60	0.41	1.68	36.27		41.03	
Pan 2	0.94	0.41	0.92	13.59		15.37	



**Figure 22: 1:50 and 1:100 Flood lines (H&H, 2023)**

### 9.6 Resource Class and River Health

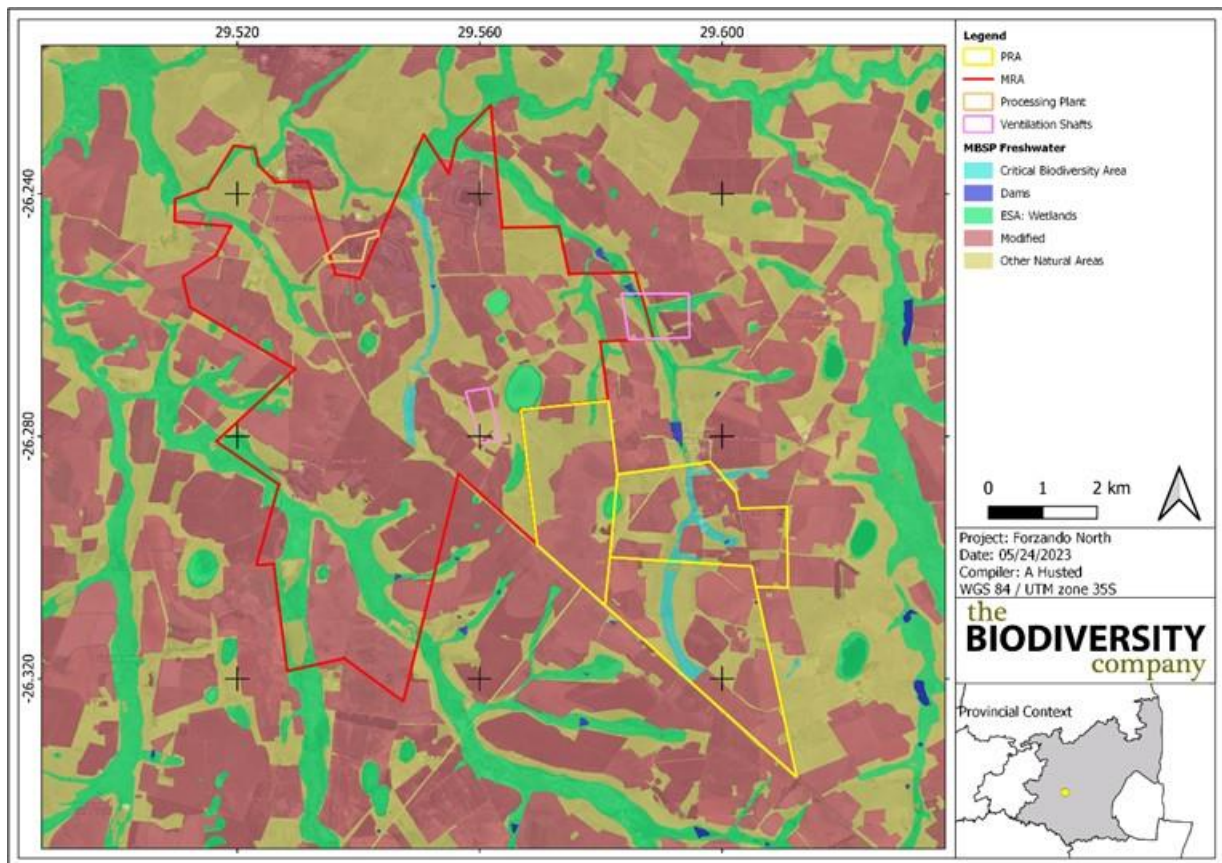
The Project area is located in one sub-quaternary reach (SQR), namely the Olifants (B11A-1369). No natural rivers were identified within the project area of influence, the affected watercourses have been identified and classified as wetland systems. The desktop Present Ecological State (PES) of the Olifants reach (B11A-1369 SQR) is classed as moderately modified (class C) (Table 20).

According to the Mpumalanga Biodiversity Sector Plan (MBSP) the Project area overlaps with aquatic features classified as Ecological Support Area (ESA) and Freshwater Critical Biodiversity Area (CBA) (refer to Plan 15).

The B11A-1369 SQR has no freshwater priority areas designated to it (Figure 23). Despite no FEPA status the preservation of water quality, riverine and wetland habitats, and their ecological functions in the SQR will help safeguard riverine habitats that sustain fish species throughout the catchment and maintain water quality for aquatic and terrestrial biota downstream. Effective management of human activities within the SQR is necessary to sustain water quality, prevent further degradation of downstream water resources, contribute to national biodiversity objectives, and promote sustainable use of water resources.

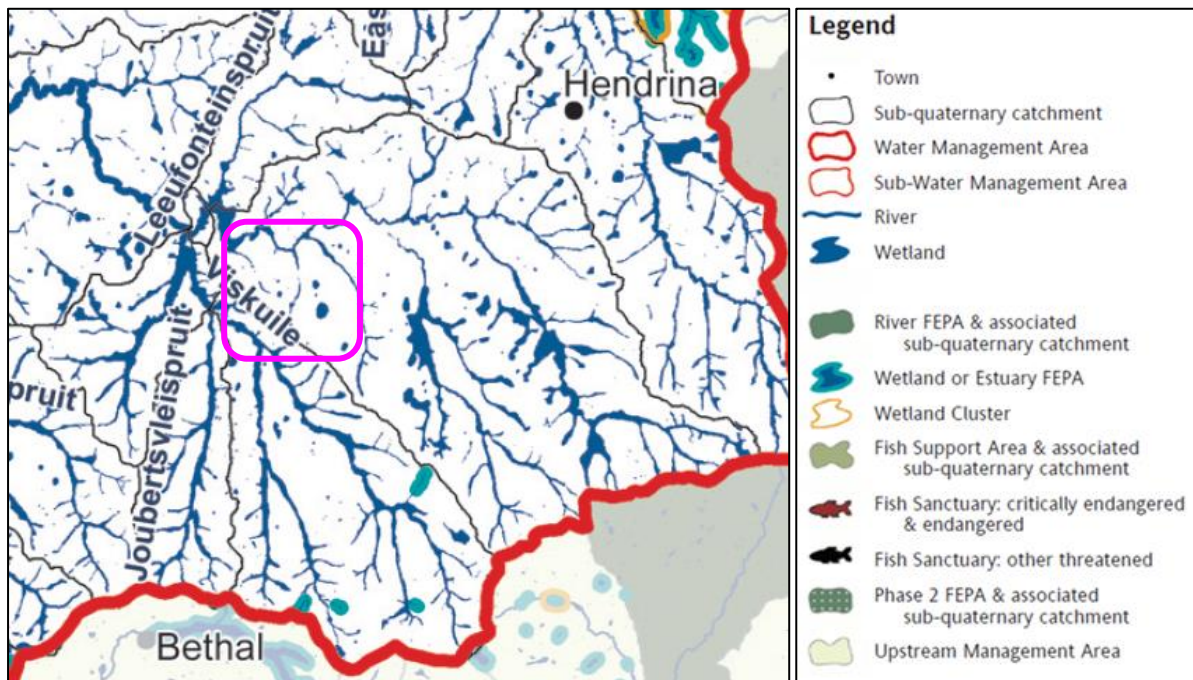
**Table 20: Present Ecological Status of B11A-1369 SQR (TBC, 2023b)**

Component/Catchment	Olifants (B11A-1369)
Present Ecological Status	Moderately Modified (class C)
Ecological Importance Class	High
Ecological Sensitivity	High
Default Ecological Category	Largely Natural (class B)



**Plan 15: Freshwater CBAs (TBC, 2023b)**





**Figure 23: FEPA map of the Olifants System, the pink square indicates the approximate location of the Project area (TBC, 2023b)**

### 9.7 Wetlands

A Freshwater Ecology Assessment was undertaken by The Biodiversity Company and is attached as Appendix F 4. The study used a 500m zone of investigation around the Project area to assess the possible sensitivities of the receiving environment, the results of which are briefly discussed below.

Wetlands are defined in the NWA as “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”

“Watercourse” is defined in the Act as any river or spring, any natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which or from which water flows and any other collection of water declared by the Minister to be a watercourse.

The National Freshwater Ecosystems Priority Areas (NFEPA) Project was a collaboration between the Council for Scientific and Industrial Research (CSIR), South African National Biodiversity (SANBI), the Water Research Commission (WRC), DWS and Department of Environmental Affairs (DEA) and many other role-players and attempted to map the freshwater ecosystem priority areas, including rivers and wetlands, throughout South Africa. The FEPA wetlands dataset mapped four wetland hydrogeomorphic (HGM) types within the Project area (Plan 16), dominated by channelled valley bottom systems. The FEPA wetland condition ranges from largely natural (Class AB) to critically modified (Class Z), whilst the wetland rankings range from Rank 5 to Rank 6. No NFEPA priority wetlands were identified within the Project area (TBC, 2023b).

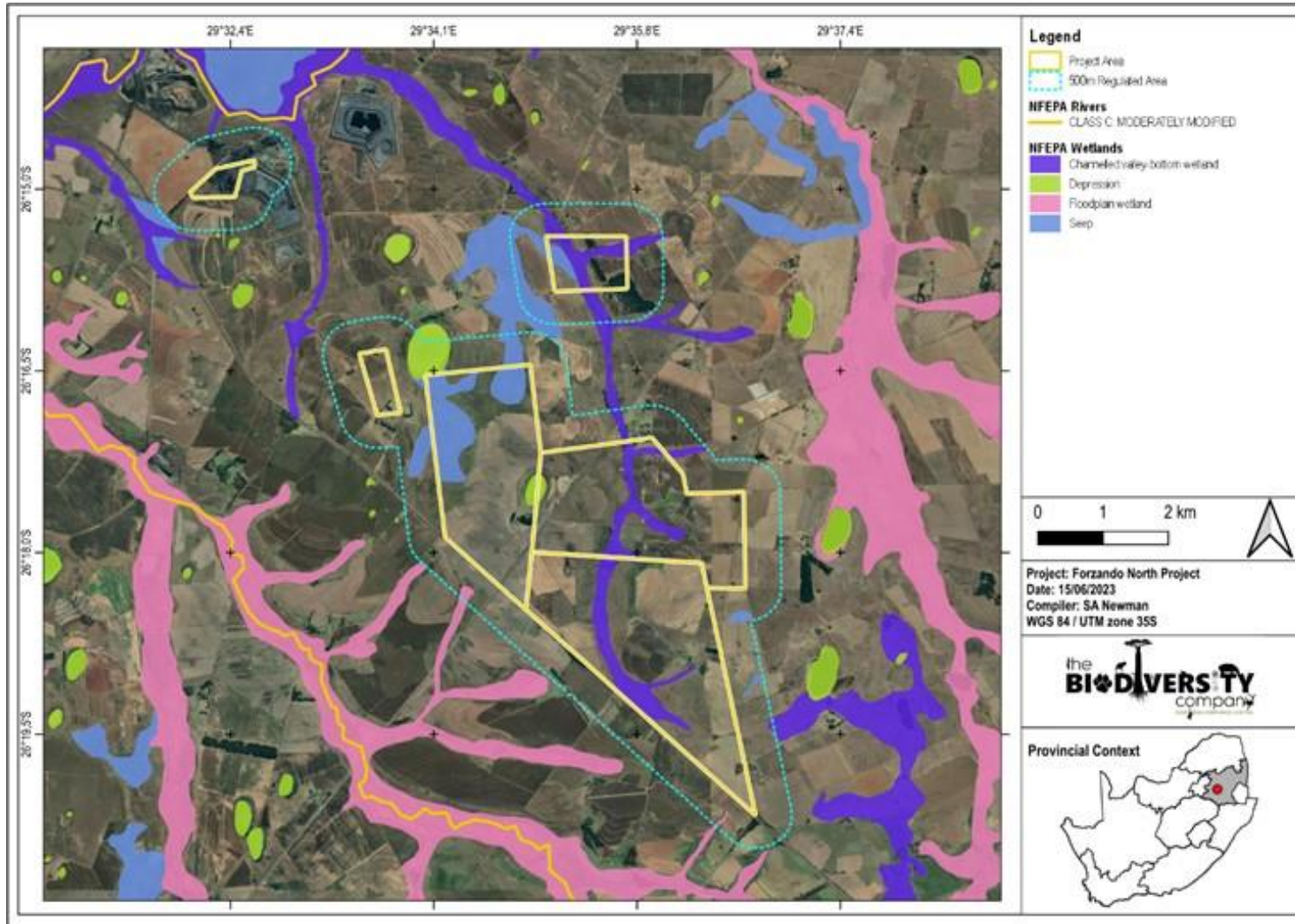
A total of 18 natural wetland units were ground-truthed and delineated by The Biodiversity Company. The wetland units represent four wetland types, namely channelled and unchannelled valley bottom systems, seepage areas and pans (or depressions). Several artificial wetlands (or dams) were also identified within the Project area (Plan 17, read together with Table 21). Some wetland units, notably HGM 3 and HGM 15 have been grouped based on the HGM type and also ecological condition. It is assumed that systems of a similar type, and also positioned in a similar landscape are likely to provide similar ecological services. Only systems at an appreciable level of risk of the project (i.e. undermined or proximal to infrastructure) have been classified and further assessed. The level 1-4 classification of these hydrogeomorphic (HGM) units as per the national wetland classification is presented in the Table 21 (TBC, 2023b).

The wetlands were found to provide a Moderately High level of ecoservices, except for seepage systems which offer an Intermediate level of service. The most significant benefits are indirect regulating and supporting services, including enhancing water quality, flood attenuation, and streamflow regulation. The wetlands are also generally considered important from biodiversity maintenance perspective. None of the wetlands are considered important in terms of their direct provisioning of harvestable resources and cultivated foods for humans (TBC, 2023b).

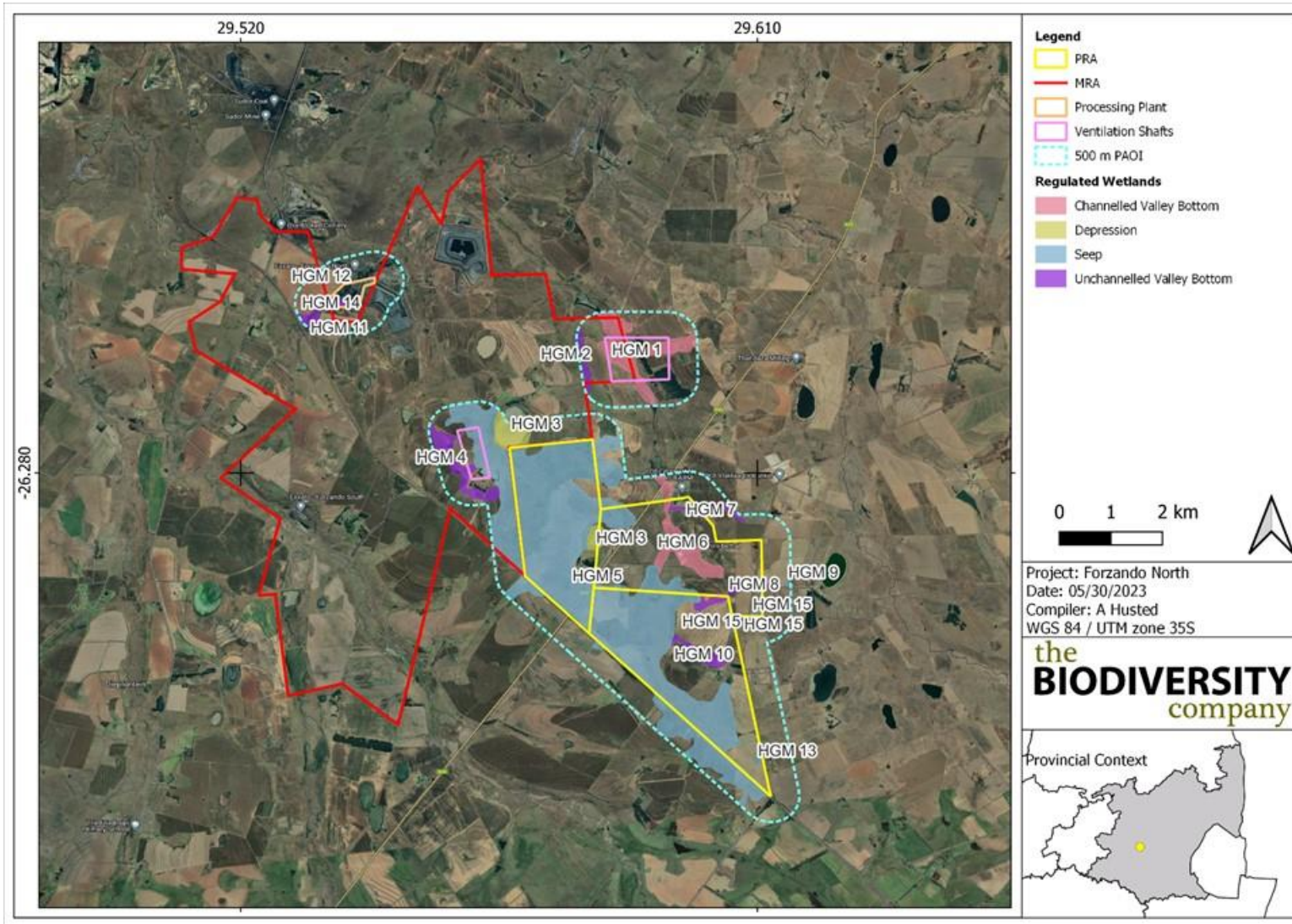
The integrity of the systems ranges from Largely Modified (class D) to Critically Modified (class F). Approximately 77% of wetlands are considered to be seriously modified. The remaining modification to the wetlands account for largely modified measuring 16% and critically modified measuring 6% (Plan 18, read together with Table 22). The land uses in the area have changed from natural to more intense commercial agriculture, and proximal mining activities. Approximately 80% of wetlands are considered to be of Marginal (class C) ecological importance and sensitivity. The importance and sensitivity of the remaining wetlands account for 3% and 16% for Low (class D) and High (class B) classifications (TBC, 2023b).

The appropriate wetland buffer zone for the Project was determined using the "Buffer zone guidelines for wetlands, rivers and estuaries" (Macfarlane et al., 2014). Buffer zones have been used in land-use planning to protect natural resources and minimize the impact of one land-use on another. The wetland buffer zone tool was utilized to calculate the suitable buffer required for the activities, acting as a "barrier" between the activities and the wetland systems. The model reveals that the largest risk posed by the activities during the operational phase is the alteration of flow patterns (increased flood peaks) and water quality, which are considered medium risks. A buffer zone of 32 m and 50 m for the processing plant and ventilation shafts, respectively, was recommended assuming that mitigation measures are implemented. However, a buffer zone is not applicable for undermining wetlands (TBC, 2023b).

The delineated wetlands have been assigned an overall high sensitivity, with the associated buffer area being assigned a medium sensitivity. The remaining extent of the Project area of influence is assigned an overall low wetland sensitivity (Plan 19) (TBC, 2023b).



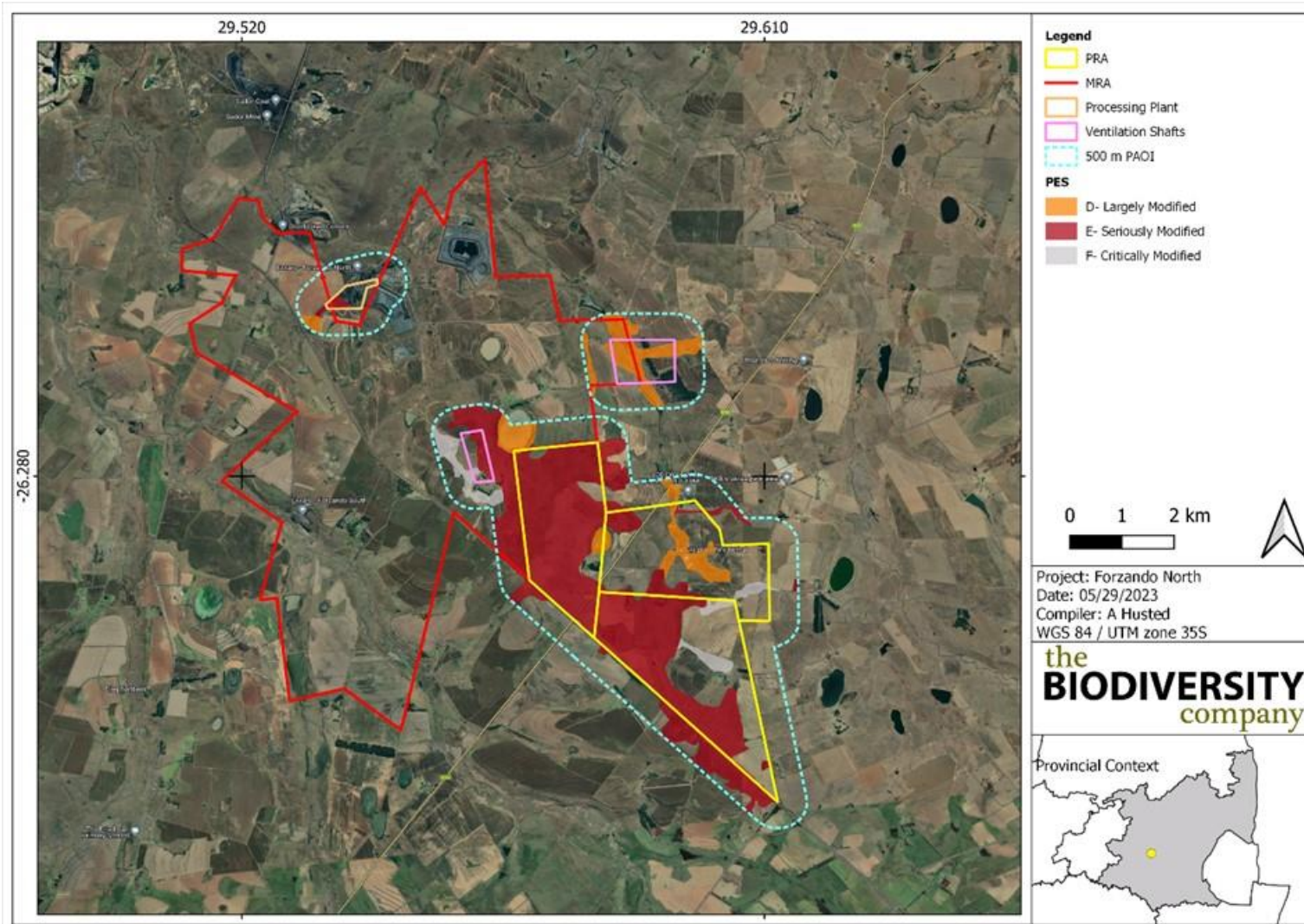
Plan 16: NFEPA wetland and river systems associated with the Project Area (TBC, 2023b)



Plan 17: Delineated Wetlands (TBC, 2023b)

**Table 21: Wetland Classification as per SANBI Guideline (TBC, 2023b)**

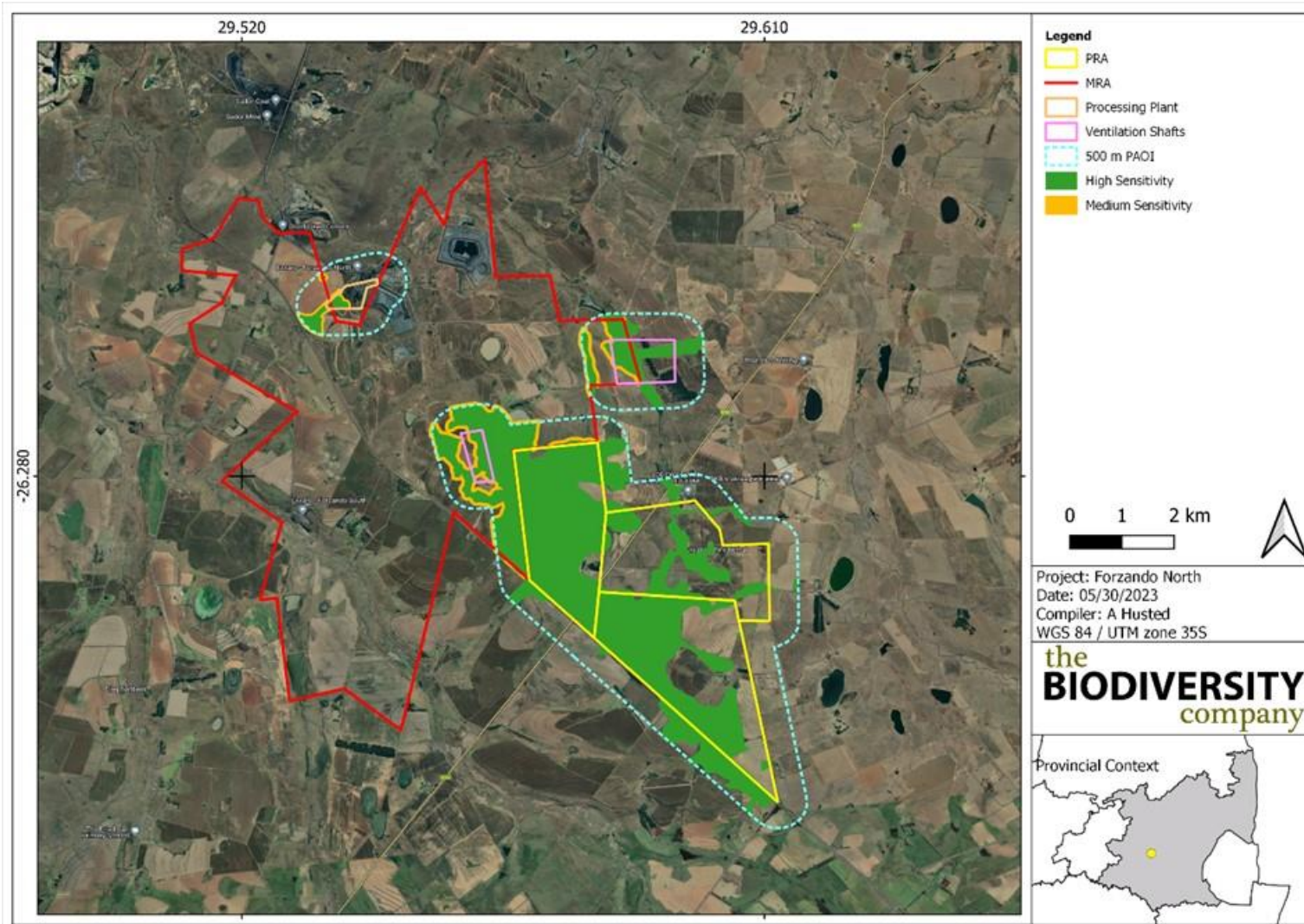
Wetland System	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	FEPA Wet Veg	Landscape Unit	4A (HGM)	4B	4C
HGM 1,6	Inland	Highveld	Mpumalanga highveld Grassland Group 4	Valley floor	Channelled valley bottom	N/A	N/A
HGM 2,4,7,8,10,11,14	Inland	Highveld	Mpumalanga highveld Grassland Group 4	Valley floor	Unchanneled valley bottom	N/A	N/A
HGM 5,9,12,15	Inland	Highveld	Mpumalanga highveld Grassland Group 4	Slope	Seep	Without channel outflow	N/A
HGM 3,12	Inland	Highveld	Mpumalanga highveld Grassland Group 4	Bench	Depression	Endorheic	Without channel inflow



Plan 18: Spatial representation of PES (TBC, 2023b)

**Table 22: Summarised results of the PES (TBC, 2023b)**

Wetland Type	Class D	Class E	Class F	Total
Channelled Valley Bottom	152.6	-	-	152.6
Unchannelled Valley Bottom	21.3	20.3	83.8	125.4
Depression	48.0	0.5	-	48.5
Seep	1.5	1065.4	-	1066.8
<b>Total</b>	<b>223.4</b>	<b>1086.1</b>	<b>83.8</b>	<b>1393.3</b>
<b>Percentage</b>	<b>16.03%</b>	<b>77.95%</b>	<b>6.01%</b>	<b>100.00%</b>



Plan 19: Assigned Sensitivity Areas (TBC, 2023b)

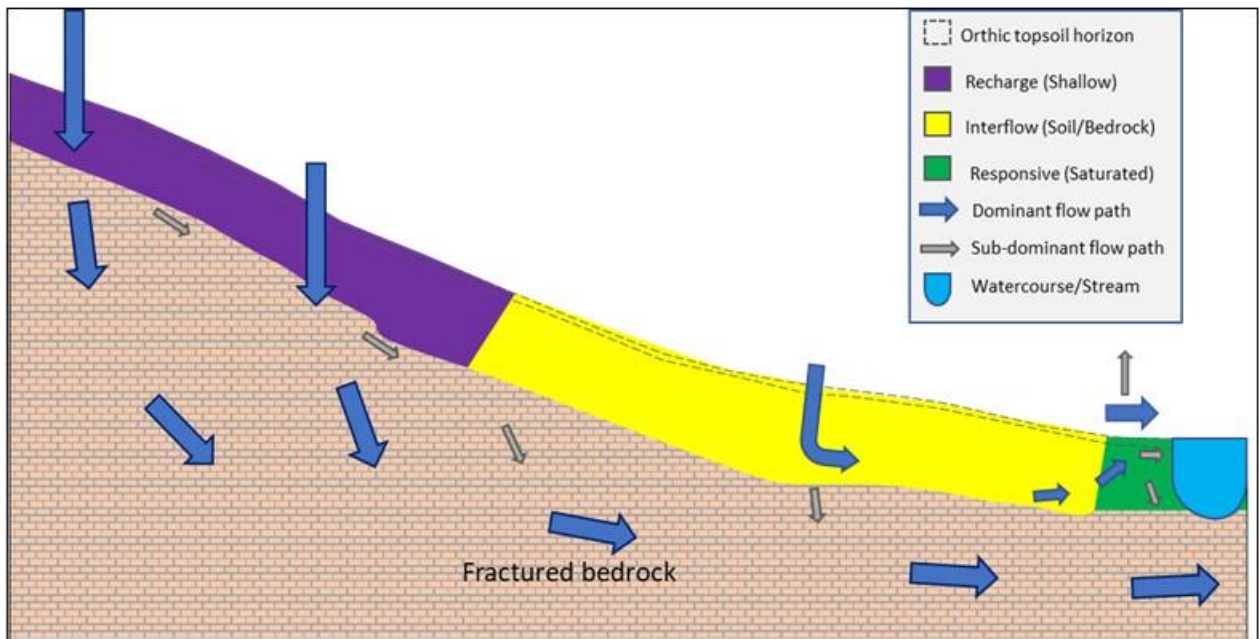


### 9.8 Hydropedology

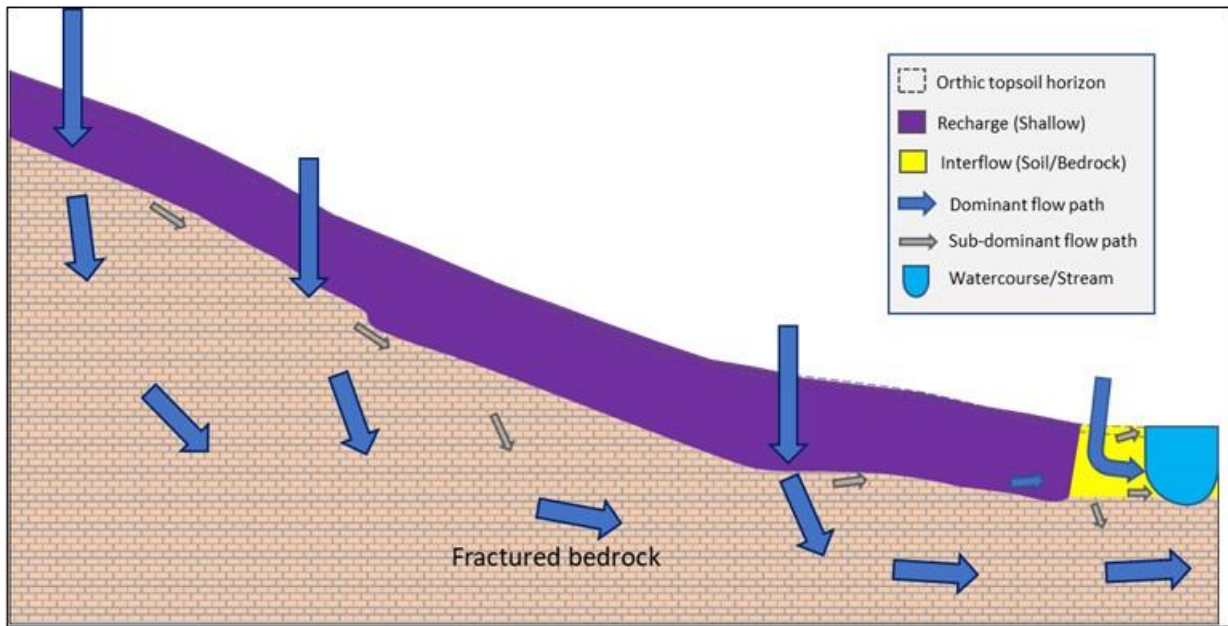
A Level 2 Hydropedological study (Appendix F 5) was completed for the Project, based on the protocols compiled by van Tol *et al.*, (2021) and issued by the DWS. Whereby, three main hillslope patterns were identified in the Project area (see Figure 24 - Figure 26).

The majority of the slopes for the first and second hydropedological patterns are characterised by deep recharge hydropedological types. These patterns occur from the crest to the lower mid-slope, after which a transition occurs from recharge to an interflow (soil/bed rock) or responsive (saturated) at the valley bottom. At the mid-slope section, an increased Saturated Hydraulic Conductivity (Ks) occurs in the soil profile. Restrictions in the water flow occurs within the interflow soils due to the presence of a high clay content and partially or unfractured parent material (TBC, 2023c).

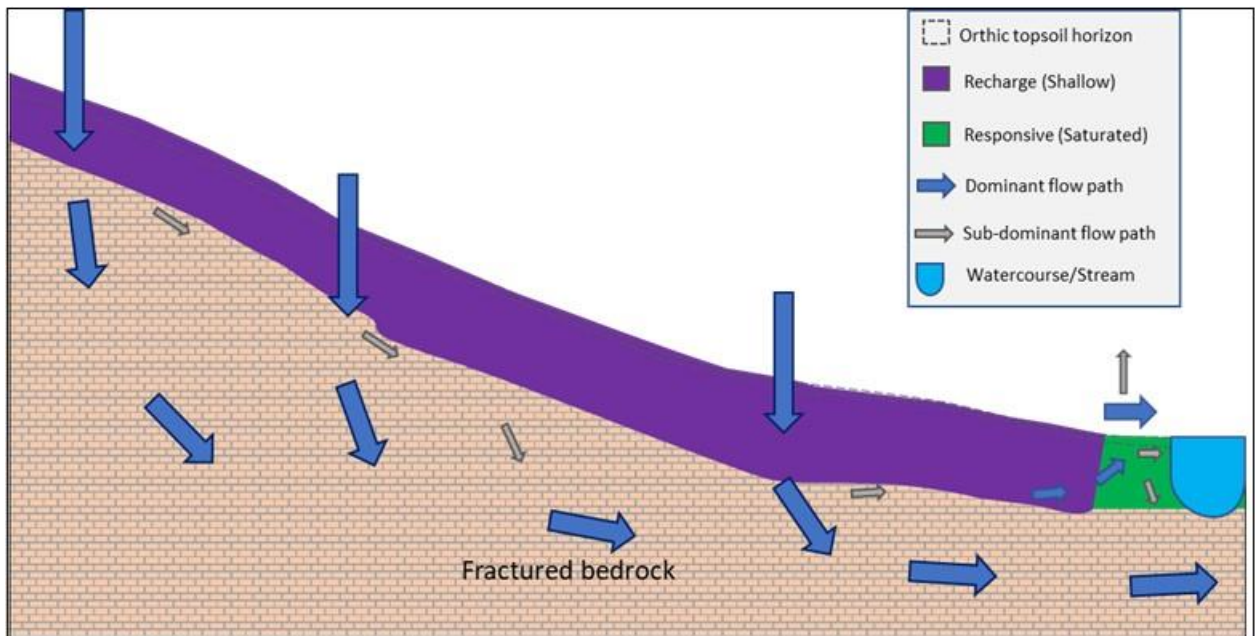
The third hydropedological pattern includes deep recharge soil forms in the crest which transect to interflow (Soil/Bed rock) soils in the mid-slope area with a transition to a responsive saturated hydropedological types. The recharge type transitions into a responsive (saturated) hydropedological type at the valley bottom section (TBC, 2023c).



**Figure 24: Hillslope hydrology of one of three distinct hydropedological patterns identified in the Project area**



**Figure 25: Hillslope hydrology of the two of three distinct hydropedological patterns identified in the Project area**



**Figure 26: Hillslope hydrology of the three of three distinct hydropedological patterns identified in the Project area**

On-site, the Ermelo and Avalon soil forms have been identified as having well-drained profiles. These forms are made up of yellow-brown apedal profiles, which can merge into a fractured substratum, and are characterized by extremely high  $K_s$  rates. No signs of leaching or oxidation/reduction processes were identified upper subsurface horizons in the soil profile, which, together with the high  $K_s$  emphasises rapid vertical recharge of the groundwater stores as being the dominant flow path (TBC, 2023c).

The interflow hydrogeological types found in foot slope areas are classified as A/B and soil/bedrock. Neocutanic and albic horizons are present in these interflow types. Neocutanic horizons are weakly structured subsoil horizons with variegated soil colours caused by illuvial material coating weak structural units on soil colloids. Albic horizons have a uniform coloration due to the dominance of grey to whitish clay particles, with a sand to sandy loam texture (TBC, 2023c).

In the valley bottom regions, the Katspruit soil form is characterized by a gley horizon as the subsoil, indicating prolonged or permanent saturation resulting in responsive soils subject to overland and return flow during precipitation events. Gley horizons have a homogenous dark to light grey color with smooth transitions, a strong pedal structure with low hydraulic conductivities, and a clay texture. The gley horizon is typically second in diagnostic sequence in shallow profiles and occurs at the toe of hillslopes where lateral water inputs are dominant and the underlying geology is characterized by a low hydraulic conductivity (TBC, 2023c).

## 9.9 Groundwater

The geohydrological assessment was completed by Aquiscience, refer to Appendix F 6 for a copy thereof.

Two aquifers naturally occur in the area. These two aquifers are associated with a) the upper weathered material, and b) the underlying competent and fractured rock material. Mining of the coal seams has also resulted in the creation of an artificial aquifer system in the underground voids. The occurrences and classification of the respective undisturbed aquifer types underlying the Project area are summarised in the table below.

**Table 23: Principal groundwater occurrences and classification according to the Parsons (Parsons, 1995) classification system for undisturbed aquifers**

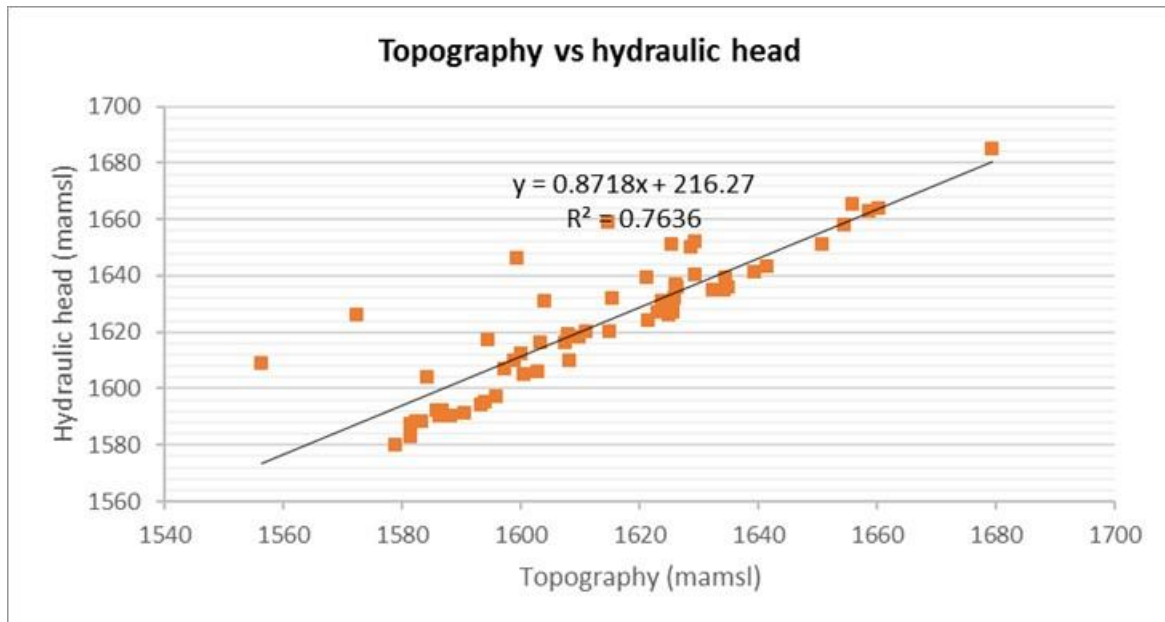
Aquifer	Type	Lithology	Groundwater occurrence	Depth	Probable	Classification
				(m)	yield (l/s)	
Shallow weathered	Unconfined	Semi consolidated material	Weathered rock	~3~20	0.1	Minor aquifer
Intergranular and/ or Fractured	Confined/ semi-confined	Ecca Group: Vryheid Formation shale/sandstone	Seepage water between host rock particles Discontinuities – fractures, fissures, joints	~20 ~ 100	0.1 – 2.0	Minor aquifer

### 9.9.1 Groundwater Depth and Flow

A hydrocensus was completed for the Forzando Complex in 2022 and supplemented in May 2023. In total 71 privately owned boreholes were surveyed, in and around the greater MRA (Plan 20).

The results of the hydrocensus show that the measured depth to groundwater level ranges between 0.70 and 58.88 metres below surface (mbs), with an average of 9.63mbs. Two water levels were recorded as artesian, which is an indication of the confined aquifer conditions at places. Several water levels were recorded as dynamic heads influenced by pumping. One wetland fed by a spring was identified with ID no. SW08/SP03 (Aqiscience, 2023).

The relationship between topography and static groundwater levels is generally strong and useful in distinguishing between boreholes with natural water levels versus those affected by disturbances such as pumping or seepage. A high correlation between the two indicates that groundwater flow mimics surface water flow. However, if the correlation is relatively poor, as seen in Figure 27 with an  $r^2 = 0.76$ , it may be a sign of dynamic groundwater levels caused by pumping or dewatering activities. Boreholes with dynamic heads cannot be considered representative of natural groundwater levels. After removing these dynamic heads, a nearly perfect correlation of 0.99 was achieved (Figure 27). It can therefore be assumed with confidence that that groundwater flow patterns will mimic surface water flow (Aqiscience, 2023).



**Figure 27: Linear regression between topography and hydraulic heads (including dynamic heads) (Aqiscience, 2023)**

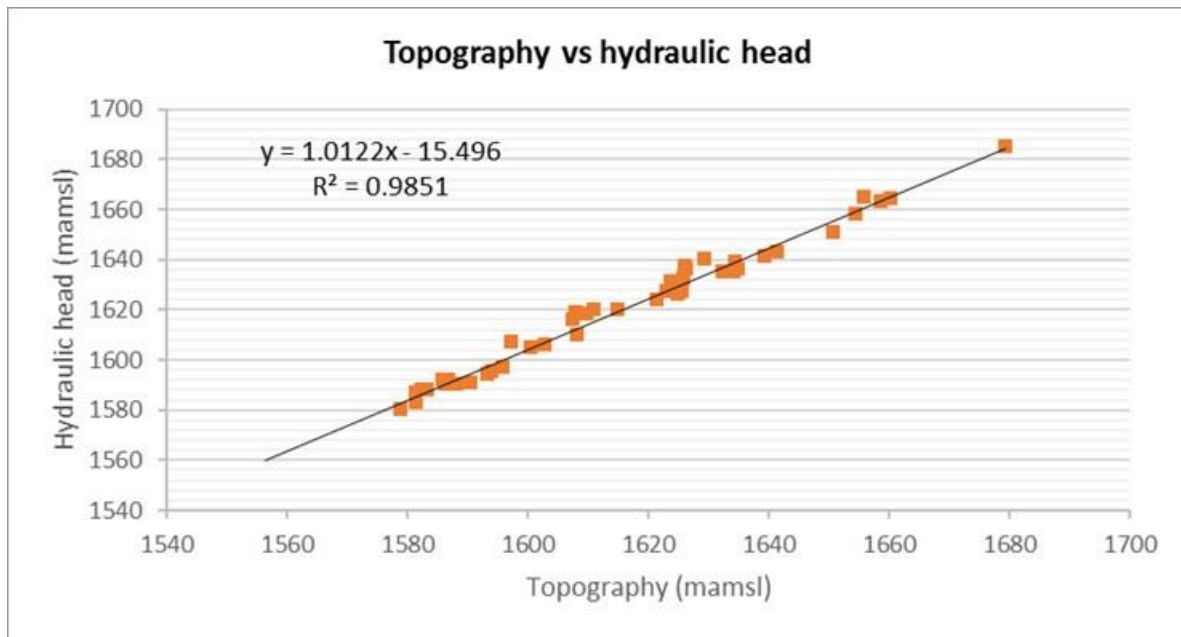
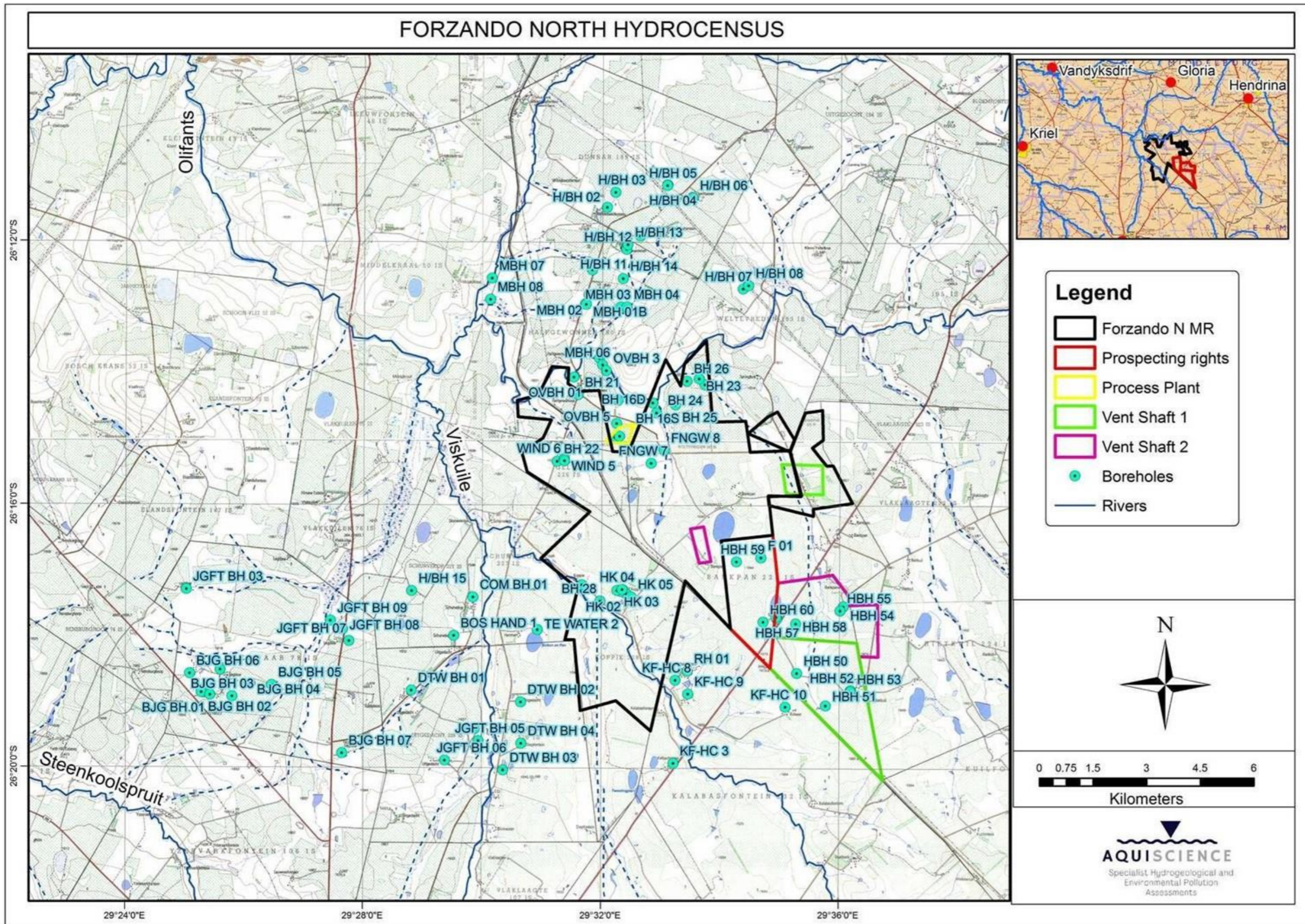


Figure 28: Linear regression between topography and hydraulic heads (dynamic levels removed) (Aqiscience, 2023)



Plan 20: Hydrocensus Points (Aquiscience, 2023)

**Table 24: Hydrocensus results (Aqiscience, 2023)**

Field ID	Coordinates			SWL (mbs)	Hydraulic head	Depth (mbs)	Application/	Farm	Owner	Sample Taken
	y	x	Z (mamsl)		(mamsl)		Description			Y/N
<b>Boreholes</b>										
H/BH 01	-26.207091	29.530470	1659	44.19	1614.81	na	Not in use	Ptn 9 Halfgewonnen 190 IS	Anton Pelser	Y
H/BH 02	-26.191180	29.534561	1662	0 (artesian)	1662	na	Not in use	Ptn 7 Dunbar 189 IS	Anton Pelser	Y
H/BH 03	-26.187349	29.536922	1664	3.62	1660.38	na	Livestock		Anton Pelser	N
H/BH 04	-26.185427	29.551471	1663	NAWL	-	na	Livestock	Ptn 0 Dunbar 189 IS	Anton Pelser	Y
H/BH 05	-26.185572	29.551430	1663	4.39	1658.61	na	Not in use		Anton Pelser	N
H/BH 06	-26.188665	29.558523	1685	5.60	1679.4	na	Not in use	Ptn 1 Dunbar 189	Anton Pelser	N
H/BH 07	-26.211768	29.572705	1626	1.01	1624.99	na	Not in use	Ptn 18	Anton Pelser	Y
H/BH 08	-26.210915	29.574226	1619	0 (artesian)	1619	na	Not in use	Weltevreden193 IS	Anton Pelser	Y
H/BH 09	-26.198423	29.543863	1665	9.00	1656	na	Not in use	Ptn 1 Dunbar 189 IS	Anton Pelser	N
H/BH 10	-26.201342	29.539881	1652	22.59	1629.41	na	Monitoring	Ptn 7 Halfgewonnen 190 IS	Anton Pelser	Y
H/BH 11	-26.201653	29.539938	1651	25.42	1625.58	na	Not in use		Anton Pelser	Y
H/BH 12	-26.201813	29.540087	1650	21.24	1628.76	na	Not in use		Anton Pelser	Y
H/BH 13	-26.200653	29.540416	1651	0.25	1650.75	na	Domestic		Anton Pelser	Y
H/BH 14	-26.209245	29.539095	1626	53.48	1572.52	na	Not in use	Ptn 10	Halfgewonnen	Y

Field ID	Coordinates			SWL (mbs)	Hydraulic head	Depth (mbs)	Application/	Farm	Owner	Sample Taken
	y	x	Z (mamsl)		(mamsl)		Description			Y/N
<b>Boreholes</b>										
								Halfgewonnen 190 IS		
H/BH 15	-26.288546	29.480175	1610	11.01	1598.99	na	Livestock	Ptn 8 Schurvekop 227 IS	Adolf Bosman	Y
BH 16D	-26.240756	29.547504	1590	3.48	1586.52	12.00	Monitoring	Ptn 10 Weltevreden 193 IS	Forzando North	Y
BH 16S	-26.240756	29.547504	1590	3.46	1586.54	6.00	Monitoring		Forzando North	Y
BH 17D	-26.243260	29.548560	1593	NAWL	-	15.00	Monitoring		Forzando North	N
BH 17S	-26.243260	29.548560	1593	NAWL	-	9.00	Monitoring		Forzando North	N
BH 21	-26.238704	29.526586	1612	11.87	1600.13	30.00	Monitoring	Ptn 2 Halfgewonnen 190 IS	Overlooked	Y
BH 22	-26.255630	29.520790	1631	7.10	1623.9	na	Monitoring	Ptn 0 Geluk 226 IS	Forzando North	Y
BH 23	-26.234601	29.560474	1594	0.58	1593.42	na	Monitoring	Ptn 3 Weltevreden 193 IS	Forzando North	Y



Field ID	Coordinates			SWL (mbs)	Hydraulic head	Depth (mbs)	Application/	Farm	Owner	Sample Taken
	y	x	Z (mamsl)		(mamsl)		Description			Y/N
<b>Boreholes</b>										
BH 24	-26.236100	29.562100	1595	0.79	1594.21	45.00	Monitoring		Forzando North	Y
BH 25	-26.241215	29.553860	1606	3.11	1602.89	na	Monitoring		Forzando North	Y
BH 26	-26.235174	29.557107	1594	0.70	1593.3	50.00	Monitoring		Forzando North	Y
BH 27	-26.286951	29.527827	1590	1.64	1588.36	na	Monitoring	Ptn 5 Koppie 228 IS	Forzando South	Y
BH 28	-26.291050	29.532973	1591	0.48	1590.52	na	Monitoring	Ptn 1 Koppie 228 IS	Forzando South	Y
BOS HAND 1	-26.299903	29.492011	1614	NAWL	-	na	Domestic	Ptn 11 Schurvekop 227 IS	Adolf Bosman	Y
COM BH 01	-26.290104	29.497364	1594	NAWL	-	45.00	Monitoring	Ptn 17 Schurvekop 227 IS	Adolf Bosman	Y
FNGW 6	-26.249218	29.538256	1627	2.23	1624.77	na	Monitoring	Ptn 1 Halfgewonnen 190 IS	Overlook	Y
FNGW 7	-26.256081	29.547153	1619	10.93	1608.07	30.00	Monitoring	Ptn 15 Bankpan 225 IS	Forzando North	Y

Field ID	Coordinates			SWL (mbs)	Hydraulic head	Depth (mbs)	Application/	Farm	Owner	Sample Taken
	y	x	Z (mamsl)		(mamsl)		Description			Y/N
<b>Boreholes</b>										
FNGW 8	-26.252760	29.550780	1604	19.77	1584.23	31.00	Monitoring	Ptn 24 Weltevreden 193 IS	Forzando North	Y
HK 01	-26.289185	29.540310	1632	NAWL	-	na	Not in use	Ptn 2 Koppie 228 IS	Gavin Kotzen	N
HK 02	-26.288542	29.538590	1635	NAWL	-	na	Not in use		Gavin Kotzen	N
HK 03	-26.288367	29.537702	1636	9.53	1626.47	na	Not in use		Gavin Kotzen	N
HK 04	-26.288103	29.539123	1639	4.43	1634.57	-40	Domestic		Gavin Kotzen	Y
HK 05	-26.289954	29.541644	1646	46.60	1599.4	na	Not in use		Gavin Kotzen	N
KF-HC 10	-26.317745	29.584972	1661	NAWL	-	na	Not in use	Ptn 7 Kalabasfontein 232 IS	Rowan	N
									Hirschowitz	
KF-HC 3	-26.332103	29.553614	1611	NAWL	-	na	Not in use	Ptn 9 Kalabasfontein 232 IS	Rowan Hirschowitz	N
KF-HC 8	-26.311042	29.554077	1618	8.20	1609.8	na	Not in use	Ptn 8 Kalabasfontein 232 IS	Rowan Hirschowitz	N

Field ID	Coordinates			SWL (mbs)	Hydraulic head	Depth (mbs)	Application/	Farm	Owner	Sample Taken
	y	x	Z (mamsl)		(mamsl)		Description			Y/N
<b>Boreholes</b>										
KF-HC 9	-26.314534	29.557630	1617	NAWL	-	na	Domestic	Ptn 11 Kalabasfontein 232 IS	Rowan Hirschowitz	N
MBH 01A	-26.215712	29.528565	1637	NAWL	-	na	Monitoring	Ptn 9 Halfgewonnen 190 IS	Halfgewonnen Coal Mine	Y
MBH 01B	-26.215770	29.528781	1635	2.61	1632.39	na	Monitoring		Halfgewonnen Coal Mine	Y
MBH 02	-26.213371	29.529540	1643	1.49	1641.51	na	Monitoring		Halfgewonnen Coal Mine	N
MBH 03	-26.216439	29.538470	1609	52.42	1556.58	na	Monitoring	Ptn 10 Halfgewonnen 190 IS	Halfgewonnen Coal Mine	N
MBH 04	-26.216415	29.540205	1607	9.71	1597.29	na	Monitoring		Halfgewonnen Coal Mine	Y
MBH 05	-26.229428	29.532531	1590	2.51	1587.49	na	Not in use		Overlooked Coal Mine	Y
MBH 06	-26.231137	29.533457	1588	5.58	1582.42	na	Monitoring		Overlooked Coal Mine	Y
MBH 07	-26.209231	29.502454	1583	1.35	1581.65	na	Monitoring	Ptn 5 Middelkraal	Halfgewonnen Coal Mine	Y

Field ID	Coordinates			SWL (mbs)	Hydraulic head	Depth (mbs)	Application/	Farm	Owner	Sample Taken
	y	x	Z (mamsl)		(mamsl)		Description			Y/N
<b>Boreholes</b>										
								50 IS		
MBH 08	-26.214604	29.501996	1580	0.96	1579.04	na	Monitoring	Ptn 0 Middelkraal 50 IS	Halfgewonnen Coal Mine	Y
OVBH 1	-26.234240	29.525440	1587	5.46	1581.54	24.00	Monitoring	Ptn 17 Halfgewonnen 190 IS	Overlooked Coal Mine	Y
OVBH 3	-26.232624	29.534494	1588	4.53	1583.47	36.00	Monitoring	Ptn 0 Halfgewonnen 190 IS	Overlooked Coal Mine	Y
OVBH 4	-26.240094	29.537787	1592	5.10	1586.9	59.00	Monitoring	Ptn 5 Halfgewonnen 190 IS	Overlooked Coal Mine	Y
OVBH 5	-26.246008	29.537459	1620	8.99	1611.01	129.00	Monitoring		Overlooked Coal Mine	Y
OVBH 6	-26.249526	29.536880	1627	3.89	1623.11	140.00	Monitoring		Overlooked Coal Mine	Y
RH 01	-26.308735	29.557511	1639	17.79	1621.21	na	Domestic	Ptn 8 Kalabasfontein 232 IS	Rowan Hirschowitz	Y

Field ID	Coordinates			SWL (mbs)	Hydraulic head	Depth (mbs)	Application/	Farm	Owner	Sample Taken
	y	x	Z (mamsl)		(mamsl)		Description			Y/N
<b>Boreholes</b>										
TE WATER 2	-26.298313	29.515428	1592	5.93	1586.07	na	Domestic	Ptn 3 Schurvekop 227 IS	-	N
Well 01	-26.200644	29.540353	1651	NAWL	-	na		Ptn 7 Halfgewonnen 190 IS	Anton Pelser	Y
WIND 5	-26.254998	29.522820	1628	NAWL	-	na	Livestock	Ptn 0 Geluk 226 IS	-	Y
WIND 6	-26.255494	29.522863	1627	3.95	1623.05	na	Livestock		-	Y
HBH 50	-26.309190	29.588170	1662	2.81	1659.19	na	Livestock	Ptn 0 Bankpan 225 IS	Anton Pelser	Y
HBH 51	-26.317430	29.596220	1663	8.70	1654.3	na	Livestock		Anton Pelser	Y
HBH 52	-26.313510	29.603190	1688	11.71		na	Domestic &		Anton Pelser	Y
					1676.29		Livestock			
HBH 53	-26.313820	29.603180	1687	5.07		na	Domestic &		Anton Pelser	Y
					1681.93		Livestock			
HBH 54	-26.292260	29.601130	1660	4.65	1655.35	na	Not in use	Ptn 0 (RE) Killowen 465 IS	Anton Pelser	N
HBH 55	-26.293293	29.600229	1653	0.33	1652.67	na	Not in use		Anton Pelser	N

Field ID	Coordinates			SWL (mbs)	Hydraulic head	Depth (mbs)	Application/	Farm	Owner	Sample Taken
	y	x	Z (mamsl)		(mamsl)		Description			Y/N
<b>Boreholes</b>										
HBH 56	-26.295440	29.582550	1657	1.33	1655.67	na	Domestic & Livestock	Ptn 8 Bankpan 225 IS	Paul Friedman	Y
HBH 57	-26.295020	29.582310	1655	1.95	1653.05	na	Domestic & Livestock		Paul Friedman	Y
HBH 58	-26.296650	29.587810	1653	2.84	1650.16	na	Not in use		Paul Friedman	N
HBH 59	-26.280960	29.571120	1640	0.94	1639.06	na	Livestock		Paul Friedman	Y
HBH 60	-26.296230	29.578650	1669	5.46	1663.54	na	Livestock		Paul Friedman	Y
F 01	-26.279940	29.578020	1640	-	-	na	Livestock		Paul Friedman	Y

na not available

### 9.9.2 Groundwater Quality

Forzando North performs routine sampling of groundwater from boreholes located within MRA to monitor the groundwater quality for potential contamination. The boreholes are strategically placed to monitor quality near to mining infrastructure on surface. The analysis of long-term groundwater trends for Forzando North, as shown in Figure 29, indicates that the pH level remains circum-neutral but there are elevated levels of  $\text{SO}_4$  at FNGW01, FNGW08, FNGW11, FNGW12 and FNGW14. These boreholes plot in fields 4-6 in the Durov diagram (Figure 31), indicating that it is fresh groundwater that has mixed with water rich in Ca and/or Na cations and  $\text{SO}_4$  anions. The enrichment of  $\text{SO}_4$  may be due to acid or neutral mine drainage reactions. Furthermore, these boreholes are downstream from the mine residue facilities and are thus likely impacted by these sources (Aquiscience, 2023).

During the hydrocensus survey, a total of 38 samples were collected from privately owned boreholes for hydrogeochemical analyses. The majority of these groundwater profiles indicate that the water is fresh, clean, and relatively young, falling under the categories of Mg- $\text{HCO}_3$ , Ca- $\text{HCO}_3$ , or Na- $\text{HCO}_3$  groundwater types. These types can be seen plotted in fields 1-3 of the Expanded Durov diagram. However, there were some groundwater samples that displayed profiles with Ca- $\text{SO}_4$ , Mg- $\text{SO}_4$ , or Na- $\text{SO}_4$ . These specific boreholes, such as BGJB H03, Boshand 1, Wind 5, JGFT BH03, DTW02, DTW03, HBH07, HBH13, HBH14, and HBH15, fall within fields 5-7 of the Durov diagram, indicating that their groundwater has been affected or impacted in some way (Figure 32).

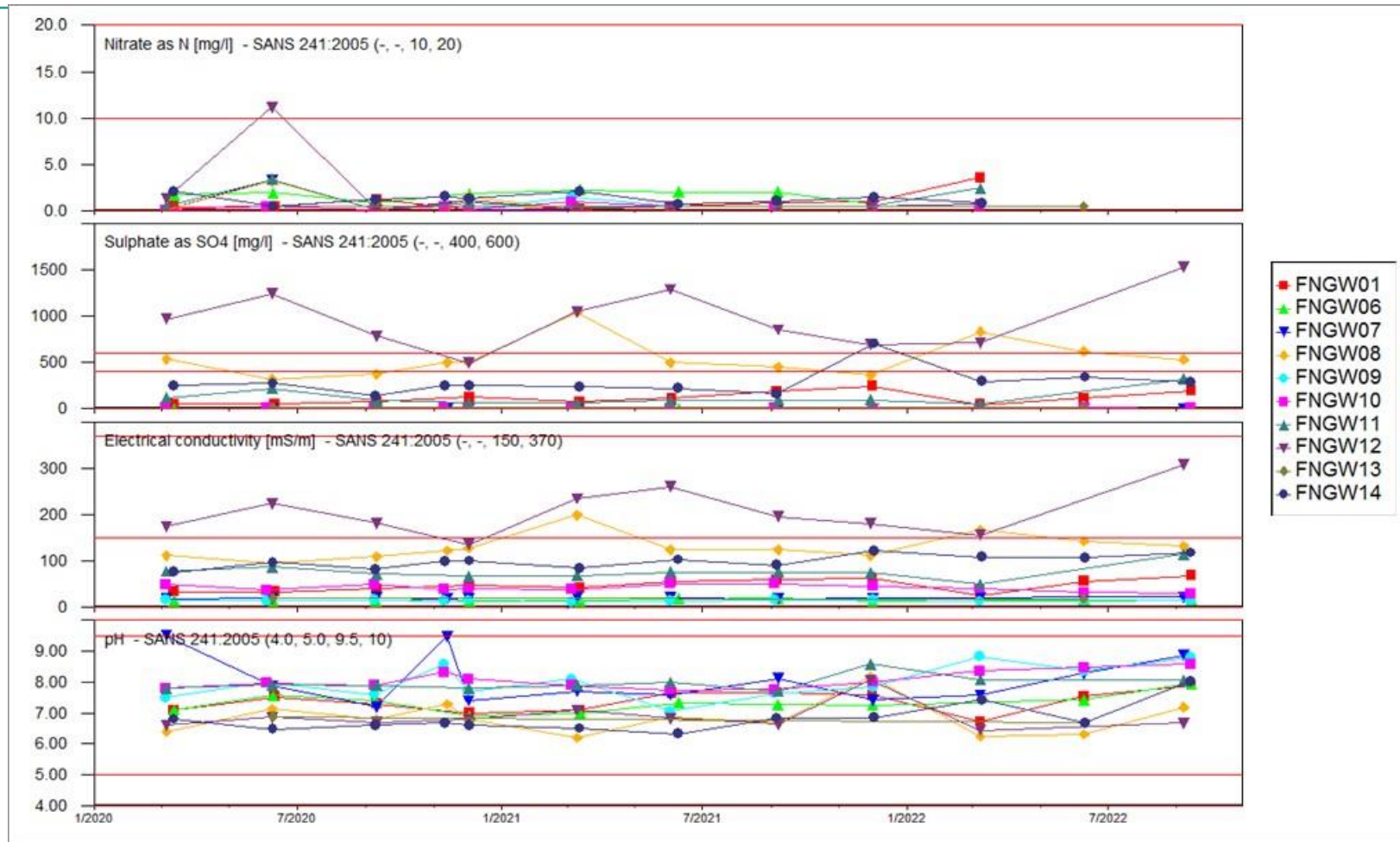


Figure 29: Long-term groundwater analysis for monitoring boreholes (Aqiscience, 2023)



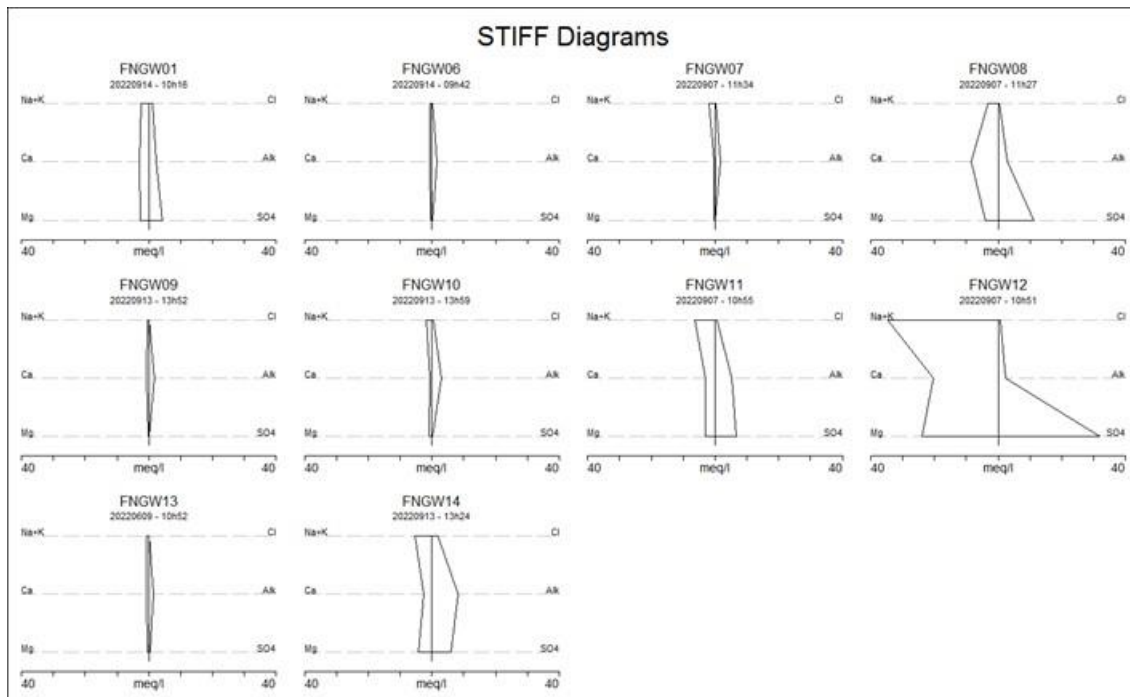


Figure 30: Stiff diagrams showing major cation and anion concentrations in meq/l for monitoring boreholes (Aquiscience, 2023)

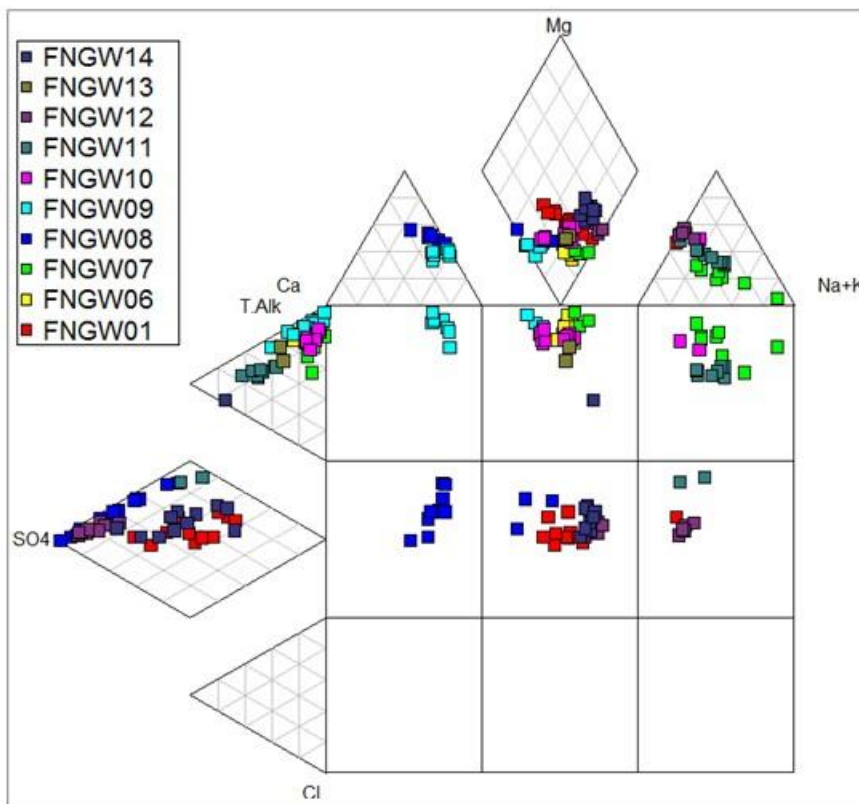


Figure 31: Expanded Durov diagram based on electro-neutrality balances for monitoring boreholes (Aquiscience, 2023)

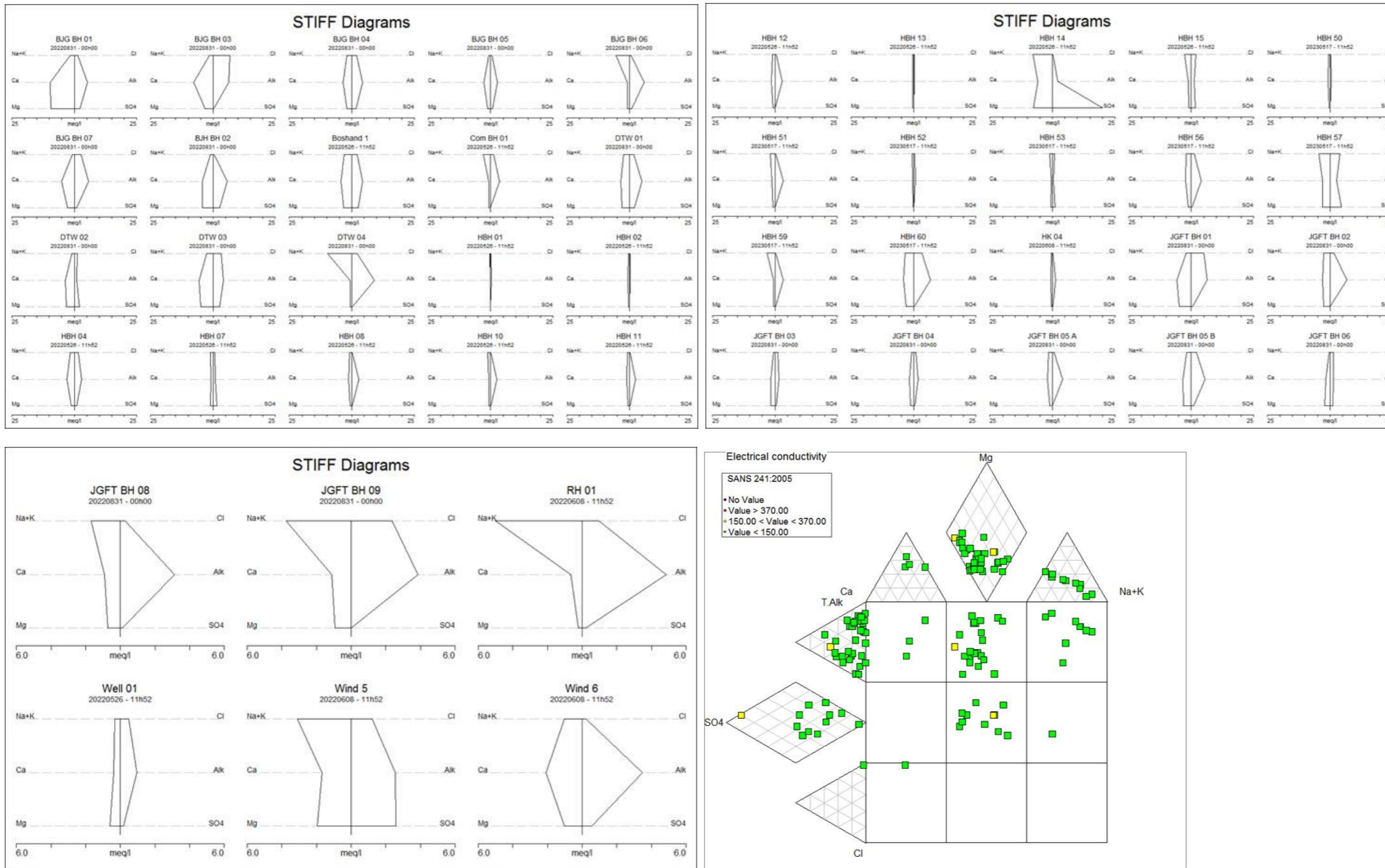


Figure 32: Stiff diagrams and Expanded Durov diagram showing concentrations in meq/l for boreholes on neighbouring farms (Aquiscience, 2023)

### 9.9.3 Aquifer Transmissivity

Previous aquifer pump tests conducted on monitoring boreholes reveal that the general transmissivity of the surrounding aquifer ranges between 0.32 and 1.10 m<sup>2</sup>/day (Table 25). These values are typical of the area and general geology, showing matrix and micro-fracture transmissivities (T). Hydraulic conductivity is a function of transmissivity and aquifer depth which is then calculated with the following:

$$K = \frac{T}{b}$$

Where:

- K is the hydraulic conductivity of the aquifer in m/d.
- T is the transmissivity of the aquifer in m<sup>2</sup>/d.
- B is the aquifer thickness.

**Table 25: Aquifer transmissivities calculated from aquifer pump tests (Aqiscience, 2023)**

Borehole	Transmissivities (m <sup>2</sup> /d)			
	Theis	Cooper Jacob	Recovery	Average
BHUG1	0.17	0.22	1.6	0.66
BHUG2	0.48	0.41	0.53	0.47
BHUG3	0.36	0.5	0.12	0.33
BHUG4	0.27	0.3	0.4	0.32
BHUG5	1.3	1.6	0.35	1.08
HGMH1	0.19	0.28	0.23	0.24
HGMH2	0.88	0.81	0.02	0.59
HGMH3	0.44	0.50	0.01	0.43

Falling head aquifer tests were also previously conducted on four boreholes and the data was used to calculate the hydraulic conductivities. Information on the boreholes and data generated can be viewed below (Table 26). The hydraulic conductivities (K) calculated vary substantially which shows the heterogeneity of the shallow and deeper fractured aquifers in the region. The data shows K values ranges of between 4.6x10<sup>-4</sup> to 3.13 m/d.

**Table 26: Hydraulic conductivities calculated from falling head tests on boreholes in the study area (Aqiscience, 2023)**

Borehole ID	Coordinates		Borehole depth	Water level	Hydraulic conductivity
			(mbs)	(mbs)	(m/d)
HMG 03	-26.21640	29.54019	24.25	10.67	4.6x10 <sup>-4</sup>
MBH 01A	-26.21569	29.52859	20.51	3.71	3.13
MBH02	-26.21335	29.52956	71.29	2.44	1.3x10 <sup>-3</sup>
MBH 07	-26.20707	29.53045	73.10	42.65	2.36

#### 9.9.4 Geochemical Analysis

Coal samples from the 2 and 4 Seams were submitted to the UIS Analytical laboratory during a previous study for geochemical and characterisation. The results of which are summarised below, refer to Appendix F 6 for a detailed discussion (Aquiscience, 2023).

**Acid Base Accounting (ABA):** The results of the ABA are presented in Table 27, whereby the following can be concluded:

- Only the S4 recorded a sulphide concentration of >0.30% and could, depending on neutralisation potentials, be sufficient to sustain long-term acid generation.
- Based on Net Neutralisation Potential (NNP) the S4 is not likely to be acid generating, whilst the S2 recorded in the grey range and is indeterminate based on neutralisation potential.
- All samples recorded circum-neutral paste pH values of ~7.90.
- The S2 recorded a Neutralisation Potential Ratio (NPR) of between 1 – 4 and is therefore regarded as indeterminate, whilst the S4 is >4 and is thus regarded as non-acid producing.

**Net Acid Generating (NAG):** Both the S2 and S4 recorded NAG pH levels less than 7, but remain above 4.5 and can thus be regarded as Rock Type IV and are considered non-acid forming due to the positive NNP (Table 28).

**Mineralogy:** As anticipated, the coal seams primarily consist of organic carbon, along with the clay mineral kaolinite and quartz. There is no presence of pyrite. Both samples contain calcite ( $\text{CaCO}_3$ ), but 4-Seam has higher levels compared to 2-Seam. Calcite is a carbonate buffer mineral that quickly dissolves and helps neutralize acidity if it arises. Additionally, there is a small amount of dolomite, which also acts as a neutralizing mineral (Table 29).

**Whole Rock Elemental Analysis:** The study conducted an analysis of inorganic elements in samples by using acid digestion and ICP-OES analysis in accordance with the GNR635 (see Figure 33 and Table 30) The major elements found in the samples were silica, aluminium, calcium, magnesium, titanium, and iron. Loss on ignition was high due to the high organic carbon content. Trace elements such as barium, lead, copper, fluoride, and antimony were also found in elevated concentrations. These findings suggest potential environmental risks, but only the bioavailable fractions pose hazards. The speciation of metals in water depends on factors such as ionic strength, hardness, organic matter, pH, redox potential, and valence state. pH, in particular, plays a significant role in metal solubility, transport, and bioavailability. Lower pH increases the solubility of metal hydroxide minerals, making more dissolved metals available for biological processes. Ionic metal species are often the most toxic to aquatic organisms.

**Leachate Analyses:** According to the results, the pH of the leachate was close to neutral, and the levels of total dissolved salts (TDS) were relatively low, measuring 4.19 mg/l and 7.45 mg/l. The concentrations of major ions such as sulphate, chloride, calcium, magnesium, and potassium were somewhat elevated but still within the low or parts per million (ppm) range. The presence of trace metal minerals was detected at very low levels, either in parts per billion (ppb) or not detected at all. All relevant analytes recorded well below the LCT0 limit (Table 31).

**Table 27: ABA test results (Aqscience, 2023)**

Acid – Base Accounting Modified Sobek (EPA-600)	Sample Identification	
	2 Seam	4 Seam
Paste pH	7.90	7.89
Total Sulphur (%)	0.42	0.65
Total sulphide (%)	0.23	0.311
Total sulphate (%)	0.004	0.015
Organic sulphur (%)	0.184	0.325
Total carbon (%)	48.9	61.4
Acid Potential (AP) (kg/t)*	7.19	9.72
Neutralization Potential (NP) (kg CaCO <sub>3</sub> /t)	22.4	125
Nett Neutralization Potential (NNP) (kg CaCO <sub>3</sub> /t)	15.16	114.97
Neutralising Potential Ratio (NPR) (NP : AP)	3.11	12.83
<b>Rock Type</b>	<b>II</b>	<b>III</b>

**Table 28: Net Acid Generation (NAG) (Aqscience, 2023)**

Description	NAG pH: (H <sub>2</sub> O <sub>2</sub> )	NAG at pH 4.5 (kg H <sub>2</sub> SO <sub>4</sub> /t)	NAG at pH 7 (kg H <sub>2</sub> SO <sub>4</sub> /t)	NNP	Rock Type
2 Seam	4.92	<0.01	7.76	15.16	Rock Type IV. Non-Acid Forming
4 Seam	5.07	<0.01	4.76	114.97	Rock Type IV. Non-Acid Forming

**Table 29: Minerology (Aqscience, 2023)**

Mineral	Composition	2-seam	4-seam
		%	%
Quartz	SiO <sub>2</sub>	11.2	13.0
Dolomite	CaMg(CO <sub>3</sub> ) <sub>2</sub>	0.9	0.7
Kaolinite	Al <sub>2</sub> Si <sub>2</sub> O <sub>7</sub> (OH) <sub>4</sub>	25.1	16.8
Calcite	CaCO <sub>3</sub>	0.2	8.8
Microcline	KAl <sub>2</sub> Si <sub>2</sub> O <sub>8</sub>	0.0	0.6
Rutile	TiO <sub>2</sub>	0.0	0.0
Muscovite	KAl <sub>2</sub> (AlSi <sub>3</sub> O <sub>10</sub> )(FOH) <sub>2</sub>	1.7	2.3

Mineral	Composition	2-seam	4-seam
		%	%
Hematite	Fe <sub>2</sub> O <sub>3</sub>	0.2	0.0
Zircon	ZrSiO <sub>4</sub>	0.3	0.2
Organic C	C	60.5	57.6

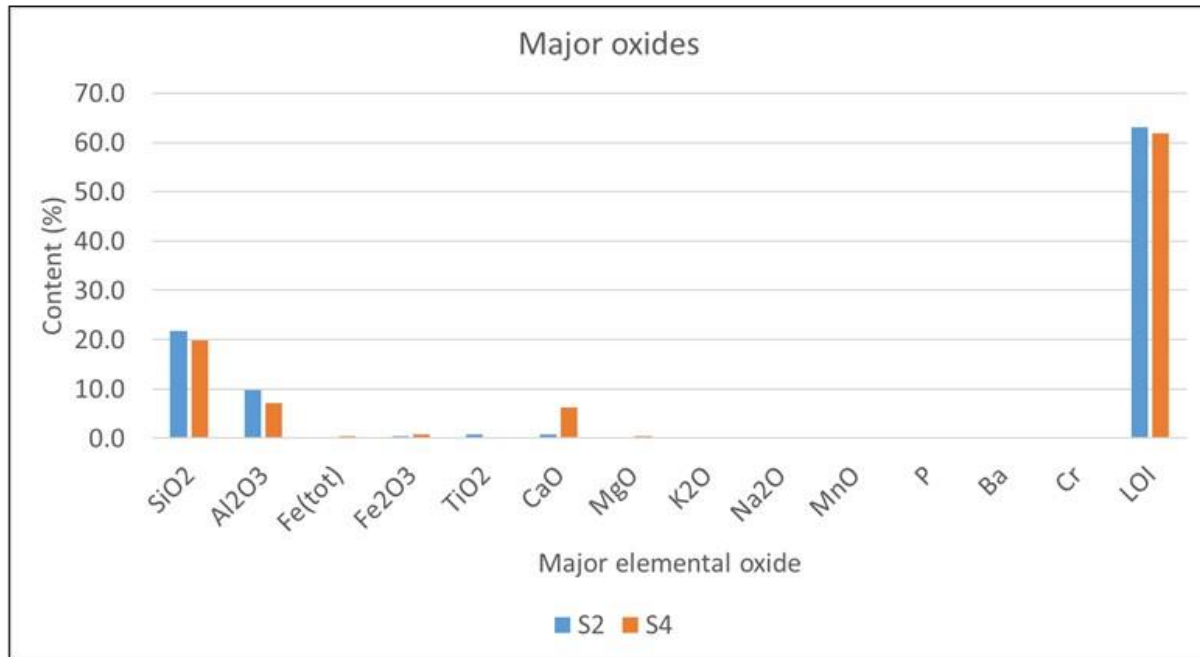


Figure 33: Major elements, loss on material on ignition and moisture content (whole rock elemental analysis)

Table 30: Total inorganic concentration results evaluated according to the Total Concentration Threshold (TCT) Limits (all units in mg/kg unless otherwise specified)

Elements & Chemical Substances	2-seam	4-seam	TCT0	TCT1
Ag, silver (mg/kg)	1.71	1.30	n/a	n/a
As, arsenic (mg/kg)	2.39	2.47	5.8	500
B, boron (mg/kg)	35.5	30.1	150	15000
Ba, barium (mg/kg)	385	495	62.5	6250
Be, beryllium (mg/kg)	3.83	2.72	n/a	n/a
Bi, bismuth (mg/kg)	1.17	0.68	n/a	n/a
Cd, cadmium (mg/kg)	0.20	0.13	7.5	260

Elements & Chemical Substances	2-seam	4-seam	TCT0	TCT1
Co, cobalt (mg/kg)	6.58	9.19	50	5000
Cr, chromium (mg/kg)	76.3	54.4	46000	800000
Cs, caesium (mg/kg)	2.76	4.38	n/a	n/a
Cu, copper (mg/kg)	16.0	14.1	16	19500
Ga, gallium (mg/kg)	20.3	10.4	n/a	n/a
Ge, germanium (mg/kg)	1.67	1.07	n/a	n/a
Hf, Hafnium (mg/kg)	10.0	5.12	n/a	n/a
Hg, mercury (mg/kg)	0.13	0.10	0.93	160
Ho, holmium (mg/kg)	0.85	1.47	n/a	n/a
In, indium (mg/kg)	0.09	0.06	n/a	n/a
Li, lithium (mg/kg)	35.8	47.4	n/a	n/a
Mn, manganese (mg/kg)	86.4	244	1000	25000
Mo, molybdenum (mg/kg)	1.49	1.34	40	1000
Nb, niobium (mg/kg)	24.3	9.60	n/a	n/a
Ni, nickel (mg/kg)	28.7	18.3	91	10600
Pb, lead (mg/kg)	28.5	18.2	20	1900
Sb, antimony (mg/kg)	35.0	5.07	10	75
Sc, scandium (mg/kg)	7.78	22.1	n/a	n/a
Se, selenium (mg/kg)	0.28	0.37	10	50
Sn, tin (mg/kg)	5.01	2.38	n/a	n/a
Sr, strontium (mg/kg)	523	800	n/a	n/a
Ta, tantalum (mg/kg)	2.10	0.86	n/a	n/a
Te, tellurium (mg/kg)	0.09	0.11	n/a	n/a
Th, thorium (mg/kg)	14.2	50.8	n/a	n/a
Tl, thallium (mg/kg)	0.24	0.28	n/a	n/a
U, uranium (mg/kg)	4.54	2.95	n/a	n/a
V, vanadium (mg/kg)	31.5	29.9	150	2680
W, tungsten (mg/kg)	2.85	1.14	n/a	n/a
Y, yttrium (mg/kg)	38.7	83.2	n/a	n/a
Zn, zinc (mg/kg)	20.7	11.0	240	160000
Zr, zirconium (mg/kg)	369	190	n/a	n/a
F-, fluoride (mg/kg)	231	223	100	10000

Elements & Chemical Substances	2-seam	4-seam	TCT0	TCT1
Cr <sup>6+</sup> , hexavalent chromium (mg/kg)	<5	<5	6.5	500

\*Shaded values exceed respective concentration threshold limit as per the GNR635 Regulations

**Table 31: Leachable inorganic concentration results evaluated according to the Leachable Concentration Threshold (LCT) Limits (all units in mg/l unless otherwise specified)**

Elements & Chemical Substances	2-seam	4-seam	LCT0	LCT1
			(GNR635)	(GNR635)
pH	7.06	6.93	n/a	n/a
EC (mS/m)	<30	<30	n/a	n/a
TDS (mg/l)	4.19	7.45	1000	12500
Alkalinity (mg/l CaCO <sub>3</sub> )	28.1	29.7	n/a	n/a
F, fluoride (mg/l)	0.19	0.10	100	10000
Cl, chloride (mg/l)	<0.25	0.48	300	15000
NO <sub>3</sub> , nitrate (mg/l)	<0.1	<0.1	11	550
SO <sub>4</sub> , sulphate (mg/l)	10.7	6.55	250	12500
Cr <sup>6+</sup> , hexavalent chromium (mg/l)	<0.05	<0.05	6.5	500
Al, aluminium (mg/l)	0.23	0.16	n/a	n/a
As, arsenic (mg/l)	<0.001	<0.001	0.01	0.5
B, boron (mg/l)	0.018	0.022	0.5	25
Ba, barium (mg/l)	0.075	0.20	0.7	35
Ca, calcium (mg/l)	6.73	7.44	n/a	n/a
Cd, cadmium (mg/l)	<0.0001	<0.0001	0.003	0.15
Co, cobalt (mg/l)	<0.001	<0.001	0.5	25
Cr, chromium (mg/l)	<0.001	<0.001	0.1	5
Cu, copper (mg/l)	<0.001	<0.001	2.0	100



### 9.9.5 Numerical Groundwater Model

The baseline data was analysed and compiled into a conceptual model which is summarised as follows (Aquiscience, 2023):

- Two naturally occurring aquifers have been identified in the area. These two aquifers are associated with the upper weathered material, and the underlying competent and fractured rock material. Mining of the coal seams has also resulted in the creation of an artificial aquifer system in the underground voids.
- Groundwater flow directions follow surface flow patterns and gradients, contributing to baseflow in major drainage systems. There's a strong correlation between hydraulic heads and surface elevation, meaning groundwater mimics surface topography, flowing from higher areas towards lower lying valleys and drainages. It then surfaces or accumulates in alluvial and hill wash deposits.
- The groundwater levels in the area are relatively shallow and are found within a weathered and fractured aquifer. Some areas may have a layer of ferricrete, which can act as a barrier between the weathered aquifer and the fractured aquifer, creating different piezometric heads, some of which may be artesian. In certain parts of the area, dolerite sills and dykes are present. Sills primarily block the movement of groundwater, while dykes can potentially create pathways for groundwater flow.
- Several wetlands were delineated within the Project area, it is believed that the aquifers in the area are mostly separate from each other, with only the weathered and/or perched aquifer being connected to the wetlands. However, the hydrogeological study conducted by The Biodiversity Company (Appendix F 5) indicated that only lateral flows between the transition from recharge to interflow pathways will be impeded upon due to the fact that recharge from the crest will pass underneath the tunnels. Since the ventilation shafts and associated infrastructure will intercept lateral flow paths in some areas where proposed activities will occur, flow impediment though not significant, can be expected where impermeable layers exist like the concrete formations or pipelines intersecting these soils. These flows will change from lateral and become vertical flows, sufficiently recharging groundwater stores.
- The Karoo aquifer is not well-developed and has low effective porosity, leading to restricted groundwater flow. Aquifer tests show low hydraulic conductivity and transmissivity, indicating a highly heterogeneous nature.

Refer to Appendix F 6 for the detailed model.

### 9.10 Terrestrial Biodiversity

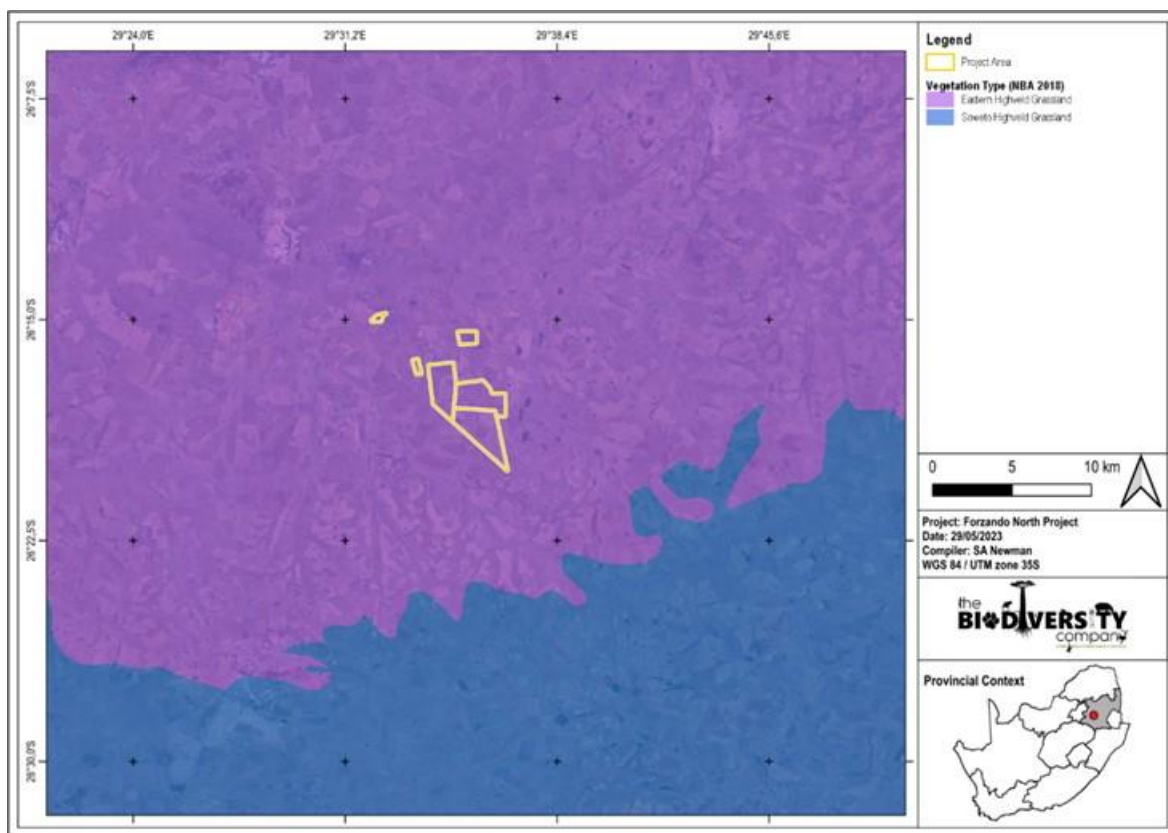
A terrestrial biodiversity survey was undertaken by The Biodiversity Company (TBC) in March 2023. The full report can be referred to for detailed information (Appendix F 7), the findings of which are summarised below.

The Project area is located within the Eastern Highveld Grassland national vegetation type of the Mesic Highveld Grassland Bioregion – see Plan 21 (Mucina & Rutherford, 2006). The MBSP spatial dataset has mapped this as a Vulnerable ecosystem however, the Revised National List of Threatened Ecosystems for South Africa, as published in Government Gazette no. 47526 (DFFE, 2022), has reclassified the Eastern Highveld Grassland as Endangered.

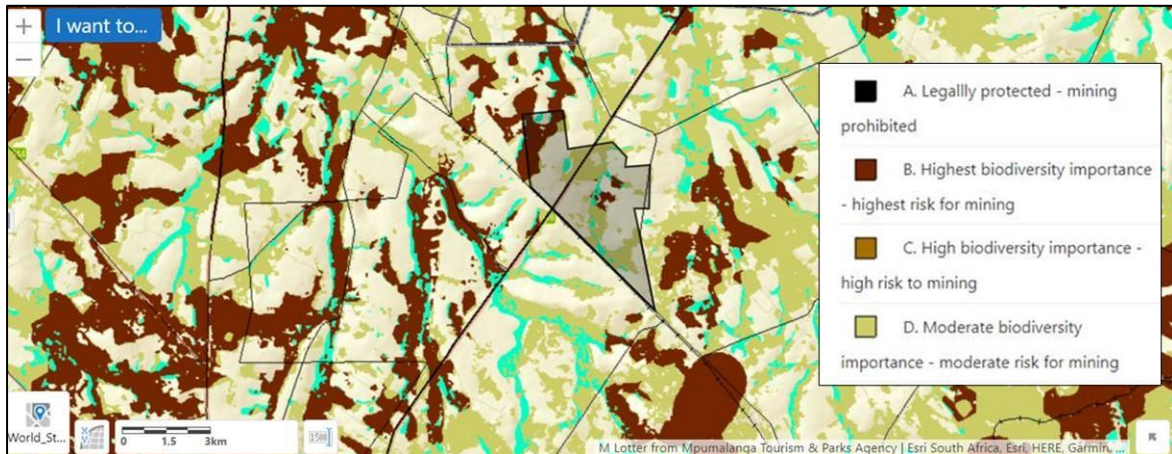
According to the terrestrial MBSP (MTPA, 2022), the Project Area overlaps with CBA 2: Optimal, other natural areas (ONA), moderately modified and heavily modified areas (Plan 25). Based on the Mining and Biodiversity Guidelines (MBG, 2013) the Project area is associated with areas of Moderate, High and Highest Biodiversity importance (Figure 34).

No formally protected areas fall within the Project area. The Rietvlei Private Nature Reserve is approximately 30 km to the south-east of the Project area, while the Heyns Private Nature Reserve is approximately 31.5 km to the north-west.

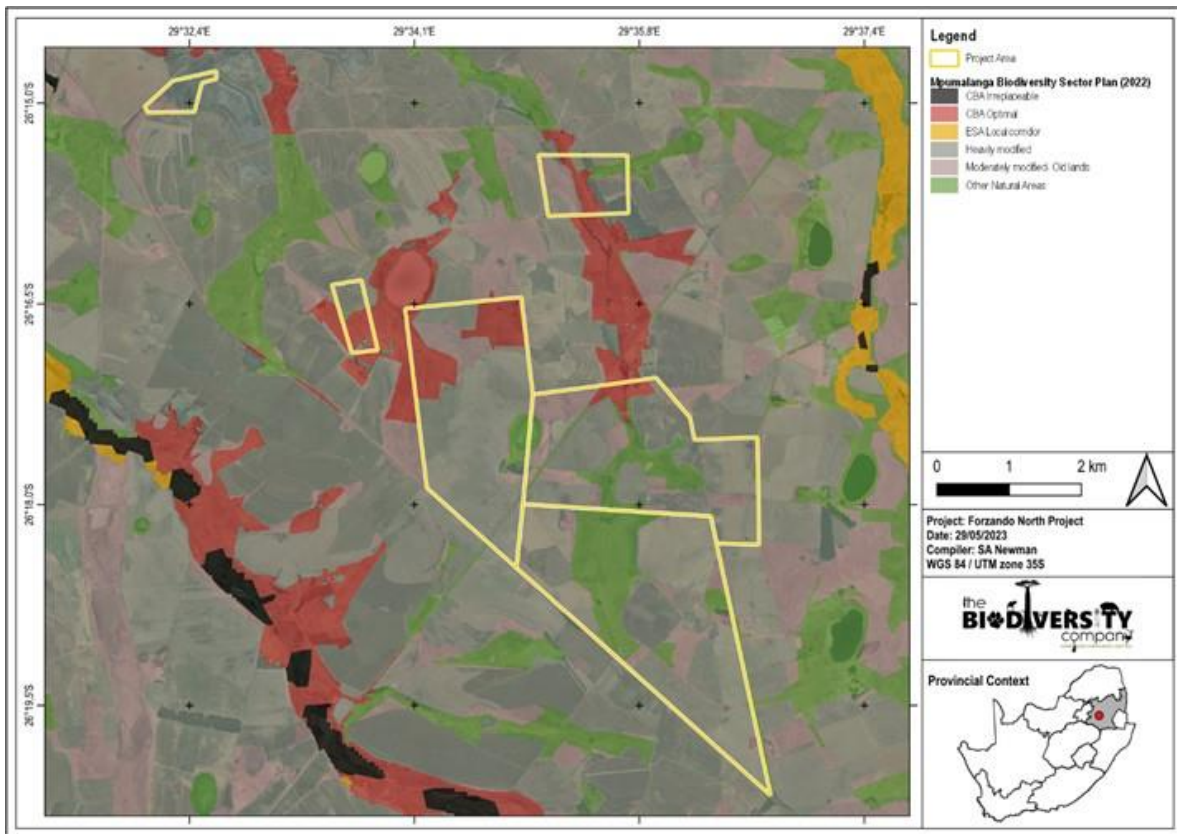
The Project area, specifically the areas assessed for the ventilation shafts, overlap with priority focus areas for expansion according to the 2018 National Protected Areas Expansion Strategy (NPAES), see Plan 23.



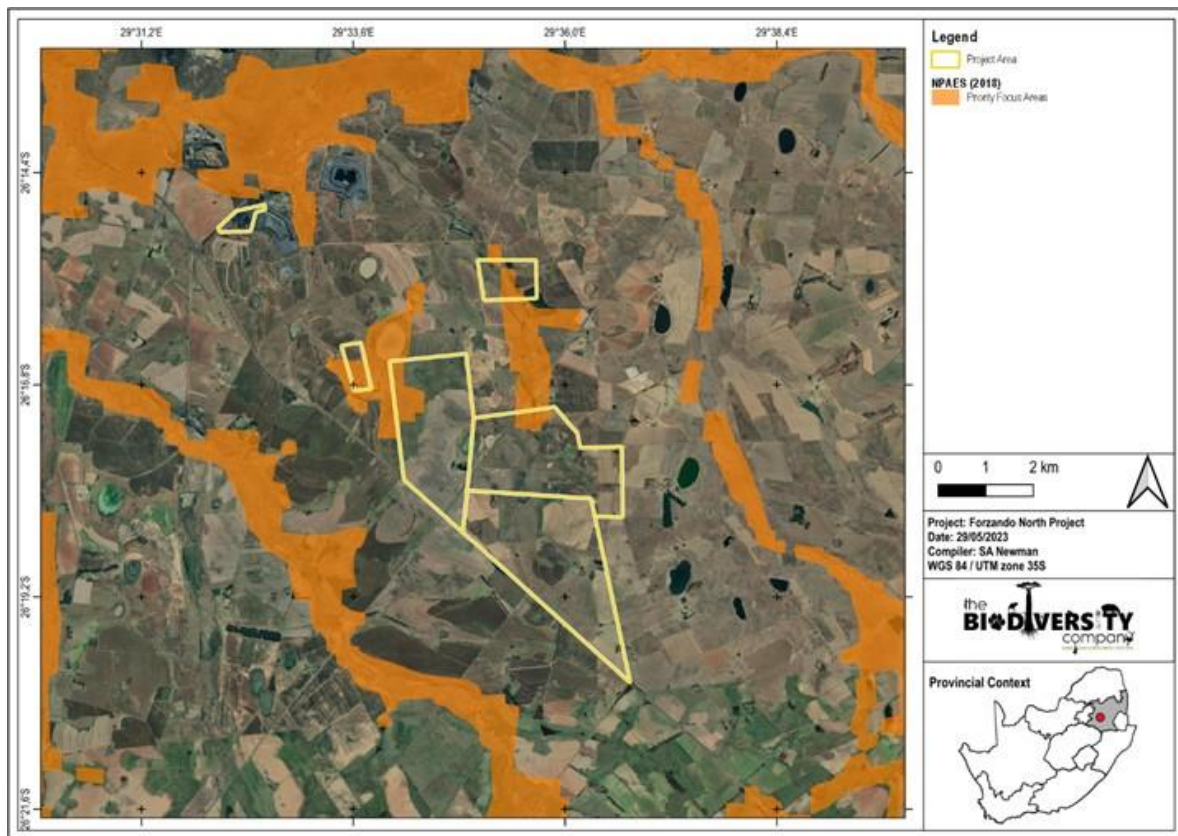
**Plan 21: Vegetation Type (TBC, 2023d)**



**Figure 34: National Mining and Biodiversity Guideline (MBG, 2013)**



**Plan 22: Terrestrial CBAs (TBC, 2023d)**



**Plan 23: NPAES focus areas and their proximity to the Project Area (TBC, 2023d)**

### 9.10.1 On-site Habitat

Five different habitat types were delineated within the Project area (Plan 24) and include:

- Modified;
- Alien thicket/plantation;
- Rock outcrop;
- Disturbed grassland; and
- Water resource.

The main impact to the vegetation and habitat types within and surrounding the Project Area are the mining and agricultural practices occurring in the region, and their associated impacts. These include, but are not limited to, human and vehicle ingress, an influx of alien invasive plant species and the grazing of livestock (TBC, 2023d).

### 9.10.2 Floral Assessment

A total of 352 species of plants are expected to occur within the Project area, please refer to Appendix F 7 for a full list thereof. One field survey was undertaken, during March 2023, to confirm the presence of species of conservation concern (SCC). Effort was made to cover all the different habitat types within the limits of time and access. Emphasis was placed on sensitive habitats, especially those overlapping with the Project Area (TBC, 2023d).

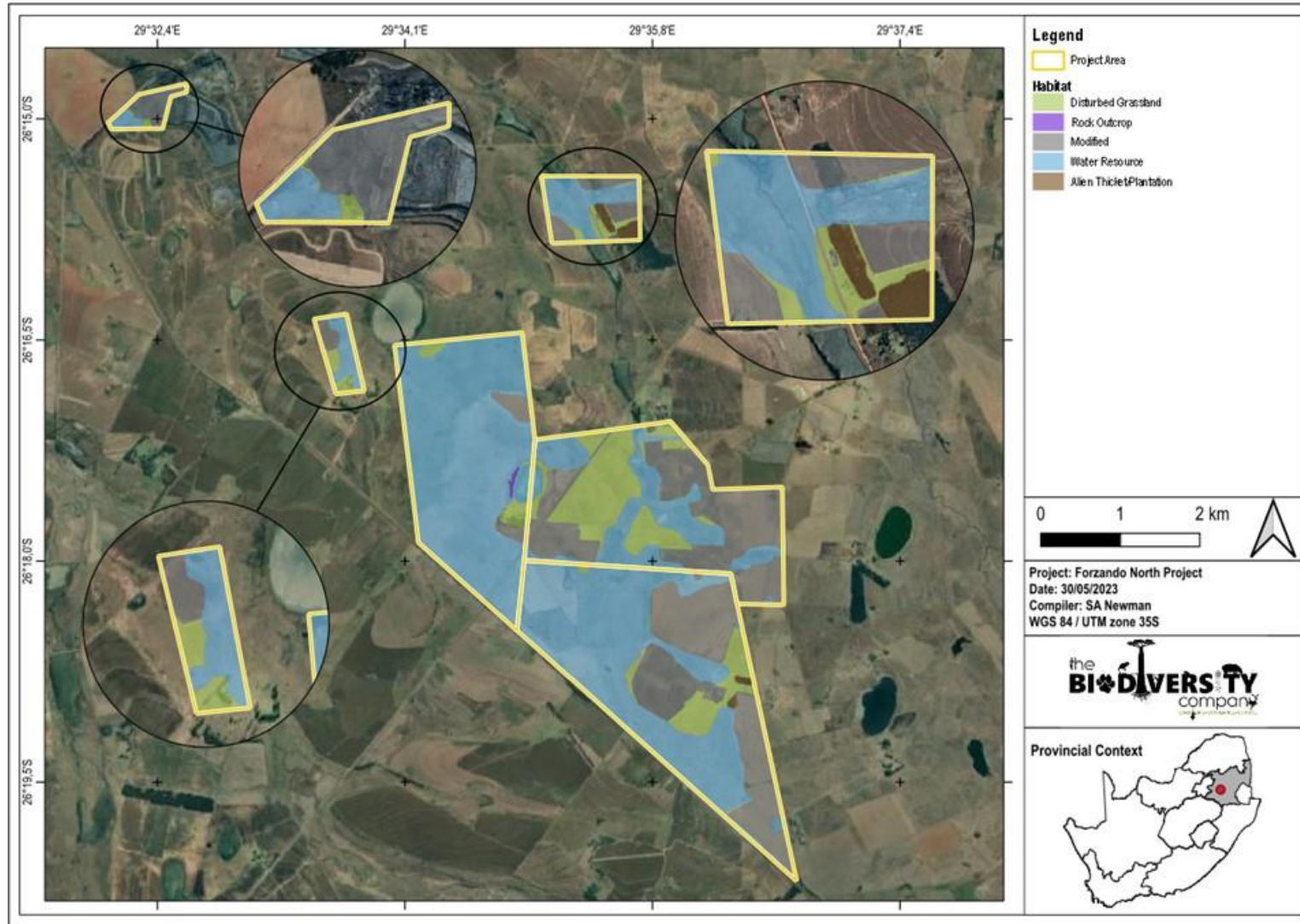
#### 9.10.2.1 Species of Conservation Concern (SCC)

No nationally recognised Red Data plant species were confirmed on site, however a total of seven are expected to occur in the area. These species, their habitat requirements, and conservation status are summarised in Table 32. Some of these SCC are sensitive to illegal harvesting. Such species have had their names obscured and are listed as sensitive plant unique number/sensitive animal unique number (TBC, 2023d).

In addition, at least 5 plant species provincially protected in terms of the Mpumalanga Nature Conservation Act, 1998 (No. 10 of 1998) were recorded onsite (Figure 35):

- *Boophone disticha*
- *Brunsvigia radulosa*,
- *Crinum bulbispermum*,
- *Gladiolus* sp., and
- *Eucomis autumnali*.

These species are not to be disturbed in any way without obtaining the relevant permits, in which case they need to be relocated (TBC, 2023d).

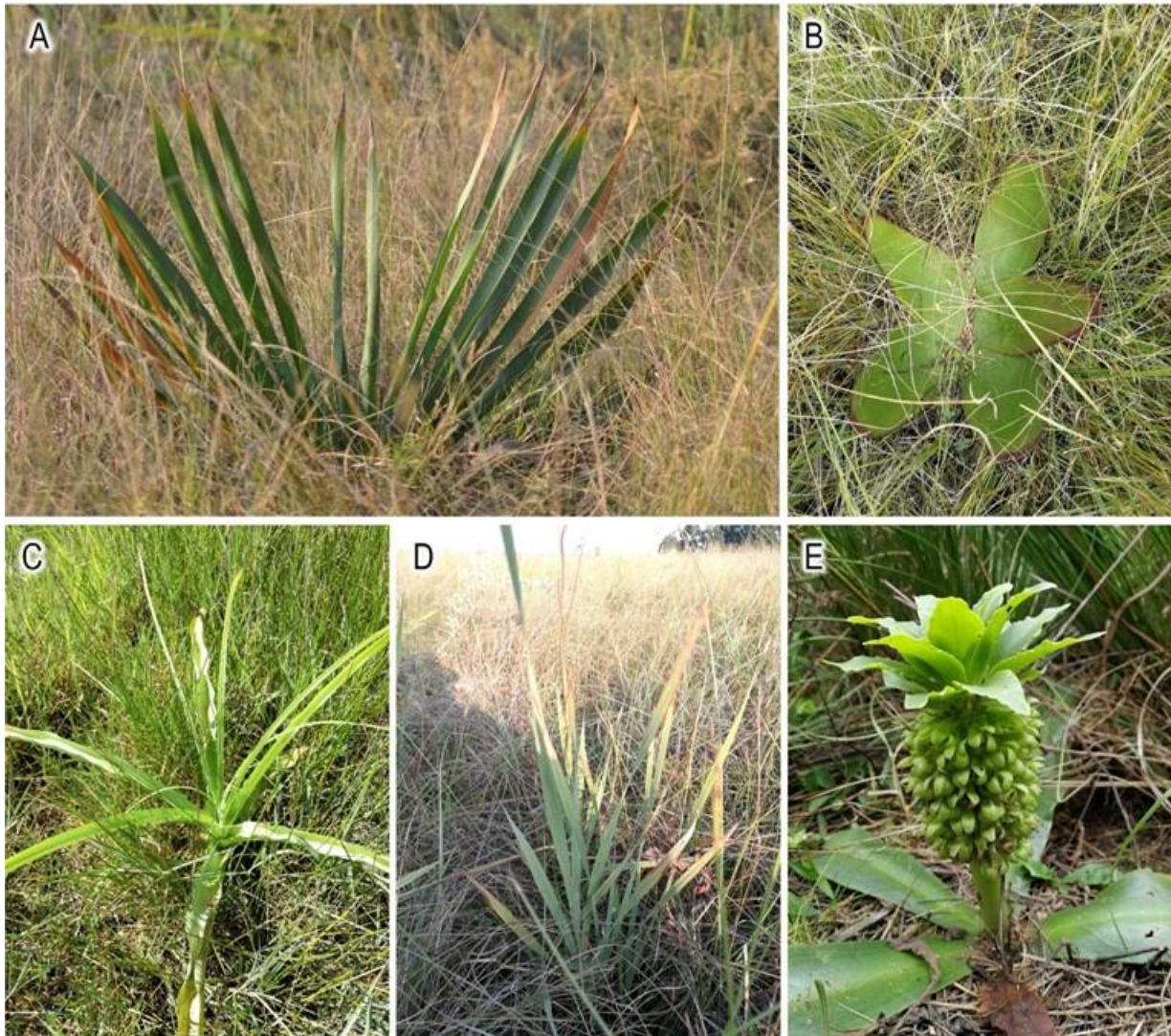


Plan 24: Map of the habitats delineated for the Project area (TBC, 2023d)

**Table 32: Flora SCC expected to occur in the Project area (TBC, 2023d)**

Family	Scientific Name	Status	Habitat	Likelihood of occurrence	Reason
Apocynaceae	<i>Miraglossum davyi</i>	VU	Eastern Highveld Grassland	Moderate	Some suitable habitat present on site
Apocynaceae	<i>Pachycarpus suaveolens</i>	VU	Eastern Highveld Grassland - short or annually burnt grasslands, 1400-2000 m	Moderate	Some suitable habitat present on site
Asphodelaceae	<i>Kniphofia typhoides</i>	NT	Low lying wetlands and seasonally wet areas in climax <i>Themeda triandra</i> grasslands on heavy black clay soils, tends to disappear from degraded grasslands	Moderate	Some suitable habitat present on site
Iridaceae	<i>Gladiolus robertsoniae</i>	NT	Moist highveld grasslands, found in wet, rocky sites, mostly dolerite outcrops, wedged in rock crevices	High	Rock outcrops present on site
	<i>Sensitive species 41</i> <sup>8</sup>	VU		High	
	<i>Sensitive species 691</i>	VU		High	

<sup>8</sup> As per the best practise guideline that accompanies the NEMA protocol and screening tool, the name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It should be referred to as *sensitive plant* or *sensitive animal* and its threat status may be included, e.g. *critically endangered sensitive plant* or *endangered sensitive animal*.



**Figure 35: Photographs illustrating the provincially protected plant species recorded in the Project Area: A) *Boophone disticha*; B) *Brunsvigia radulosa*; C) *Crinum bulbispermum*; D) *Gladiolus* sp. and E) *Eucomis autumnalis* (TBC, 2023d)**

#### 9.10.2.2 Alien Invasive Plant Species (AIPs)

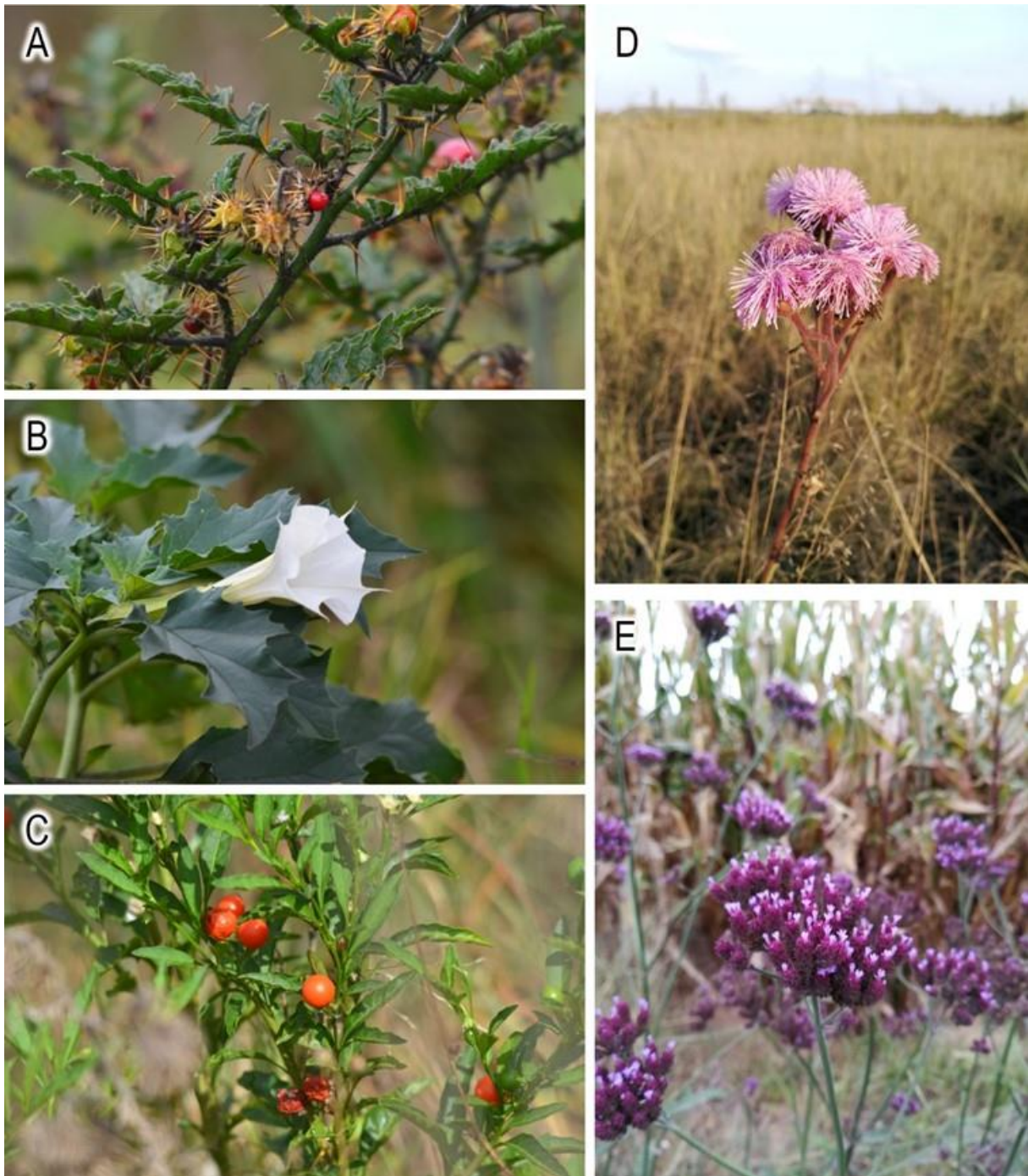
Alien invasive plant species (AIPs) can take over and transform ecosystems, the National Environmental Management: Biodiversity Act, Act 10 of 2004 (NEMBA) regulates the control and removal of different categories of invasive species. Category 1a and 1b plants require compulsory control and eradication, while Category 2 and 3 plants are regulated by area or activity and require permits. Category 2 and 3 plants are not allowed to exist in riparian zones. Anyone with control of a Category 1b plant must notify the authorities and manage it according to the relevant program and directives (TBC, 2023d).

19 AIP species were recorded from the Project Area, 17 of which are NEMBA category 1 species which require compulsory control (Table 33).



**Table 33: AIPs identified within the Project area (TBC, 2023d)**

Family	Scientific name	Common name	NEM:BA
Asteraceae	<i>Xanthium strumarium</i>	Large Cocklebur	1b
Asteraceae	<i>Campuloclinium macrocephalum</i>	Pompom Weed	1b
Asteraceae	<i>Cirsium vulgare</i>	Spear thistle	1b
Convolvulaceae	<i>Ipomoea purpurea</i>	Common Morning Glory	1b
Convolvulaceae	<i>Ipomoea indica</i>	Blue Morning Glory	1b
Fabaceae	<i>Acacia mearnsii</i>	Black Wattle	2
Fabaceae	<i>Gleditsia triacanthos</i>	Honey Locust	1b
Lamiaceae	<i>Salvia tiliifolia</i>	Lindenleaf Sage	1b
Myrtaceae	<i>Eucalyptus camaldulensis</i>	River Red Gum	1b
Nyctaginaceae	<i>Mirabilis jalapa</i>	Marvel-of-Peru	1b
Phytolaccaceae	<i>Phytolacca americana</i>	American Pokeweed	1b
Poaceae	<i>Cortaderia jubata</i>	Pampas Grass	1b
Salicaceae	<i>Populus × canescens</i>	Grey Poplar	2
Solanaceae	<i>Solanum sisymbriifolium</i>	Dense-thorned Bitter Apple	1b
Solanaceae	<i>Datura stramonium</i>	Common Thorn Apple	1b
Solanaceae	<i>Datura ferox</i>	Large thorn apple	1b
Solanaceae	<i>Solanum pseudocapsicum</i>	Jerusalem Cherry	1b
Verbenaceae	<i>Verbena bonariensis</i>	Tall Verbena	1b
Verbenaceae	<i>Verbena brasiliensis</i>	Brazilian Vervain	1b



**Figure 36** Photographs illustrating a some of the alien invasive species recorded from the Project area: A) *Solanum sisymbriifolium*; B) *Datura stramonium*; C) *Solanum pseudocapsicum*; D) *Campuloclinium macrocephalum* and E) *Verbena bonariensis* (TBC, 2023d)

### 9.10.3 Fauna

#### 9.10.3.1 Mammals

During the field survey in the Project Area, various rodent burrows were observed, indicating the presence of mammal species. The survey also recorded evidence of *Hystrix africaeaustralis* (Cape Porcupine) in the same area. Given the ample functional grassland in the Project Area,

it is highly probable that numerous mammal species would be found there, including some species of mammal SCC (Table 34) (TBC, 2023d)

**Table 34: Mammal Species expected to occur in the Project area (TBC, 2023d)**

Family	Scientific name	Common name	Red list
Bathyergidae	<i>Georychus capensis</i>	Cape Mole-rat	LC
Bovidae	<i>Sylvicapra grimmia</i>	Bush Duiker	LC
Bovidae	<i>Ourebia ourebi</i>	Oribi	EN
Canidae	<i>Canis mesomelas</i>	Black-backed Jackal	LC
Canidae	<i>Vulpes chama</i>	Cape Fox	LC
Erinaceidae	<i>Atelerix frontalis</i>	Southern African Hedgehog	NT
Felidae	<i>Leptailurus serval</i>	Serval	NT
Felidae	<i>Felis nigripes</i>	Black-footed Cat	VU
Herpestidae	<i>Atilax paludinosus</i>	Marsh Mongoose	LC
Herpestidae	<i>Cynictis penicillata</i>	Yellow Mongoose	LC
Herpestidae	<i>Herpestes sanguineus</i>	Slender Mongoose	LC
Herpestidae	<i>Suricata suricatta</i>	Meerkat	LC
Muridae	<i>Mus musculus</i>	House Mouse	Unlisted
Muridae	<i>Otomys auratus</i>	Southern African Vlei Rat (Grassland type)	NT
Muridae	<i>Rattus</i>	Roof Rat	Exotic (Not listed)
Muridae	<i>Rhabdomys pumilio</i>	Xeric Four-striped Grass Rat	LC
Muridae	<i>Gerbilliscus brantsii</i>	Highveld Gerbil	LC
Muridae	<i>Mastomys coucha</i>	Southern African Mastomys	LC
Muridae	<i>Mus (Nannomys) minutoides</i>	Southern African Pygmy Mouse	LC
Mustelidae	<i>Ictonyx striatus</i>	Striped Polecat	LC
Mustelidae	<i>Aonyx capensis</i>	Cape Clawless Otter	NT
Mustelidae	<i>Hydrictis maculicollis</i>	Spotted-Necked Otter	VU
Nesomyidae	<i>Steatomys pratensis</i>	Common African Fat Mouse	LC
Pedetidae	<i>Pedetes capensis</i>	South African Spring Hare	LC
Procaviidae	<i>Procavia capensis</i>	Cape Rock Hyrax	LC
Sciuridae	<i>Xerus inauris</i>	South African Ground Squirrel	LC
Soricidae	<i>Myosorex cafer</i>	Dark-footed Mouse Shrew	Unlisted
Soricidae	<i>Myosorex varius</i>	Forest Shrew	LC
Soricidae	<i>Crocidura maquassiensis</i>	Makwassie Musk Shrew	VU

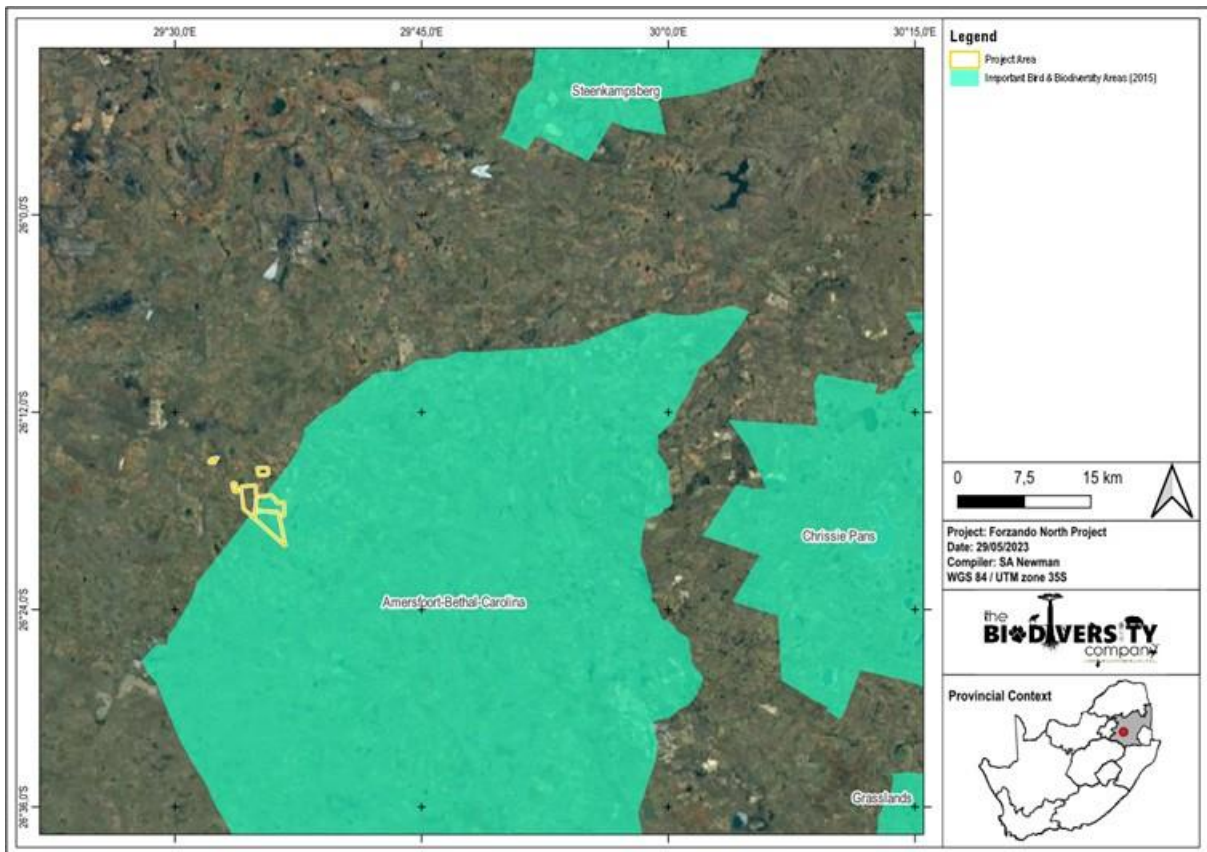
Family	Scientific name	Common name	Red list
Viverridae	<i>Genetta</i>	Common Genet	LC

### 9.10.3.2 Avifauna

According to BirdLife International, the Important Bird and Biodiversity Areas (IBAs) are global sites of great significance for the conservation of birds and other important species. These areas are considered Key Biodiversity Areas that greatly contribute to the maintenance of biodiversity worldwide. As depicted in Plan 25 the Project area (specifically the underground area) coincides with the Amersfoort-Bethal-Carolina IBA (TBC, 2023d).

The regional avifaunal assemblage of the study area is relatively well known with 190 species expected to occur within the area, of which 17 are listed as SCC (refer to Appendix F 7 for a list thereof) (TBC, 2023d).

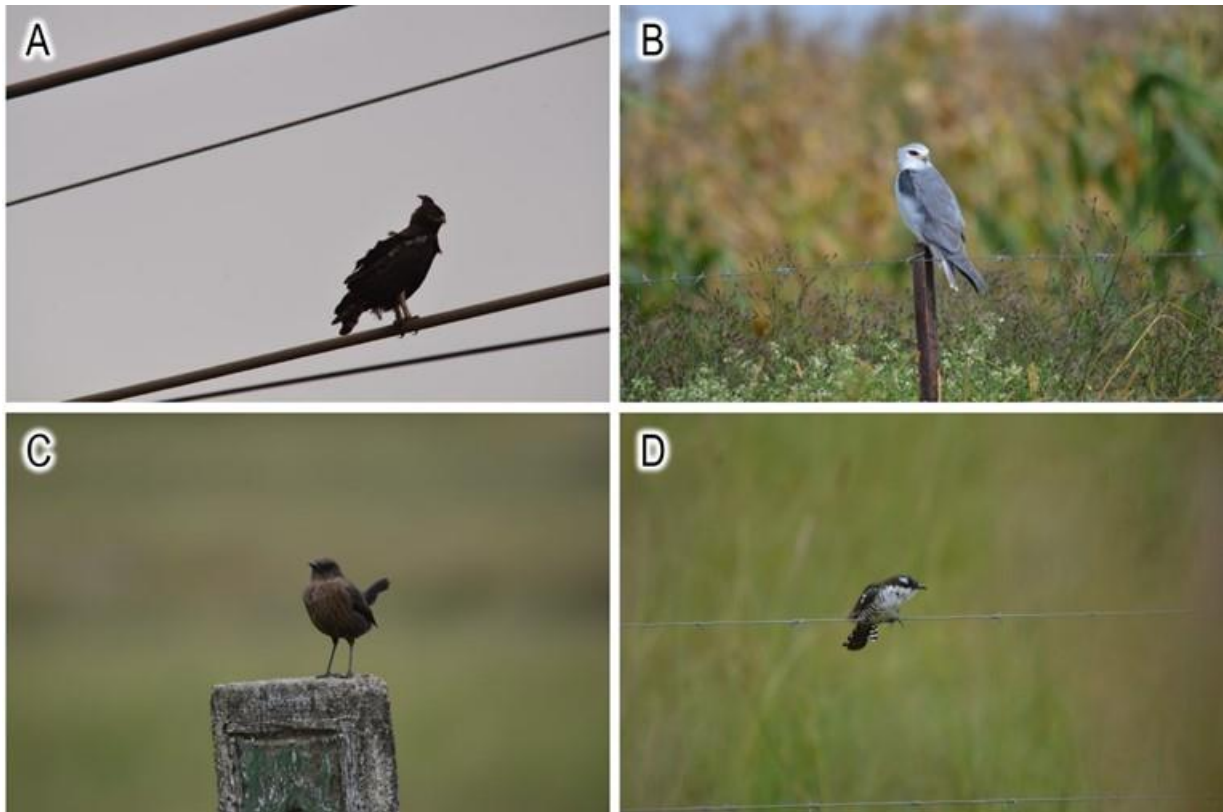
During the site survey 26 species of avifauna were recorded across the Project area (Table 35). It is considered highly likely that many more avifauna species would be recorded from the Project area, including SCC, with extensive sampling (TBC, 2023d).



Plan 25: IBAs proximal to the Project area (TBC, 2023d)

**Table 35: Summary of Avifauna recorded in the Project area (TBC, 2023d)**

Scientific name	Common name	Regional (BirdLife SA 2019)	Global (IUCN 2019)
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC
<i>Alopochen aegyptiacus</i>	Goose, Egyptian	Unlisted	LC
<i>Anas undulata</i>	Duck, Yellow-billed	Unlisted	LC
<i>Ardea cinerea</i>	Heron, Grey	Unlisted	LC
<i>Asio capensis</i>	Owl, Marsh	Unlisted	LC
<i>Bostrychia hagedash</i>	Ibis, Hadedda	Unlisted	LC
<i>Bubulcus ibis</i>	Egret, Cattle	Unlisted	LC
<i>Burhinus capensis</i>	Thick-knee, Spotted	Unlisted	LC
<i>Chrysococcyx caprius</i>	Cuckoo, Diederik	LC	LC
<i>Elanus caeruleus</i>	Kite, Black-shouldered	LC	LC
<i>Euplectes progne</i>	Widowbird, Long-tailed	Unlisted	LC
<i>Fulica cristata</i>	Coot, Red-knobbed	Unlisted	LC
<i>Lophaetus occipitalis</i>	Eagle, Long-crested	LC	LC
<i>Myrmecocichla formicivora</i>	Chat, Anteating	Unlisted	LC
<i>Numida meleagris</i>	Guineafowl, Helmeted	Unlisted	LC
<i>Passer domesticus</i>	Sparrow, House	Unlisted	LC
<i>Phalacrocorax carbo</i>	Cormorant, White-breasted	LC	LC
<i>Phalacrocorax lucidus</i>	Cormorant, White-breasted	Unlisted	LC
<i>Ploceus velatus</i>	Southern Masked-weaver, Southern	Unlisted	LC
<i>Quelea</i>	Quelea, Red-billed	Unlisted	LC
<i>Scopus umbretta</i>	Hamerkop	Unlisted	LC
<i>Streptopelia senegalensis</i>	Dove, Laughing	Unlisted	LC
<i>Threskiornis aethiopicus</i>	Ibis, African Sacred	Unlisted	LC
<i>Turdus olivaceus</i>	Thrush, Olive	Unlisted	LC
<i>Vanellus armatus</i>	Lapwing, Blacksmith	Unlisted	LC
<i>Vidua macroura</i>	Whydah, Pin-tailed	Unlisted	LC



**Figure 37: Photographs illustrating some of the avifauna species recorded from the Project area and surrounds: A) *Lophaetus occipitalis* (Long-crested Eagle); B) *Elanus caeruleus* (Black-shouldered Kite); C) *Myrmecocichla formicivore* (Anteating Chat) and D) *Chrysococcyx caprius* (Diederik Cuckoo) (TBC, 2023d)**

### 9.10.3.3 Herpetofauna

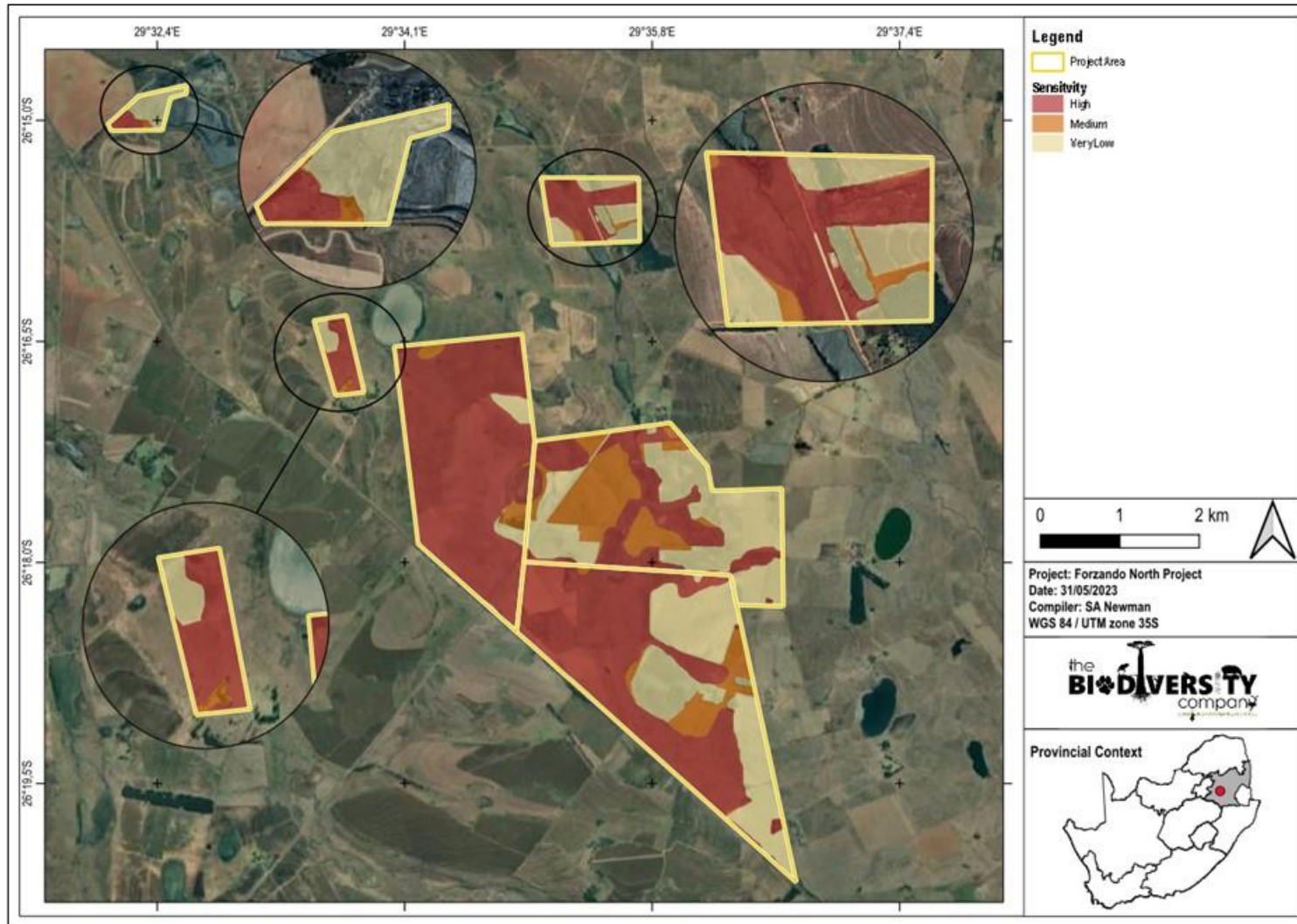
During the field survey, no amphibian species were observed. This may be attributed to the fact that amphibians are naturally elusive, combined with the limited duration of the survey. To obtain an accurate representation, extensive sampling over multiple surveys would be necessary. Nonetheless, since suitable habitat was present, it is likely that common amphibian species inhabit the project area. One reptile species, namely *Hemachatus haemachatus* (rinkhals), was recorded within the project area during the field survey. Similar to amphibians, reptiles can be challenging to spot, especially within a brief survey period. However, it is probable that typical reptile species thrive in the project area, based on the presence of favourable habitat (TBC, 2023d). Refer to Appendix F 7 for a list of species expected to occur in the area.

### 9.10.4 Combined Sensitivity

The Project Area was categorised as possessing habitats with areas ranging from 'Very Low' to 'High' site ecological importance (SEI), Table 36. The SEI of the Project Area is illustrated in Plan 26. Table 38 provides a guideline for interpreting SEI (TBC, 2023d).

**Table 36: Summary of the proposed Forzando North Project Area SEI (TBC, 2023d)**

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Modified	No natural habitat remaining.	Several major current negative ecological impacts.	Very Low	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Very Low
Alien Thicket/Plantation	< 50% of receptor contains natural habitat with limited potential to support SCC.	Several minor and major current negative ecological impacts.	Low	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Very Low
Rock Outcrop	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km <sup>2</sup>	Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches	High	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	High
Disturbed Grassland	Any area of natural habitat of threatened ecosystem type with status of VU.	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type	Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Medium
Water Resource	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km <sup>2</sup>	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type.	High	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	High



Plan 26: Combined habitat sensitivity (SEI) (TBC, 2023d)

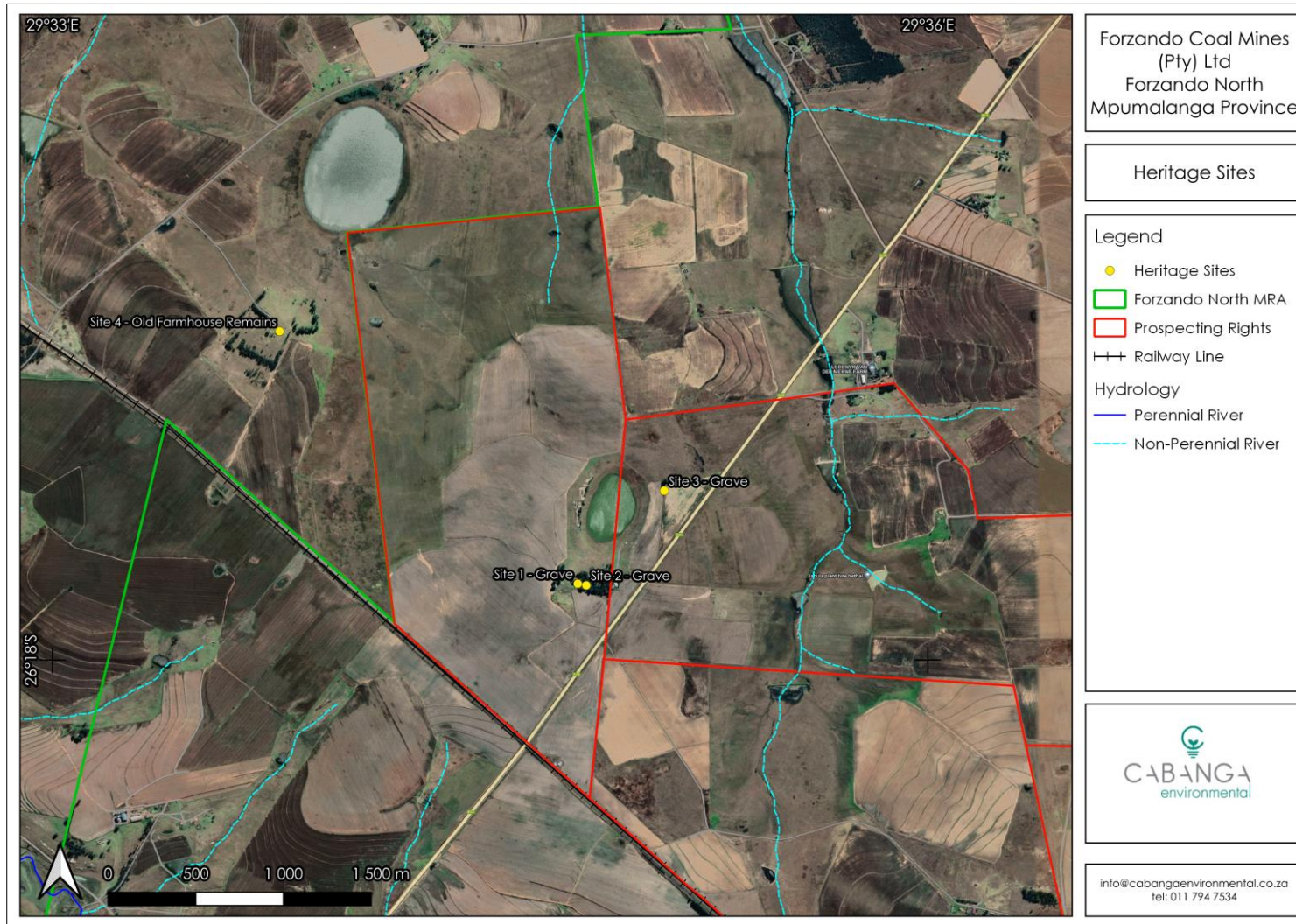


**Table 37: Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities (TBC, 2023d)**

Site Ecological Importance (SEI)	Interpretation in relation to proposed development activities
<b>High</b>	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
<b>Medium</b>	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
<b>Low</b>	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
<b>Very Low</b>	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.



### 9.11 Heritage and Archaeology



A Heritage Impact Assessment (HIA) was completed by Archaetnos Culture and Cultural Resource Consultants for the Project (attached as Appendix F 8). Four sites of cultural heritage significance were located during the survey (Plan 27) as summarised in Table 38 overleaf (Archaetnos, 2023). Sites no. 1-3 are all single graves. Graves are always regarded as having a high cultural significance. Site no. 4 is an old farmhouse and received a field rating of Local Grade III C (low significance).



Plan 27: Identified Heritage Sites

**Table 38: Summary findings of the Heritage resources (Archaeos, 2023)**

ID	Description	Photo
<p><b>Site 1</b></p>	<p>This site consists of a single grave. The grave is located in a thicket of trees at a farmstead. There is no headstone and grave dressings are made of packed bricks. No information was visible and thus the grave is categorised as unknown.</p> <p><b>Cultural Significance rating:</b> High</p> <p><b>Integrity Rating:</b> 3 - Reasonable state of preservation, but no contextual information</p> <p><b>In-field rating:</b> Local Grade IIIB, where it may be mitigated and should be included in the heritage register.</p>	
<p><b>Site 2</b></p>	<p>This site consists of a single grave. The grave is located in a thicket of trees at a farmstead and is about 48 m from site no. 1. There is no headstone and grave dressing is made of packed bricks. No information was visible and thus are the grave is categorised as unknown.</p> <p><b>Cultural Significance rating:</b> High</p> <p><b>Integrity Rating:</b> 3 - Reasonable state of preservation, but no contextual information</p> <p><b>In-field rating:</b> Local Grade IIIB, where it may be mitigated and should be included in the heritage register.</p>	

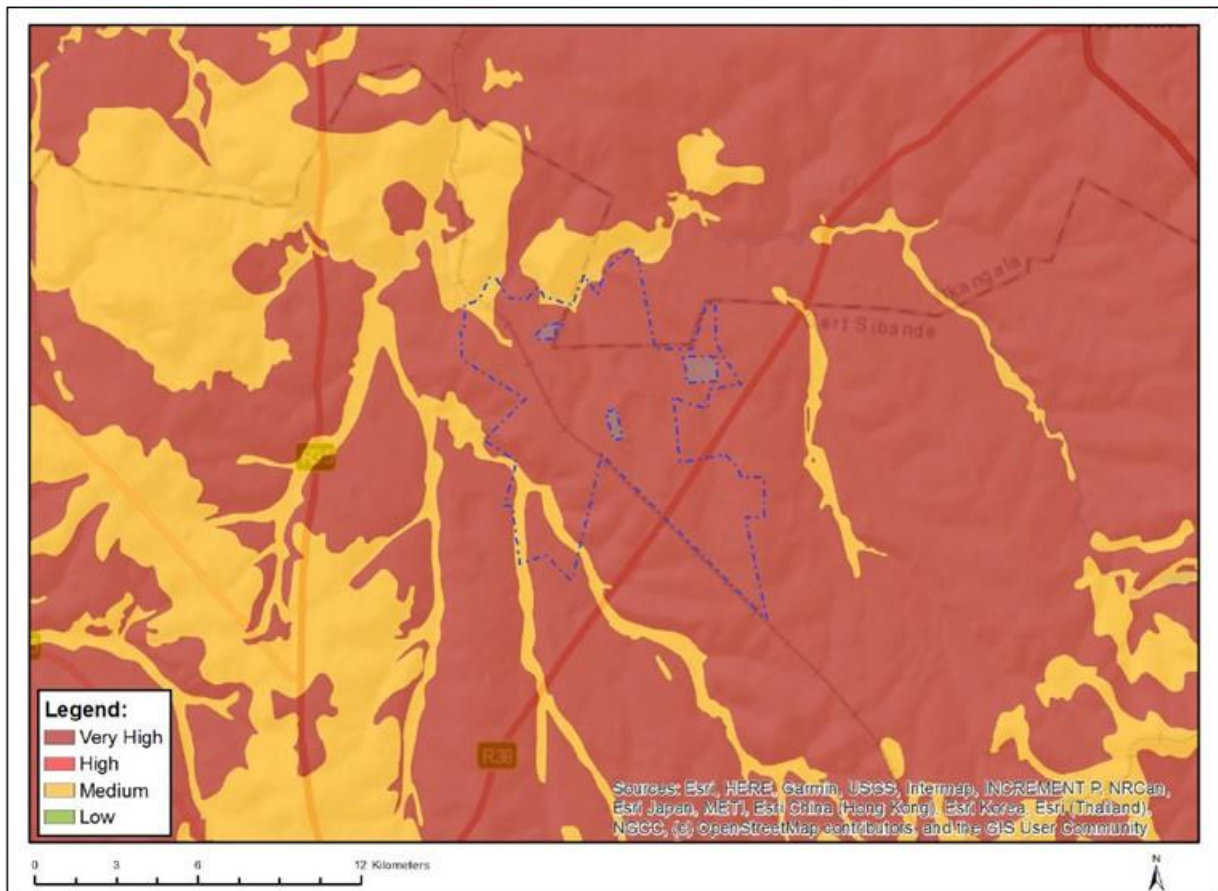
ID	Description	Photo
<p><b>Site 3</b></p>	<p>This site consists of a single grave. The grave is located next to an agricultural field. It is only marked by a headstone which is made of carved stone. No information was visible and thus the grave is categorised as unknown. The grave has been fenced off.</p> <p><b>Cultural Significance rating:</b> High</p> <p><b>Integrity Rating:</b> 3 - Reasonable state of preservation, but no contextual information</p> <p><b>In-field rating:</b> Local Grade III B, where it may be mitigated and should be included in the heritage register.</p>	
<p><b>Site 4</b></p>	<p>This site consists of the remains of an old farmhouse of about 18 m long and 16 m wide with at least eight rooms. It no longer has a roof and only consists of brick walls. The site likely is older than 60 years, but without artefactual evidence this is difficult to determine. It is in a poor state and not very unique.</p> <p><b>Cultural Significance rating:</b> Low</p> <p><b>Integrity Rating:</b> 1 – Bad state of preservation, but no contextual information</p> <p><b>In-field rating:</b> Local Grade III C, the description in the phase 1 heritage report is seen as sufficient recording (low significance) and it may be granted destruction at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorisation.</p>	

### 9.12 Palaeontological Setting

According to SAHRIS, the MRA falls within an area of very high palaeo-sensitivity (Figure 38). A Phase 2 Palaeontologic Study was completed for the project (Bamford, 2023). The report concluded the following (refer to Appendix F 9 for the full report):

The Project area falls within the Vryheid Formation of the Ecca Group. The Vryheid Formation contains the unique *Glossopteris* flora, which thrived as the continent shifted towards the poles and the climate became warmer. The formation is characterized by coal seams that formed over time from peat deposits, which were buried and altered by heat and pressure. Although coal seams do not retain the original plant structures, the flora can be identified through impressions or compressions found between the coal seams or in fine-grained sediments. The dominant plants in the flora are *Glossopteris*, along with other early gymnosperms such as lycopods, sphenophytes, ferns, and cordaitaleans. Unlike fossil plants, vertebrates are not found in the Vryheid Formation due to different preservation requirements. The Jurassic dolerite is an intrusive volcanic rock that does not preserve fossils, while the Quaternary sands along the stream are unlikely to contain fossils due to being moved by river floods (Bamford, 2023).

The majority of the surveyed land had been farmed, with most areas either recently cleared or undergoing mielie harvesting. The watercourses were lined with dense grasslands, and no rocky outcrops, such as shales, were present where *Glossopteris* fossil plants could typically be found. The only rocks observed were sandstone fragments in one location, likely brought in for road construction, and two piles of laterite that had been removed from a dam and deposited in a heap. No shales were detected throughout the entire surveyed area, and as a result, no fossils were discovered. In summary, the survey did not yield any fossils (Bamford, 2023).



**Figure 38: Palaeo-sensitivity (DFFE, 2023)**

### 9.13 Air Quality

To assess the baseline air quality at the mine, available monitoring data for PM<sub>10</sub> and PM<sub>2.5</sub> were analysed from a permanent ambient air quality monitoring station known as the Elandsfontein Station (-26.245814°S; 29.417320°E), situated 9.26 km to the west of the existing Forzando North MRA. The data was collected during the period of 01 January 2018 – 31 December 2020, with a relatively high data capture observed for PM<sub>10</sub> (68.95%) and PM<sub>2.5</sub> (71.6%). However, the data availability at the monitoring station reduced significantly after 2020. Dustfall monitoring is performed by Forzando Coal Mine through single-unit dust bucket stations on a monthly basis, and data for the monitoring periods May 2022 – March 2023 was provided for review (Rayten, 2023).

The analysis of the baseline air quality data between 01 January 2018 to 31 December 2020 showed no exceedances of the PM<sub>10</sub> (75 µg/m<sup>3</sup>) daily standard, whereas a total of 13 exceedances occurred for the PM<sub>2.5</sub> (40 µg/m<sup>3</sup>) daily standard during the monitoring period. Nonetheless, there were no observed breaches of the applicable annual standards (40 µg/m<sup>3</sup> and 20 µg/m<sup>3</sup> for PM<sub>10</sub> and PM<sub>2.5</sub>, respectively) between 2018 – 2020 (Rayten, 2023).

In terms of the dustfall data, none of the 84 dustfall rates recorded for the May 2022 - March 2023 monitoring period exceeded the non-residential or residential limits of 1200 and 600 mg/m<sup>2</sup>/day, respectively. The recorded dustfall rates ranged from 26.7 – 446 mg/m<sup>2</sup>/day. All

monitoring sites complied with the South African National Dust Control Regulations for the period assessed (Rayten, 2023).

Existing key sources of air pollution surrounding the Project area have been identified to be:

- Agricultural activities (temporary crops) and potential biomass burning (surrounding areas);
- Planted forest (surrounding areas);
- Solid fuel combustion from nearby informal settlements (south-west quadrant);
- Vehicle dust entrainment on unpaved roads (surrounding areas); and
- Extraction sites.

#### **9.14 Noise**

Ambient (background) noise levels were measured at three locations (Figure 39 ) between 4 – 8 May 2023 in accordance with the South African National Standard (SANS) 10103:2008 resulting in 1,100 daytime and 570 night- time measurements. Considering the sound level data collected in the area:

- daytime fast-weighted sound levels ranged from 24 to more than 70 dBA, with average sound levels being 46.5 dBA. This is typical of a rural to sub-urban noise district, setting a zone sound level of 45 dBA for the daytime period; and
- night-time fast-weighted sound levels ranged from 24 to just more than 60 dBA, with average sound levels being 39.2 dBA. This is typical of a sub-urban noise district and typical of ambient sound levels in a rural agricultural community, setting a zone sound level of 40 dBA for the night-time period.

Considering the requirements of the National Noise Control Regulations (GNR154 of 1993), activities relating to the proposed Project should not change the existing ambient sound levels with more than 7 dBA, nor exceed the World Health Organization (WHO) and International Finance Corporation (IFC) noise limits. The upper noise limits recommended are:

- 52 dBA (based on the daytime rating level) for daytime residential use; and
- 45 dBA (as recommended by the WHO and IFC) for night-time residential use.

Forzando North should also limit the noise level to less than 70 dBA on the boundary (70 dBA during the daytime period and 60 dBA at night for a 70 dBA day-night noise limit) (E.A.R, 2023). Potential noise-sensitive receptors (NSR) identified in the Project area and the relative distance between the receptor and potential noise sources associated with the Project, are illustrated in Figure 40 overleaf.

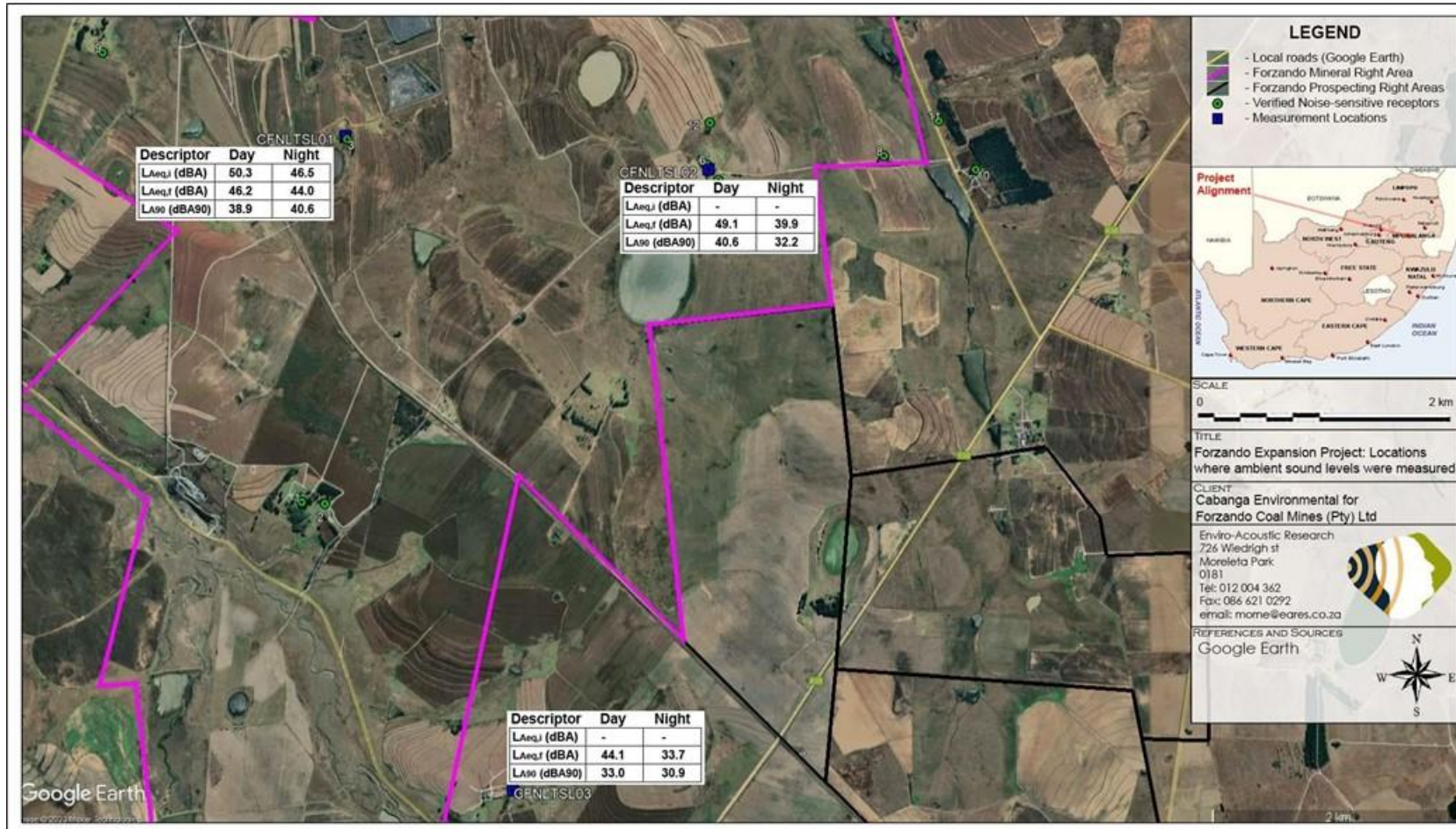


Figure 39: Localities where ambient noise levels were monitored (E.A.R, 2023)



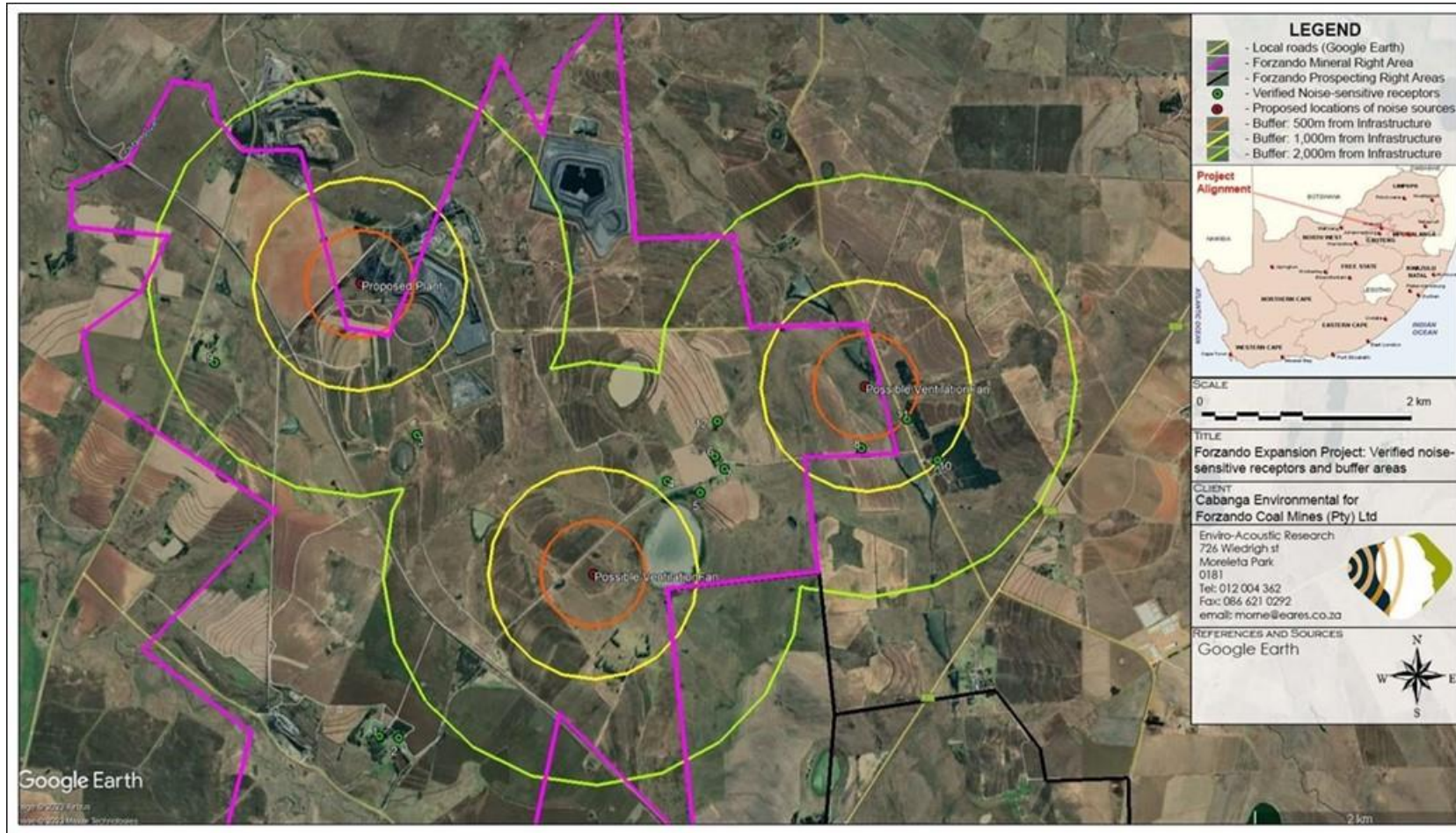


Figure 40: Potential noise-sensitive receptors in relation to the Project Area (E.A.R, 2023)

### 9.15 Visual Setting

The Project area is characterised by an agricultural landscape setting, including cultivation of mielies and soy as well as grazing by cattle, sheep and goats. Common to the area are the clusters of blue gum trees that are mostly associated with the farmsteads. In addition, electricity infrastructure and mining activity, have resulted in a high degree of visual degradation of the area.

### 9.16 Social Setting

The Project area falls within two local Municipalities, being the Msukaligwa and Govan Mbeki Local Municipalities, within the Gert Sibande District Municipality (DC30).

The Gert Sibande District Municipality covers an area of 31 842 km<sup>2</sup>, approximately 40% of Mpumalanga's land mass, and comprises seven local Municipalities (Table 39).

According to StatsSA 2016 Community Survey, Gert Sibande Municipality's population increased from 1 043 194 in the year 2011, to 1 135 409 in the year 2016. Indicating a population growth of 1.9% per annum (StatsSA, n.d.).

In 2019 the unemployment rate was 28.7% however, job losses in 2020 due to COVID-19 is estimated to be in the region of 30 000 – 39 000 and thus the unemployment rate is expected to have increased to between 35.3% and 37.4%. Some 46.7% of the population within the District fell below the lower-bound poverty line in 2019 (GSDM, 2022).

The 2016 Community Survey as referenced in the Municipal IDP (GSDM, 2022) identifies the following as the leading challenges in the District:

- Lack of safe and reliable water supply;
- Lack of employment opportunities;
- Inadequate roads;
- Cost of electricity; and
- Cost of water.

The following are the main economic sectors in the Municipality which have been identified as pivotal in spurring economic growth and employment creation:

- Agriculture and forestry;
- Mining and energy;
- Tourism and cultural industries;
- The Green Economy, Information and Communication; and
- Manufacturing and beneficiation (GSDM, 2022).

**Table 39: Gert Sibande District Local Municipalities (GSDM, 2022)**

Name of Municipality	Main Administrative Location	Area (km <sup>2</sup> )	Population (2011)	Population (2016)	Unemployment rate (2019)
Chief Albert Luthuli	Carolina	5 559	186 010	187 630	34.1%
Dipaleseng	Balfour	2 616	42 390	45 232	38.4%

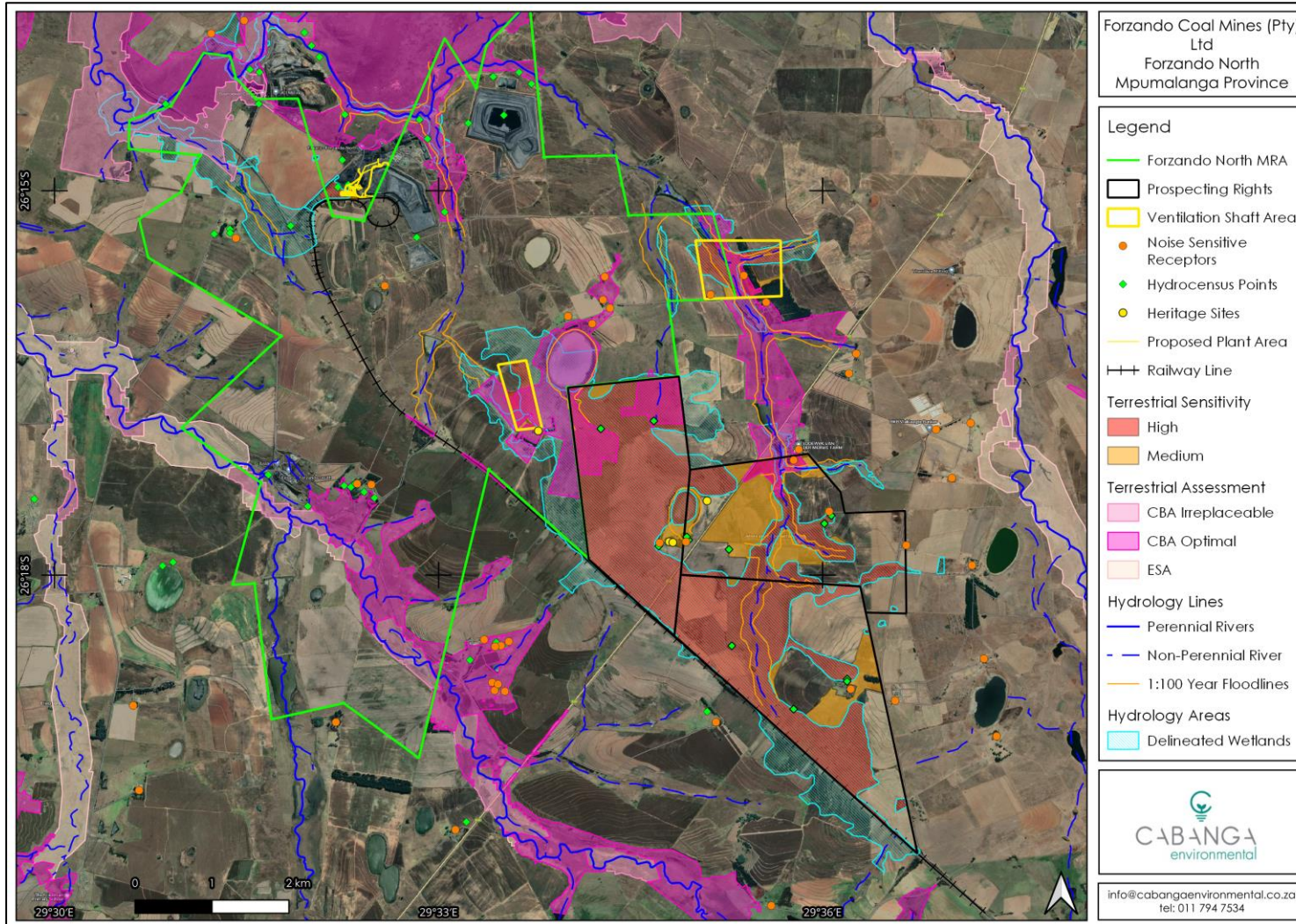
Name of Municipality	Main Administrative Location	Area (km <sup>2</sup> )	Population (2011)	Population (2016)	Unemployment rate (2019)
Dr. Pixley Isaka Ka Seme	Volkrust	5 227	83 235	85 395	37.5%
Govan Mbeki	Secunda	2 955	294 538	340 091	25,3%
Lekwa	Standerton	4 585	115 662	123 419	27.1%
Mkhondo	eMkhondo	4 882	171 982	189 036	32.3%
Msukaligwa	Ermelo	6 017	149 377	164 608	24.3%
<b>Total</b>		<b>31 842 km<sup>2</sup></b>	<b>1 043 194</b>	<b>1 135 411</b>	

## 10 ENVIRONMENTAL SENSITIVITY

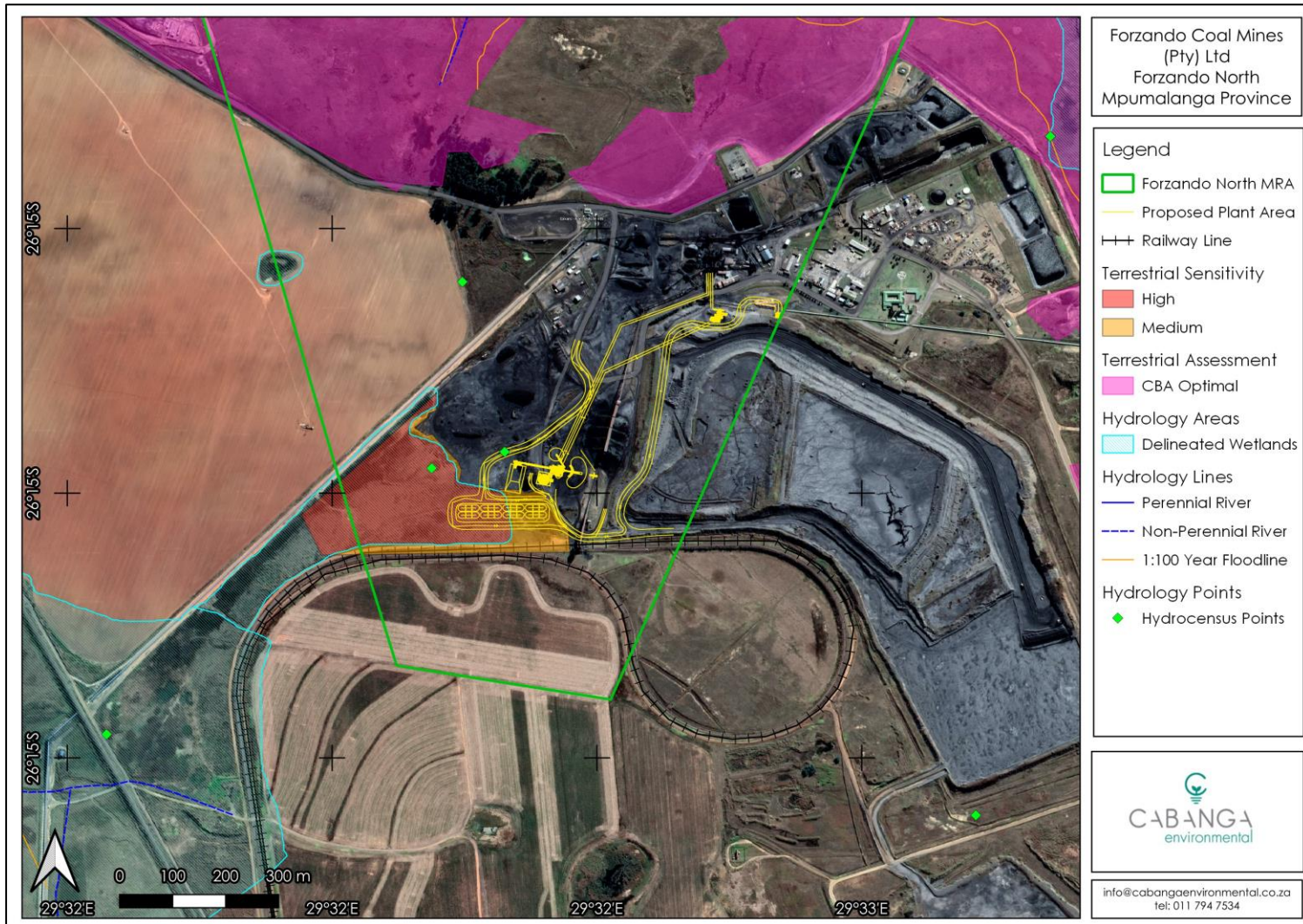
The sensitive environmental features associated with the Project area are as follows:

- Watercourses;
- Wetlands;
- CBAs;
- Flora and fauna species; and
- Graves/heritage sites.

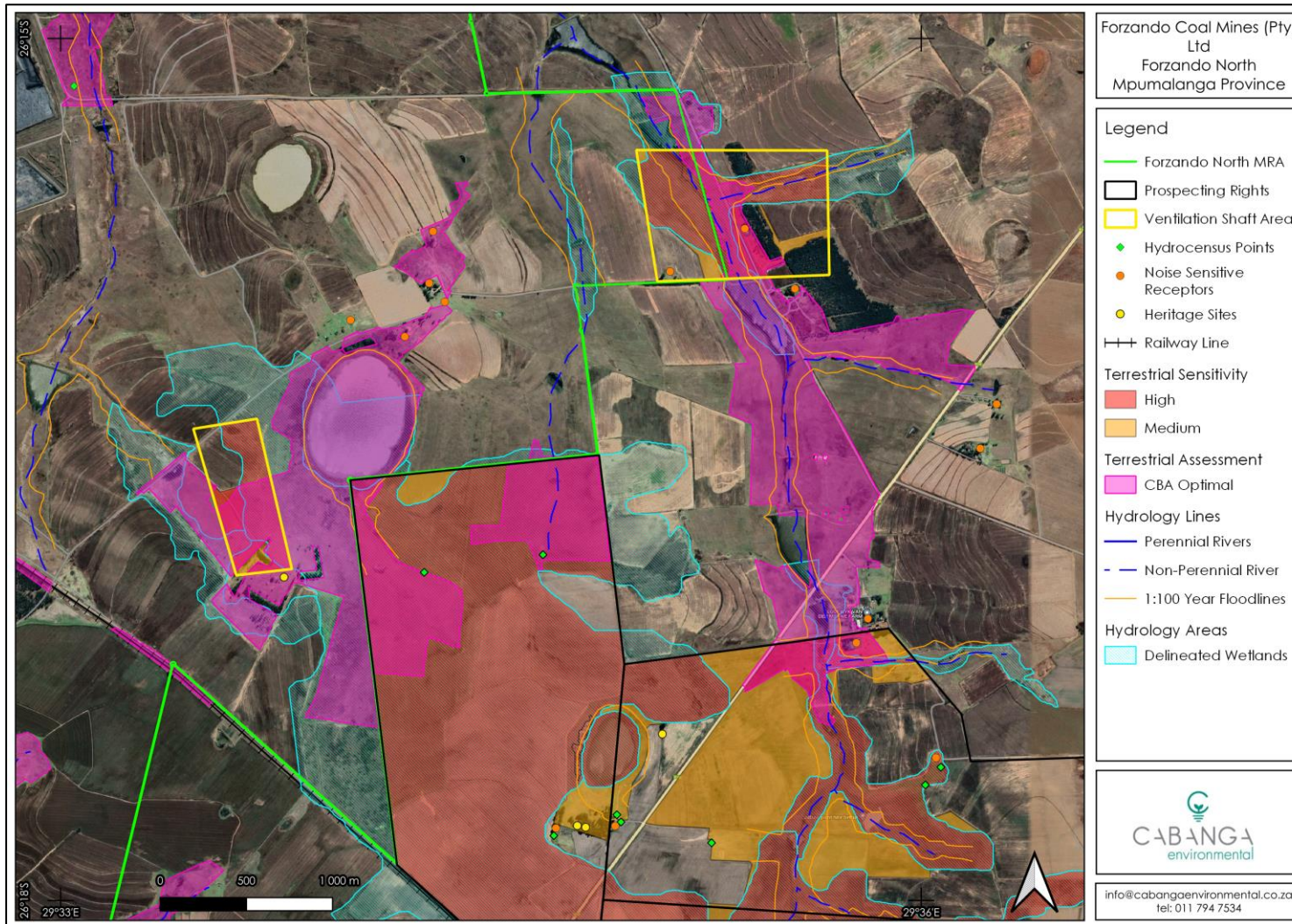
Plan 28 depicts the environmentally sensitive areas, in relation to, the Project area and proposed infrastructure.



Plan 28: Overall Environmental Sensitivity Map



**Plan 29: Environmental Sensitivity Map – Zoomed in on proposed Plant area**



**Plan 30: Environmental Sensitivity Map – Zoomed in on Ventilation Shaft areas**

## 11 IMPACT ASSESSMENT

The purpose of the impact assessment is to determine the Significance of potential impacts associated with the proposed project changes, so that those activities that are expected to result in high impacts can be altered, or management measures imposed to lessen the impact significance.

### 11.1 Impact Assessment Methodology

Impact Significance is calculated by the following formula:

$$\text{Impact Significance} = \text{Consequence} \times \text{Likelihood}$$

Likelihood refers to the probability that an impact will occur at some time during the project.

The Matrix which is proposed to determine Likelihood is as follows:

**Table 40: Matrix used to determine Likelihood**

Likelihood	Unlikely: Impact Could occur in extreme events. Less than 15% chance of the impact ever occurring.	1
	Possible: possibility of impact occurring is very low. 16% - 30% chance of the impact occurring.	2
	Probable There is a distinct possibility of the impact occurring. 31% to 60% chance.	3
	Highly Probable: The impact is expected to occur. Between 61% and 85 % chance.	4
	Definite: There are sound scientific reasons to expect that the impact will occur	5

**Consequence** is calculated by considering the duration, spatial scale and intensity of an impact.

**Duration** relates to the time-frame that an aspect will be impacted upon. For example, any impact to a heritage resource is considered permanent, while the impact of increased traffic related to a construction activity will only last as long as the construction phase. Duration is rated according to the following criteria:

**Table 41: Matrix used to rate Duration**

Duration	Short term: Less than 1 year and is reversible.	1
	Short to medium term: 2 - 3 years	2
	Medium term - 3 to 10 years	3
	Long term: 11-20 years	4
	Permanent: in excess of 20 years	5

**Spatial Scale** relates to the physical extent of the zone of influence of an impact. Where groundwater or air quality impacts, for example, can extend far beyond the footprint of the activity, it is not expected that the impact of vegetation removal should extend beyond the footprint of the activity. Scale is rated according to Table 42. Table 42: Matrix used to rate Scale

Scale / Extent	Isolated: Limited footprint within the site will be affected (less than 50% of the site)	1
	Site Specific: The Entire Site will be affected	2

	Local: Will affect the site and surrounding areas	3
	Regional: Will affect the entire region / catchment / province	4
	National: Will affect the country, and possibly beyond the borders of the country	5

The **Intensity** of an impact is calculated by considering the severity of the impact (how it will change the aspect, will it be destroyed completely, or altered slightly?) and the sensitivity of the aspect (is the aspect sensitive to change, and is the aspect important to ecosystem processes or social dynamics?). For example, if the impact is anticipated to completely destroy a local plant population, but the plant population is commonly found and protected in nearby surroundings, the over-all intensity is lowered. If, however, the plant population in question is unique or protected, the intensity increases proportionately.

The Matrix which is proposed to determine Intensity is as follows:

**Table 43: Matrix used to rate Intensity**

<b>Intensity</b>	2	Not significant	<b>Magnitude</b>	Slight: Little effect, negligible disturbance / benefit	1		
				Slight to Moderate: Effects are observable but natural process continue	2		
				Moderate: ecosystem processes / social dynamics are permanently altered, but functioning.	3		
				Moderate - High: natural / social processes are altered to the point where function is limited	4		
				High: The aspect is affected so that its functioning is compromised and this effect is irreversible	5		
	3	Slight				The aspect is not sensitive to change (No irreplaceable loss of resource)	1
						The aspect is of not of significant value but is sensitive to change	2
						The affected aspect is of moderate value and is slightly resilient to change	3
						The affected aspect is of significant value and only slightly resilient to change	4
						The affected aspect is valued, irreplaceable and sensitive to change. Irreplaceable loss of significant resource	5
4	Slight Moderate						
5	Moderate						
6	Moderate High						
7	High						
8	Very High						
9	Extremely High						
10	Fatal Flaw						

Therefore, considering the formula:

$$\text{Significance} = \text{Consequence} \times \text{Likelihood}$$

Where Consequence = Duration + Scale + Intensity

And Intensity = Severity of the Impact + Sensitivity of the Aspect

The over-all **Significance rating** can be calculated as a value between 4 and 100. The score is then categorised as follows:

- 4 to 19 = Insignificant Impact, no mitigation is required beyond standard best practice;



- From 20 to 39 = Low Impact, specific mitigation should be included in the EMPr and monitoring should be undertaken;
- From 40 to 59 = Moderate Impact, specific mitigation with strict monitoring is required;
- From 60 to 79 = High Impact, mitigation should consider alteration of the design or process to reduce the impact significance;
- >Higher than 80 (100 max) = The Impact is so Significant that the project design must be reconsidered to avoid the impact.

Impacts will be rated as per the abovementioned methodology without consideration of mitigation measures first, however there may be some mitigation already inherent in the design of the Project.

Those impacts that are rated as having a moderate impact or above will be investigated further and management measures identified to attempt to reduce the Consequence or Likelihood of the impact. These impacts will then be rated again, while considering the mitigation measures that have been imposed.

### **11.2 Identification of Impacts**

Potential impacts associated with the Project were identified by evaluating the activities associated with each project element in the environmental context of the MRA. Impact identification was facilitated through specialist studies, review of the approved EMPr Amendment, the understanding of the EAP, inputs from the Applicant and inputs from the Public Participation Process (PPP). These are listed in the table overleaf.

**Table 44: Impacts identified for the proposed Project and extended LOM**

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
1	Clearance of vegetation, stripping and stockpiling of soils	Yes	Activity 19, 27 & 30 of GNR 983: Listing Notice 1 Activity 12(f)(i) of GNR 985: Listing Notice 3	2,5 Ha	Degradation, destruction and fragmentation of portions of sensitive habitats (including wetlands)	Terrestrial Biodiversity
					Displacement of faunal community due to habitat loss and disturbance (noise, dust and vibration) and/or direct mortalities	Terrestrial Biodiversity
					Destruction of SCC	Terrestrial Biodiversity
					Increased runoff and erosion ultimately resulting in loss of vegetation communities, and leading to the sedimentation of downstream water resources	Surface water, wetlands & associated aquatic ecosystems Terrestrial Biodiversity
					Spread or establishment of alien invasive species	Terrestrial Biodiversity
					Stockpiles will alter the topographical nature and visual characteristics of the area	Topography, Visual Aesthetics
					Loss of land capability / land potential	Soils, Land Use & Land Capability

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
					Loss of topsoil - increased potential for soil erosion	Soils, Land Use & Land Capability
					Increased infiltration to aquifers	Groundwater
					Increased dust, PM10 & PM2.5 from	Air Quality
					Loss of and disturbance to archaeological, palaeontological and heritage sites	Heritage & Palaeontology
2	Operation of machinery and vehicle movement	No	-	-	Impact on global climate change due to GHG emissions	Climate Change
					Compaction and alteration of soil characteristics	Soils, Land Use & Land Capability
					Potential for environmental pollution due to leaky equipment/vehicles	Soils, Land Use & Land Capability Surface water, wetlands & associated aquatic ecosystems, Groundwater
					Increased dust, PM10 & PM2.5	Air Quality
					Emissions into the atmosphere from machinery,	Air Quality

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
					vehicles and generators: Nox, SO <sub>2</sub> , CO emissions	
					Traffic will result in road degradation and increased potential for road incidences.	Traffic, Social, Health & Safety
3	Presence of personnel onsite	No	-	-	Staff interacting with potentially dangerous fauna (i.e. snakes, bushpigs etc.)	Traffic, Social, Health & Safety
					Increased risk of unfamiliar people may result in a risk of safety to the landowner/user. Increased risk of stock theft/loss.	Social, Health & Safety
					Increased risk for veldt fires	Social, Health & Safety
					Physical injuries at the workplace, road traffic incidences and other accidental injuries. Resultant health system issues (increased pressure on health services and infrastructure)	Social, Health & Safety
4	Extension of existing haul roads at the plant area (in already disturbed footprint area)	Yes	Activity No. 18.f.i.(cc) & (ee) of GNR 985: Listing Notice 3	16 000m <sup>2</sup>	Compaction and alteration of soil characteristics	Soils, Land Use & Land Capability

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
5	Service tracks/access routes to the ventilation shafts	Yes	Activity No. 4.f.i.(cc) & (ee) of GNR 985: Listing Notice 3	10 000m <sup>2</sup>	Compaction and alteration of soil characteristics	Soils, Land Use & Land Capability
					Destruction of SCC	Terrestrial Biodiversity
					Loss of and disturbance to archaeological, palaeontological and heritage sites	Heritage & Palaeontology
6	Construction of the proposed Plant and expansion of existing stockpile area	Yes	Activity No. 12 and 19 of GNR 983: Listing Notice 1	Plant Footprint = 2 Ha Proposed expansion to the stockpile area = 2 Ha	Coal stockpiles and plant will alter the topographical nature and visual characteristics of the area	Topography, Visual Aesthetics
					Direct disturbance / degradation / loss to wetland due to the expansion of the stockpile area	Wetlands & associated aquatic ecosystems
					Increased erosion and sedimentation	Surface water, wetlands & associated aquatic ecosystems
					Potential contamination of water resources/wetlands with machine oils and construction materials	Surface water, wetlands & associated aquatic ecosystems
					Increased dust, PM10 & PM2.5	Air Quality

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
					Deterioration in visual aesthetics	Visual Aesthetics
					Increase in environmental noise levels due to construction activities	Noise
7	Raise bore drilling of 2x Ventilation Shafts, construction and installation of ventilation fans	Yes	Activity No. 12 & 19 of GNR 983: Listing Notice 1 Activity 14(ii)(a)(f)(i)(ff) of GNR 985: Listing Notice 3	5 000m <sup>2</sup> (2 500m <sup>2</sup> each)	Direct disturbance / degradation / loss to wetland due to the construction of the shafts.	Wetlands & associated aquatic ecosystems
					Increased erosion and sedimentation	Surface water, wetlands & associated aquatic ecosystems
					Potential contamination of water resources/wetlands with machine oils and construction materials	Surface water, wetlands & associated aquatic ecosystems
					Increased dust, PM10 & PM2.5	Air Quality
					Deterioration in visual aesthetics	Visual Aesthetics
					Increase in environmental noise levels due to construction activities - day time	Noise

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
					Increase in environmental noise levels due to construction activities - night time	Noise
8	Operation of vent shafts & fans	No	-	5 000m <sup>2</sup> (2 500m <sup>2</sup> each)	Potential for increased stormwater runoff leading to increased erosion and sedimentation.	Surface water, wetlands & associated aquatic ecosystems
					Increase in environmental noise levels due to operation of the ventilation fan - day time	Noise
					Increase in environmental noise levels due to operation of the ventilation fan - night time	Noise
9	Underground mining (incl. dewatering for the safe continuation of mining)	Yes	Activity No. 21D of GNR 983: Listing Notice 1	Prospecting Right Area to be annexed: 1 482.66 Ha	Impact on global climate change due to fugitive GHG emissions	Climate Change
					Alteration of geological nature and sequence	Geology
					Alteration of topography and hydrological characteristics through potential subsidence	Topography Surface water, wetlands & associated aquatic ecosystems

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
					Altered hydrological regime due to dewatering	Surface water, wetlands & associated aquatic ecosystems
					Cone of depression as a result of active dewatering activities - groundwater quantity	Groundwater
					Impacts on groundwater quality due to poor quality seepage from the mining area	Groundwater
					Destruction of potential palaeontological resources	Heritage & Palaeontology
					Annexation of Prospecting Rights will extend the LoM by an additional 11 years, thus resulting in continued employment for the current workforce	Social
10	Coal handling and stockpiling incl. conveyances and the beneficiation process (operation of the plant)	Yes	Activity 34 of GNR 983: Listing Notice 1	Proposed expansion to the stockpile area = 2 Ha	Soil pollution as a result of irresponsible handling of coal or generation of coal dust, coal spillages and coal dust deposition	Soils, Land Use & Land Capability
					Potential for increased stormwater runoff leading to	Surface water, Wetlands &



No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
					Increased erosion and sedimentation	associated aquatic ecosystems
					Potential for increased contaminants entering the wetland systems	Surface water, wetlands & associated aquatic ecosystems
					Impacts on water quality due to poor quality seepage and runoff from the coal handling and stockpile areas	Surface water, wetlands & associated aquatic ecosystems Groundwater
					Increased dust, PM10 & PM2.5	Air Quality
					Increase in environmental noise levels due to numerous, simultaneous operational activities	Noise
11	Mine residue handling and disposal: discard and slurry will be disposed of onto the existing, licensed discard dump	No		No new residue facilities proposed.	Potential for spontaneous combustion and associated emissions	Air Quality
					Impacts on water quality due to poor quality seepage and uncontrolled runoff	Surface water, wetlands & associated aquatic ecosystems, Groundwater

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
12	Installation and operation of the slurry pipeline	No	-	The slurry pipeline associated with the processing plant will have 160mm diameter and 22ℓ / second throughput. Approximately 3.5km in length.	Environmental pollution due to potential leaks	Soils, land use & land capability, surface water, wetlands & associated aquatic ecosystems, Groundwater
13	Installation and operation of water reticulation pipelines	No	-	The slurry pipeline associated with the processing plant will have 200mm diameter and 50ℓ / second throughput. <2km in length.	Environmental pollution due to potential leaks	Soils, land use & land capability, surface water, wetlands & associated aquatic ecosystems, Groundwater
14	Installation and operation of electricity distribution infrastructure			11kV, 2 - 7.5km in length	Destruction of SCC	Terrestrial Biodiversity
					Loss of and disturbance to archaeological, palaeontological and heritage sites	Heritage & Palaeontology
					Deterioration in visual aesthetics	Visual Aesthetics
15	Refuse and waste management	No	-	Waste generated by the plant personnel will feed into the existing waste streams.	Potential contamination through littering and/or incorrect waste disposal	Surface water, wetlands & associated aquatic ecosystems, Terrestrial Biodiversity, Soils

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
					Deterioration in visual aesthetics	Visual Aesthetics
					Potential for pests and vermin	Social, Health & Safety
					Potential contamination of surrounding environment with sewage	Surface water, wetlands & associated aquatic ecosystems, Terrestrial Biodiversity, Soils
					Exposure to potentially hazardous materials, waste and malodours	Social, Health & Safety
16	Maintenance and operation of existing Mine infrastructure and facilities	No	-	Continued use of existing ancillary infrastructure such as the administration complex, change houses, lamp rooms, parking, workshops, stores, weighbridges, wash bays etc	Impact on global climate change due to GHG emissions	Climate Change
					Continued fragmentation and degradation of ecosystems	Terrestrial Biodiversity
					Spread or establishment of alien invasive species	Terrestrial Biodiversity
					Erosion and resulting loss of vegetation communities	Terrestrial Biodiversity
					Ongoing displacement and direct mortalities of faunal community due to	Terrestrial Biodiversity

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
					disturbance (road collisions, noise, light)	
17	Storage and use of dangerous goods / Hazardous Substances	No	-	Forzando North has a separate environmental authorisation for the storage of up to 80m <sup>3</sup>	Environmental pollution due to hydrocarbon/chemical contamination into the natural environment.	Soils, Land Use & Land Capability Surface water, wetlands & associated aquatic ecosystems, Groundwater
18	Operation and maintenance of the existing stormwater management system	No	-	Dirty water from the proposed plant and associated stockpile area will drain to the existing PCDs	Reduction in catchment yield due to containment of dirty water on site	Surface water, wetlands & associated aquatic ecosystems
					Potential for poor quality water impacting on groundwater and/or surface water and wetlands if pipelines or dams/trenches burst, spill or leak.	Surface water, wetlands & associated aquatic ecosystems, Groundwater
19	Water use	Yes	Activity 34 of GNR 983: Listing Notice 1	The proposed plant will use a maximum of 40 833 m <sup>3</sup> / month	Irresponsible use of water and water wastage.	Water Resources
20	Sealing and closure of underground portal. Backfilling of boxcut adit. Removal of surface infrastructure	It is noted that the intended closure of any facilities, structures, or infrastructure associated with a Listed Activity will in turn trigger Activity 31 of GNR 983: Listing Notice 1. However, as there is		Current and proposed surface activities affects~300 Ha The Project will	Profiling and restoration of free drainage	Topography, Hydrology
					Potential loss or degradation of nearby wetlands through inappropriate closure	Surface water, wetlands &

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
	and general rehabilitation. Decommissioning and Closure of Mine	approximately 16 years LoM remaining this has been excluded from the application for environmental authorisation. Decommissioning and closure impacts have been included so as to provide the Competent Authority with a comprehensive assessment.		extend the LoM to 2039		associated aquatic ecosystems
					Increased runoff and erosion ultimately resulting in loss of vegetation communities, and leading to the sedimentation of downstream water resources	Surface water, wetlands & associated aquatic ecosystems Terrestrial Biodiversity
					Continued fragmentation and degradation of ecosystems	Terrestrial Biodiversity
					Spread or establishment of alien invasive species	Terrestrial Biodiversity
					Ongoing displacement and direct mortalities of faunal community due to disturbance (road collisions, noise, light)	Terrestrial Biodiversity
					Increased dust, PM10 & PM2.5	Air Quality
					Increase in environmental noise levels decommissioning and rehabilitation activities	Noise
					Retrenchment/loss of employment and procurement opportunities	Social

No	Activity	Listed Activity Triggered	Applicable Activity	Extent	Impact / Risk Description	Aspect
					Void recharge and potential for decant	Groundwater, Surface water, wetlands & associated aquatic ecosystems
					Soil replacement, amelioration and seeding. Vegetative cover and plant community succession. Influx of Animals to the area once vegetation establishes.	Terrestrial Biodiversity
					Improvement in visual aesthetics	Visual Aesthetics

### 11.3 Impact Assessment

Potential Environmental and Social Impacts that may result from the proposed Project, have been listed in Table 46 pre- and post-mitigation.

All specialists utilise some form of impact rating similar to the process detailed in Section 11.1. The impact rating completed by the specialists was as far as possible translated into the impact assessment process detailed in Table 46. As far as practically possible, considering variations in impact assessment methodology by different specialists, the specialist impact assessment is therefore duplicated within a single unified impact assessment process, to allow for all impacts to be assessed in the same way, reducing subjectivity and allowing for direct comparative ranking of all the impacts identified during the environmental process.

Key impacts as identified by the relevant specialist studies have been discussed further below. Mitigation measures are proposed in Section 12 and the Amended EMP is attached as Appendix G.

#### 11.3.1 Climate Change

South Africa is highly susceptible to climate variability and the consequences of climate change, primarily due to its dependence on rain-fed agriculture and natural resources, poverty (especially in rural areas), and low adaptive capacity. The country is the fifth most water-scarce nation in sub-Saharan Africa. Since the 1960s, South Africa has experienced significant temperature increases, particularly in arid, inland regions, with average temperatures rising by 1.5°C. Precipitation trends have remained highly variable from year to year, affecting not only South Africa but also southern Africa as a whole (Cornerstone, 2023).

The province of Mpumalanga in South Africa is expected to experience a rise in temperatures by 2°C by 2035, 1-3°C between 2040 and 2060, and 3-5°C between 2080 and 2100. However, the range of outcomes for rainfall projections is uncertain, with some models indicating a decrease in rainfall while others suggest moderate future increases. The total frequency of rainfall events is unlikely to change significantly, but heavy rainfall events may increase. The region is expected to become drier and experience greater variability in rainfall, as well as an increase in evaporation rates (Cornerstone, 2023).

A Climate Change Impact Assessment (Cornerstone, 2023) was undertaken, whereby the Carbon Footprint was calculated for the proposed Project (Appendix F 1):

- The total estimated Scope 1 and Scope 2 greenhouse gas (GHG) emissions during the construction phase for the proposed project will be 58,84 tonnes Carbon Dioxide equivalent (tCO<sub>2</sub>e).
- The total estimated annual Scope 1 and Scope 2 operational phase GHG emissions is 62 551,97 tCO<sub>2</sub>e and the estimated total operational phase GHG emissions for the 11-year LoM is 688 071,71 tCO<sub>2</sub>e.
- The total estimated Scope 1 and Scope 2 GHG emissions during the decommissioning and closure phase for the proposed project will be 29,92 tCO<sub>2</sub>e.

The majority of GHG emissions associated with proposed Project for the construction and decommissioning phases will be from mobile combustion (Scope 1 emissions). For the operational phase, the most significant emissions will be fugitive emissions during coal mining,

as well as CO<sub>2</sub>e from purchased electricity. It is recommended that emissions management and mitigation efforts should start by focusing on the reduction of fugitive emissions, as well as reduction of emissions from purchased electricity and mobile combustion.

Due to the global scale and long-term impacts of local GHG emissions on climate change, it would not be appropriate to apply the traditional environmental impact assessment methodology to GHG Emissions Assessments. The significance associated with the potential impacts on climate change from GHG emissions is rather based on intensity (or magnitude), which is based on a combination of criteria and benchmarks. The categorisation of impact magnitude based on a set of pertinent criteria and making use of widely recognised standards as a measure of the level of impact, are in line with the industry norms. Based on these criteria and benchmarks, the following can be concluded:

- Based on pre-defined thresholds, which are in line with the IFC Performance Standards, the Equator Principles and the European Bank of Reconstruction and Development, the intensity (or magnitude) of the proposed Project's annual average operational phase emissions of 62 551,97 tCO<sub>2</sub>e can be regarded as being medium-low.
- No limit/threshold for reporting has been defined in Annexure 1 of the National Greenhouse Gas Emissions Reporting Regulations, 2017 (Notice 275 of 2017) (NGERs) for coal mining and handling. No 'low impact' level has therefore been set by the NGERs. It is therefore, conservatively, interpreted that any emissions from category 1B1a should be regarded as being of medium impact and significance.
- Based on the comparison with the South African underground coal mining sector industry benchmark value (0,022 tCO<sub>2</sub>e/t coal mined), the intensity (or magnitude) of the proposed Project's emission intensity of 0,07 tCO<sub>2</sub>e/t coal mined can be regarded as of medium significance.
- Based on the universal threshold for allocating carbon budgets, which is 30 000 tCO<sub>2</sub>e, the annual emissions from the proposed project (62 551,97 tCO<sub>2</sub>e) are considered to be of low to medium significance.
- The intensity (or magnitude) of the overall impact of the proposed project, considering its contribution to the target National net GHG emissions, is considered to be medium.

Based on the above, the overall intensity (or magnitude) of the GHG emissions from the proposed Project on current and potential regional and cumulative global climate change is regarded as medium to medium-low, translating into a medium to medium-low overall impact significance rating.

It should also be kept in mind that the burning of the coal for electricity production is taking place off site, by Eskom. This would be a significant GHG emission, but is a Scope 3 emission for Forzando Coal Mines (Pty) Ltd, and are therefore not reported on in the Study. Therefore, even though the overall intensity of the GHG emissions associated with the proposed project is expected to be of medium to medium-low significance, the off-site (Scope 3) impact from coal burning for electricity generation will most likely be high to very high. Eskom will however report on these emissions as Scope 1.

The outcome of the high-level climate risk and vulnerability (CRV) screening of potential vulnerabilities/risks of the project to the effects of climate change is of moderate to low



significance. The main recommendation is that the High-Level Assessment/Initial CRV Screening be built on and elaborated throughout the LoM (Cornerstone, 2023).





Please refer to Appendix F 1 for the full Climate Change Impact Assessment Report.

### 11.3.2 Geology, Physiography and Topography

The very nature of mining projects will inevitably result in altered geology. Despite the impact rating as High, there is no mitigation for this impact as it is an inherent effect of mining. The cumulative effect is Significant, as coal reserves in South Africa are diminishing and are non-renewable.

When coal, rock and minerals are removed from an underground mine, the overlying earth can sink, i.e. subsidence can occur. The extent of subsidence depends on the mining method, local geology, depth of mining and amount of material extracted. The Rock Engineer's Report (Appendix F 12) concluded that no subsidence is expected to occur as pillar design parameters satisfy both the Probability of Survival and the Pillar Life Index criterion. In the unlikely event that pillar failure does occur, the resultant subsidence profile is expected to be Class C. Class C can be described as: "Noticeable in flat terrain, smooth, cracks 2 – 10cm wide, compression ridges 1 – 5 cm high" (M.Mazibuko, 2023).

The various Subsidence Classes, as well as the surface profile which can be expected are depicted in Figure 41 for illustrative purposes.

<p>Class B  <math>0.001 &lt; S_m / H &lt; 0.005</math></p>	
<p>Class C  <math>0.005 &lt; S_m / H &lt; 0.02</math></p>	
<p>Class D  <math>0.02 &lt; S_m / H &lt; 0.05</math></p>	
<p>Class E  <math>S_m / H &gt; 0.05</math></p>	

**Figure 41: Examples of the various subsidence classes**

In the unlikely event that surface subsidence does occur this will create fractures and cracks that will not only increase recharge into the underground workings, but also increase the risk of decant due to the creation of preferential flow paths linking the deeper fractured aquifer to surface. Additional consequences resulting from surface subsidence are disturbances of the flow drivers into the wetlands and loss of post-closure land uses. Due to the extent of the MRA the pre-mitigation significance is rated as Moderate, post-mitigation the significance is rated as Insignificant.

### **11.3.3 Soils, Land Use and Land Capability**

The area of land potentially taken out of agricultural use as a result of the construction of the ventilation shafts is approximately 5,000m<sup>2</sup>. The cumulative impact of loss of agricultural land use will therefore not have an unacceptable negative impact on the agricultural production capability of the area.

During the construction phase the Project could cause soil compaction and erosion, as well as changes in surface dynamics and the loss of soil resources. This could lead to a decrease in land capability. Mitigation measures are necessary to lower the overall significance rating from Moderate (pre-mitigation) to Low (post-mitigation).

The operational phase of the proposed project is anticipated to have moderately adverse effects on land capability. These effects may include the settling of coal dust from the coal stockpiles, soil compaction caused by increased traffic, and potential soil contamination due to leaks or spills (TBC, 2023a).

Impacts during the decommissioning and closure phase are expected to be similar to that of the construction phase.

Please refer to Appendix F 2 for the detailed Soils and Agricultural Potential Assessment.

### **11.3.4 Surface Water**

Sensitive water resources in relation to Project area are the Joubertsvleispruit, Viskulle River and Olifants River. Key impacts to surface water as a result of the Project, relates primarily to the deterioration of water quality, erosion/sediment transportation and change in flow regime. Effective stormwater management, especially clean and dirty water separation, is imperative to reduce the risk of affected water flowing into the receiving surface water environment. Without mitigation measures, the impact is regarded as Moderate. Mitigation measures (discussed further in Section 12) reduce the potential impacts to Low.

Dust may contribute to the deterioration of water quality. Dust at mining operations can be caused by trucks being driven on roads, coal handling and processing, drilling operations and wind blowing over disturbed areas. Another potential impact on water quality is spillages of pollution causing potential material as well as overflows/seepage from the existing PCDs and stormwater management facilities.

It is not anticipated that the freshwater resources (including rivers/spruits, wetlands/pans) will be significantly affected by the underground mining activities as these are isolated from the deeper aquifer that will be dewatered during the Operational Phase of the Mine. Historical monitoring data indicates that water levels within the perched aquifer remains largely

unaffected by the underground activities, validating its isolation from the deeper fractured and even the weathered aquifer (Aqiscience, 2023).

Water from the Mine's dirty footprint area is channelled to the PCDs, this ultimately reducing the catchment yield. In the context of the existing land-uses in the study area and the existing state of local water resource any additional impacts to surface water quality or quantity can be regarded as cumulative in nature. The impact assessment indicates that anticipated impacts can be avoided, or managed to be of low significance, thus not cumulatively contributing to water resource impacts.

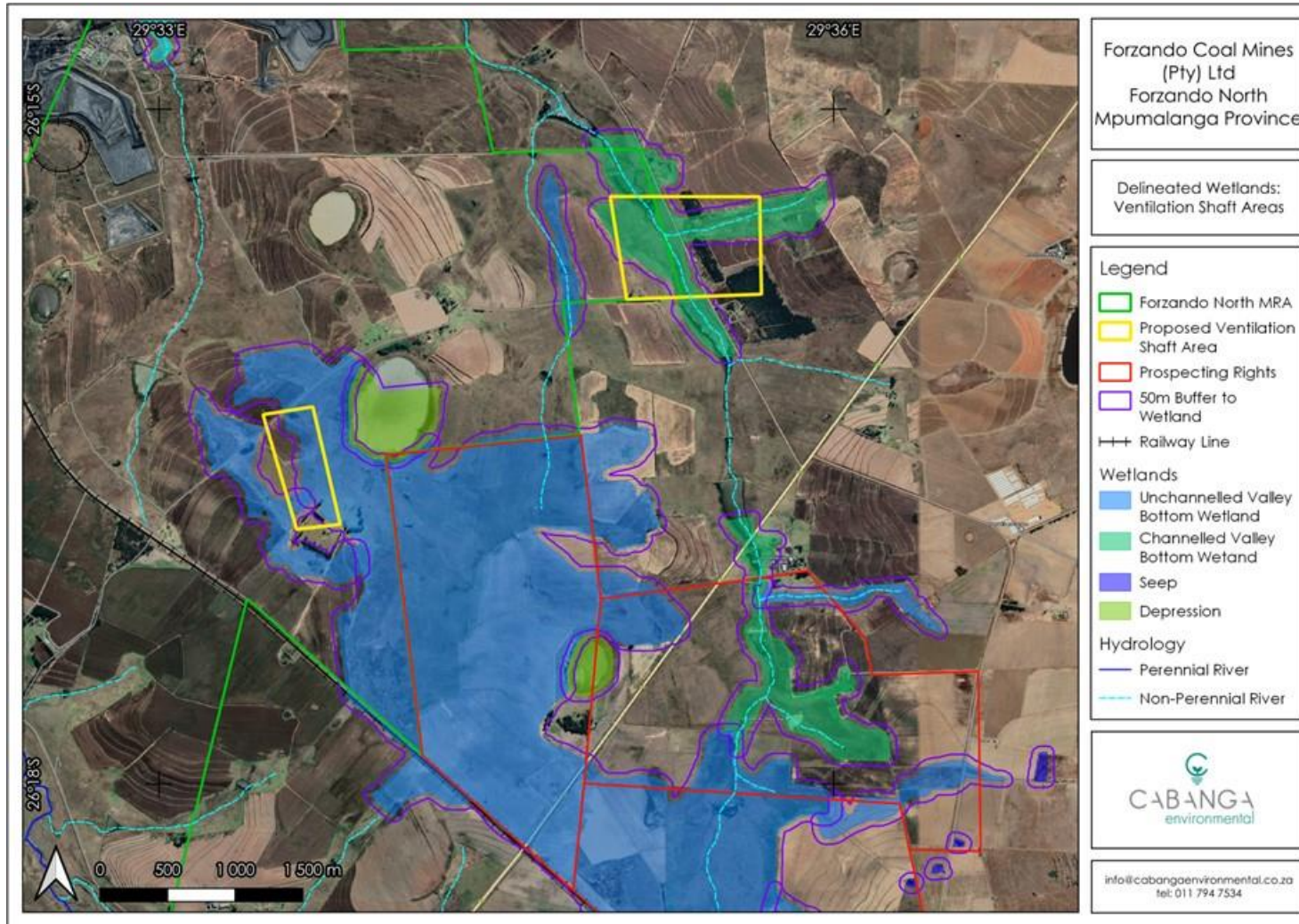
### **11.3.5 Wetlands and Aquatic Ecology**

The ventilation shafts have the potential to indirectly affect surface flow, interflow, and shallow groundwater, but the impact is expected to be minimal. By maintaining a 50 m buffer between the shafts and the delineated wetlands, the risk of concentrated stormwater discharge on the wetlands is considered to be low (TBC, 2023b).

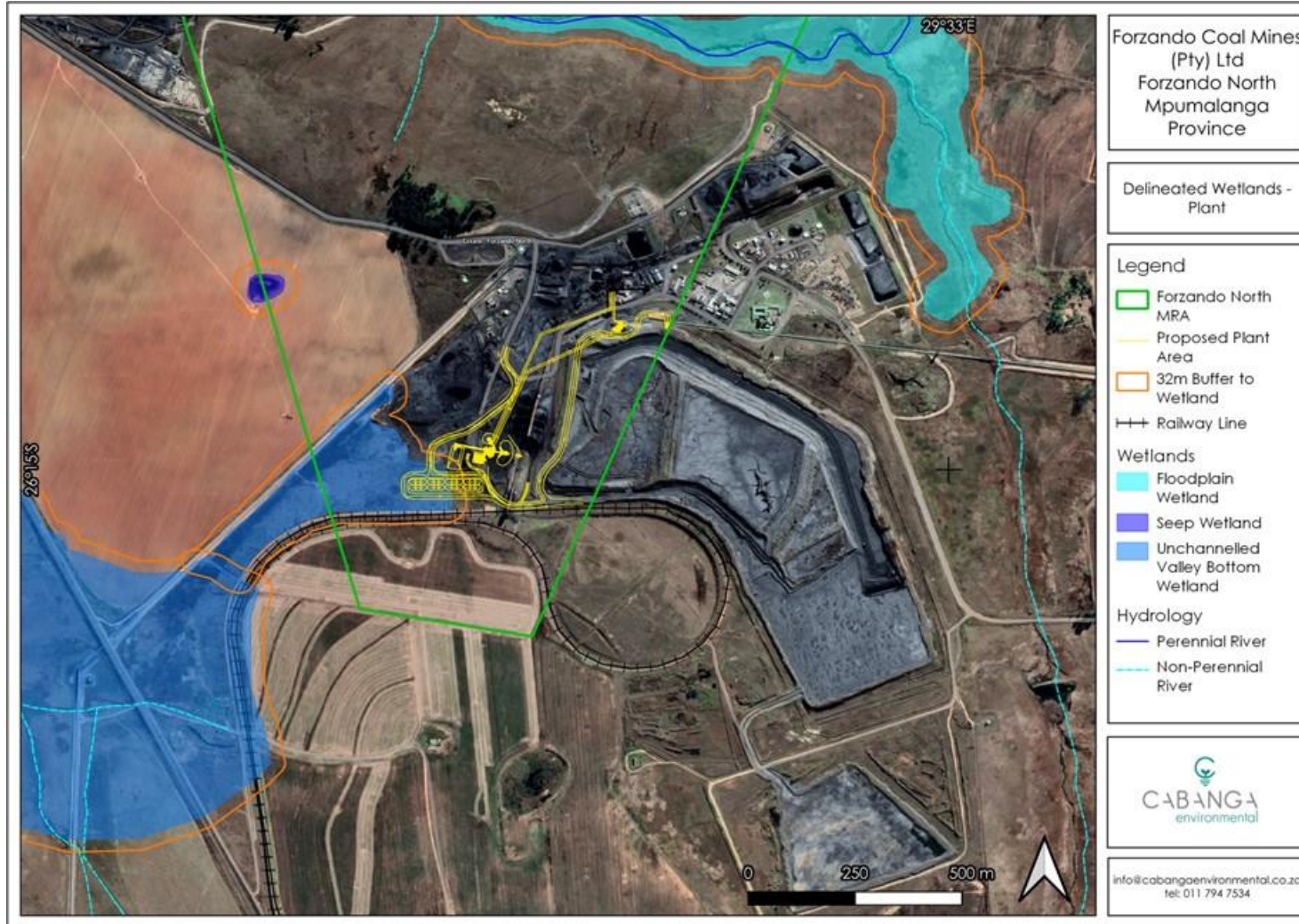
The proposed ventilation shafts located within the interflow (Soil/Bedrock) hydrogeological type is expected to have an impact on the hillslope hydrology, but no impacts on the total streamflow of watercourses as both lateral and vertical flow paths will occur in response to the flow impediment (TBC, 2023c). Interflow is considered an important driver for the associated seepage areas, and less important for the valley bottom systems. The overall residual risk for the proposed ventilation shafts is therefore low (TBC, 2023b).

The proposed expansion of the stockpile area, associated with the new plant, will encroach on a Seep wetland (Plan 32) and result in the direct loss of approximately 2 Ha of wetlands. The impact is considered Significant before mitigation, it is proposed that a rehabilitation plan be compiled and implemented for the relative components. Numerous wetlands in the study area have already been impacted or lost through mining, farming and/or construction of infrastructure including roads and dams. Additional loss/degradation of wetland resources would be considered cumulative in nature.

The Freshwater Ecology Assessment is attached as Appendix F 4



Plan 31: Proposed vent shaft areas in relation to water resources (TBC, 2023b)



Plan 32: Proposed plant and stockpile expansion area in relation to water resources (TBC, 2023b)

### 11.3.6 Groundwater

Construction activities will be limited to the development of the processing plant, ventilation shafts, and associated infrastructure (i.e. pipelines, roads). This phase is estimated to last no more than 12 months. Site clearing and removal of topsoil may cause water to pond in cleared areas during the wet season, potentially increasing infiltration to aquifers. However, the construction of infrastructure and compaction of surface areas will cause a very small reduction of recharge to the aquifer, counteracting the increased infiltration to aquifers. The potential net risk effect is insignificant and no specific mitigation is required (Aquiscience, 2023).

The main risks to groundwater quality during the Construction Phase are related to the management and disposal of materials, waste, and hydrocarbon spills/leaks. Except for the lesser oil and diesel spills and sewage generated from construction campsites there are no activities expected that could impact on regional groundwater quality during the Construction Phase (Aquiscience, 2023).

During the operational phases of mining, the dewatering of underground sections is required to allow for safe working conditions. Dewatering will result in a cone of depression and a potential decline in water levels, which could result in a loss in resource for surroundings water users. The localised dewatering of the deep aquifer cannot be prevented. It is expected that the deeper aquifer will be drawn down to the bottom of No. 4 Seam. No hydrocensus boreholes are drilled down to this depth, with most boreholes extracting groundwater from the shallower aquifer, typically less than 60 metres below the surface (mbs). However, due to leakage in the aquifer, some minor drawdown effects may occur in privately used boreholes. The cones of depression formed as a result from dewatering after 5 years, 10 years and LoM are displayed in Plan 33 - Plan 35 (Aquiscience, 2023).

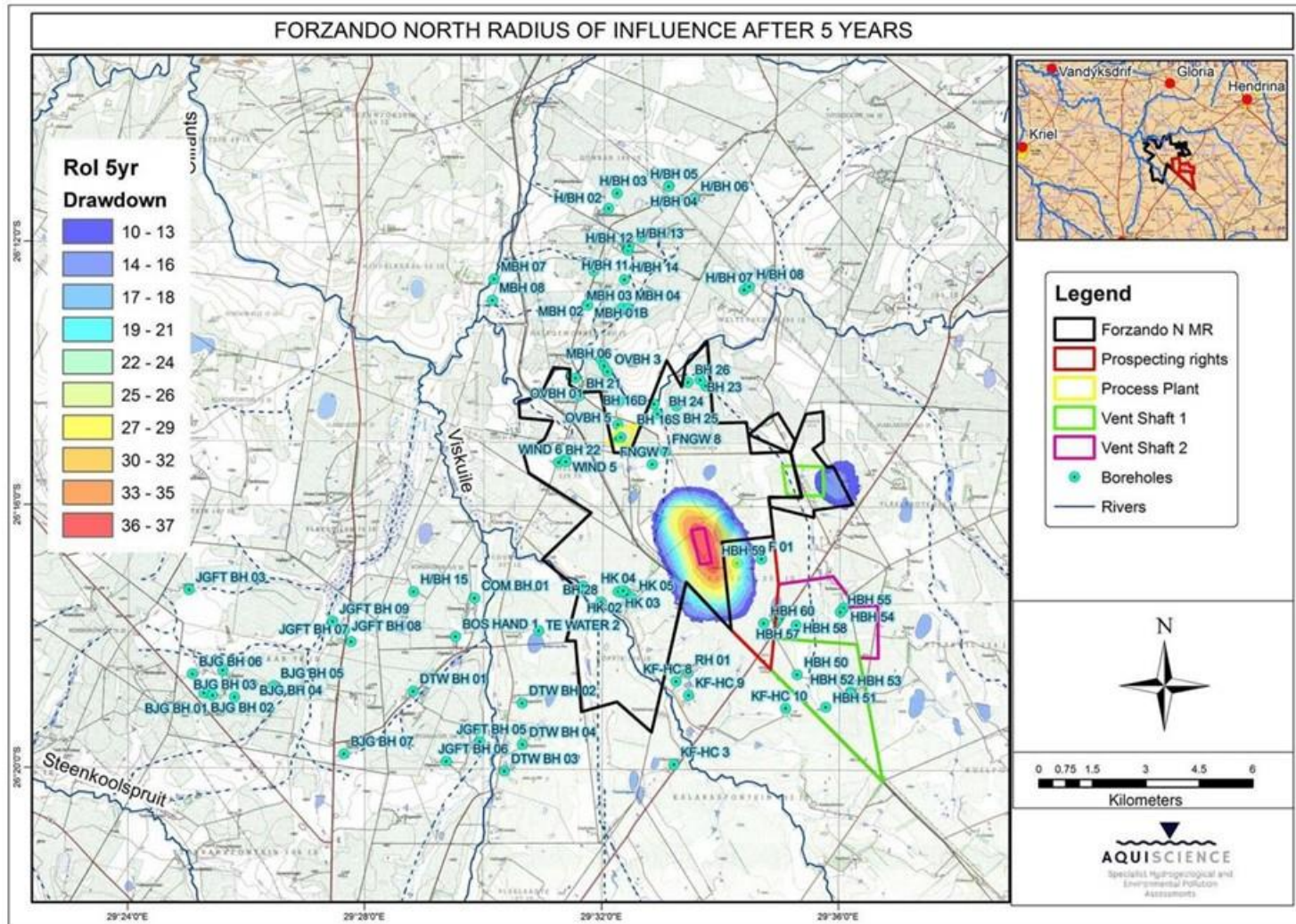
Cumulative dewatering impacts of the historical mining and areas under application are depicted in Plan 36. By examining the cone of depression, it is evident that the influence extends north and south. The mining activities at Forzando North Coal Mine have the potential to affect several privately owned boreholes and the fountain located on Portion 8 of the farm Bankpan 225 IS. Potentially affected boreholes are listed in Table 45 (Aquiscience, 2023).

It is important to note that the assessment does not include neighbouring mining activities. Other mines in the immediate vicinity, such as Forzando South, Halfgewonnen Coal Mine, Overlooked Coal Mine, and Weltevreden Coal Mine, could also contribute to cumulative groundwater-related impacts.

The two main ways in which groundwater can become contaminated are through interstitial release and ion exchange release. Coal material often contains pyrite, and when it is exposed to oxygen and rainwater, it can create acidic, saline, and metal-rich water. However, during the Operational phase, groundwater will be pumped to the PCDs and re-used. The residence times will, therefore, be limited, and water quality is expected to be good to fair. Some mineralization may occur, the water should be kept in a closed system and not allowed to seep or be discharged into the environment. There is a chance of groundwater pollution during mining operations, but it is expected to be minimal due to the localized nature of the pollution. In terms of quality no receptor boreholes will be impacted on during the Operational phase (Aquiscience, 2023).

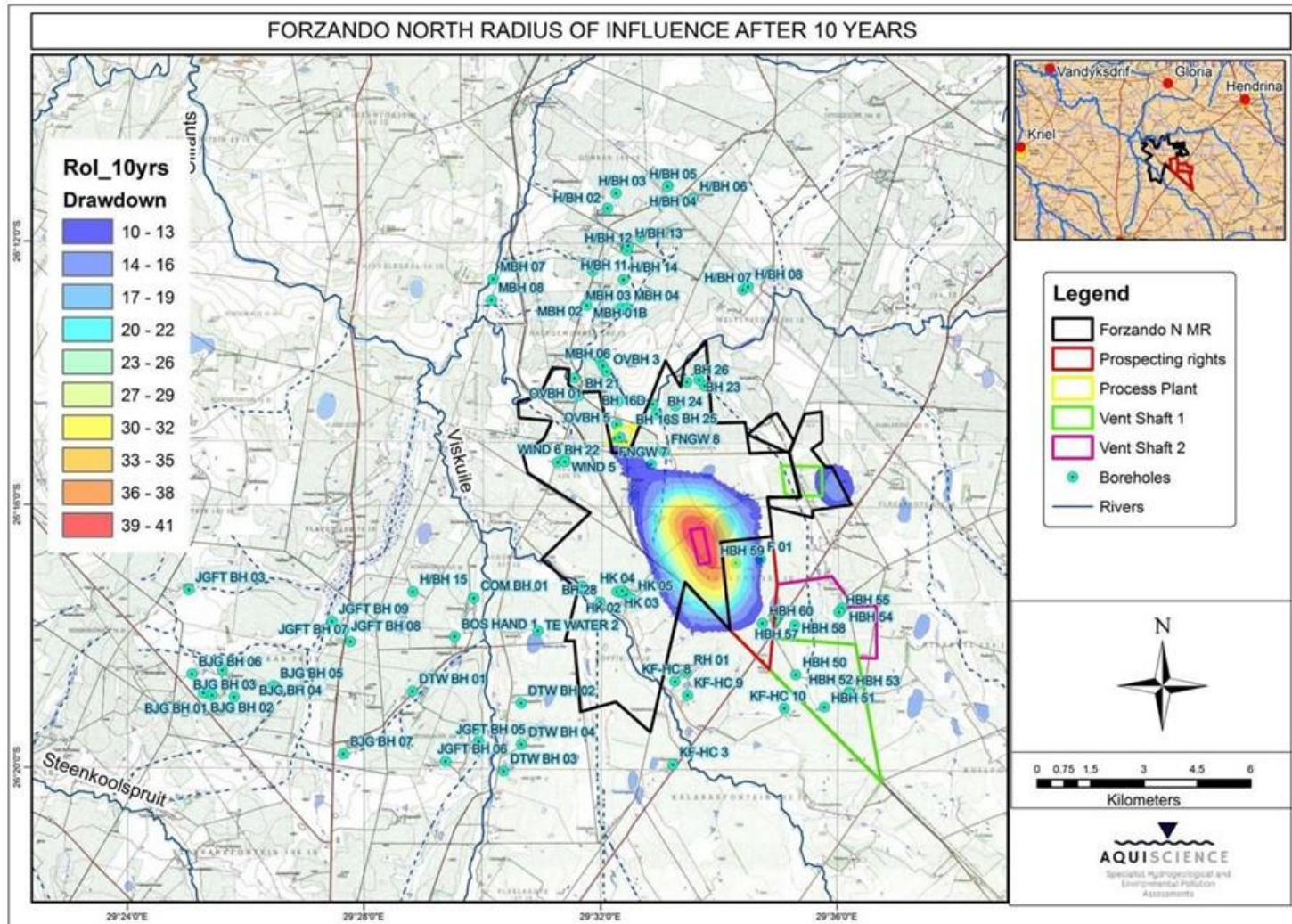
**Table 45: Surrounding boreholes potentially impacted on due to mine dewatering (Aqiscience, 2023)**

Receptor ID	Type	Application	Farm
HK02	Groundwater	Privately owned (not in use)	Ptn 2 Koppie 228 IS
HK03	Groundwater	Privately owned (not in use)	Ptn 2 Koppie 228 IS
HK04	Groundwater	Privately owned (domestic use)	Ptn 2 Koppie 228 IS
WIND 5	Groundwater	Private use - Livestock	Ptn 0 Geluk 226 IS
WIND 6	Groundwater	Private use - Livestock	Ptn 0 Geluk 226 IS
H/BH50	Groundwater	Private use - Livestock	Ptn 0 Bankpan 225 IS
H/BH56	Groundwater	Private use - Domestic & Livestock	Ptn 8 Bankpan 225 IS
H/BH57	Groundwater	Private use - Domestic & Livestock	Ptn 8 Bankpan 225 IS
H/BH59	Groundwater	Private use - Livestock	Ptn 8 Bankpan 225 IS
H/BH60	Groundwater	Private use - Livestock	Ptn 8 Bankpan 225 IS
F01	Fountain	Private use - Livestock	Ptn 8 Bankpan 225 IS
OVBH04	Groundwater	Monitoring	Ptn 5 Halfgewonnen 190 IS
OVBH05	Groundwater	Monitoring	Ptn 5 Halfgewonnen 190 IS
OVBH06	Groundwater	Monitoring	Ptn 5 Halfgewonnen 190 IS
FNGW06	Groundwater	Monitoring	Ptn 1 Halfgewonnen 190 IS
FNGW08	Groundwater	Monitoring	Ptn 24 Weltevreden 193 IS
HBH14	Groundwater	Monitoring	Ptn 10 Halfgewonnen 190 IS
BH16D	Groundwater	Monitoring	Ptn 10 Weltevreden 193 IS
BH21	Groundwater	Monitoring	Ptn 2 Halfgewonnen 190 IS
BH22	Groundwater	Monitoring	Ptn 0 Geluk 226 IS
BH23	Groundwater	Monitoring	Ptn 3 Weltevreden 193 IS
BH24	Groundwater	Monitoring	Ptn 3 Weltevreden 193 IS
BH25	Groundwater	Monitoring	Ptn 3 Weltevreden 193 IS
BH26	Groundwater	Monitoring	Ptn 3 Weltevreden 193 IS
BH27 (FSGW 3)	Groundwater	Monitoring	Ptn 5 Koppie 228 IS
BH17D	Groundwater	Monitoring	Ptn 10 Weltevreden 193 IS
BH17S	Groundwater	Monitoring	Ptn 10 Weltevreden 193 IS
FNGW06	Groundwater	Monitoring	Ptn 1 Halfgewonnen 190 IS

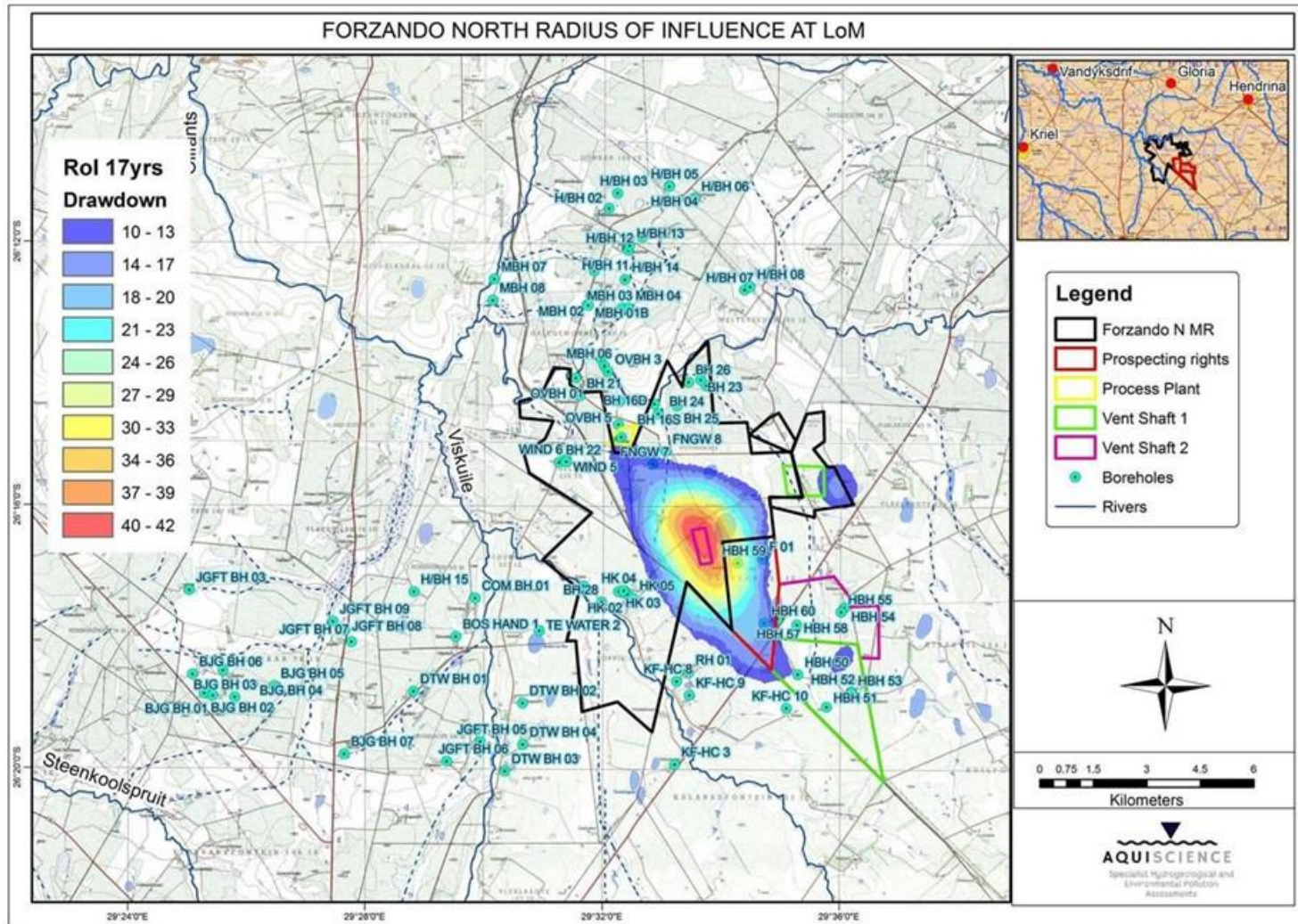


Plan 33: Groundwater level drawdown after 5 years (Aquiscience, 2023)

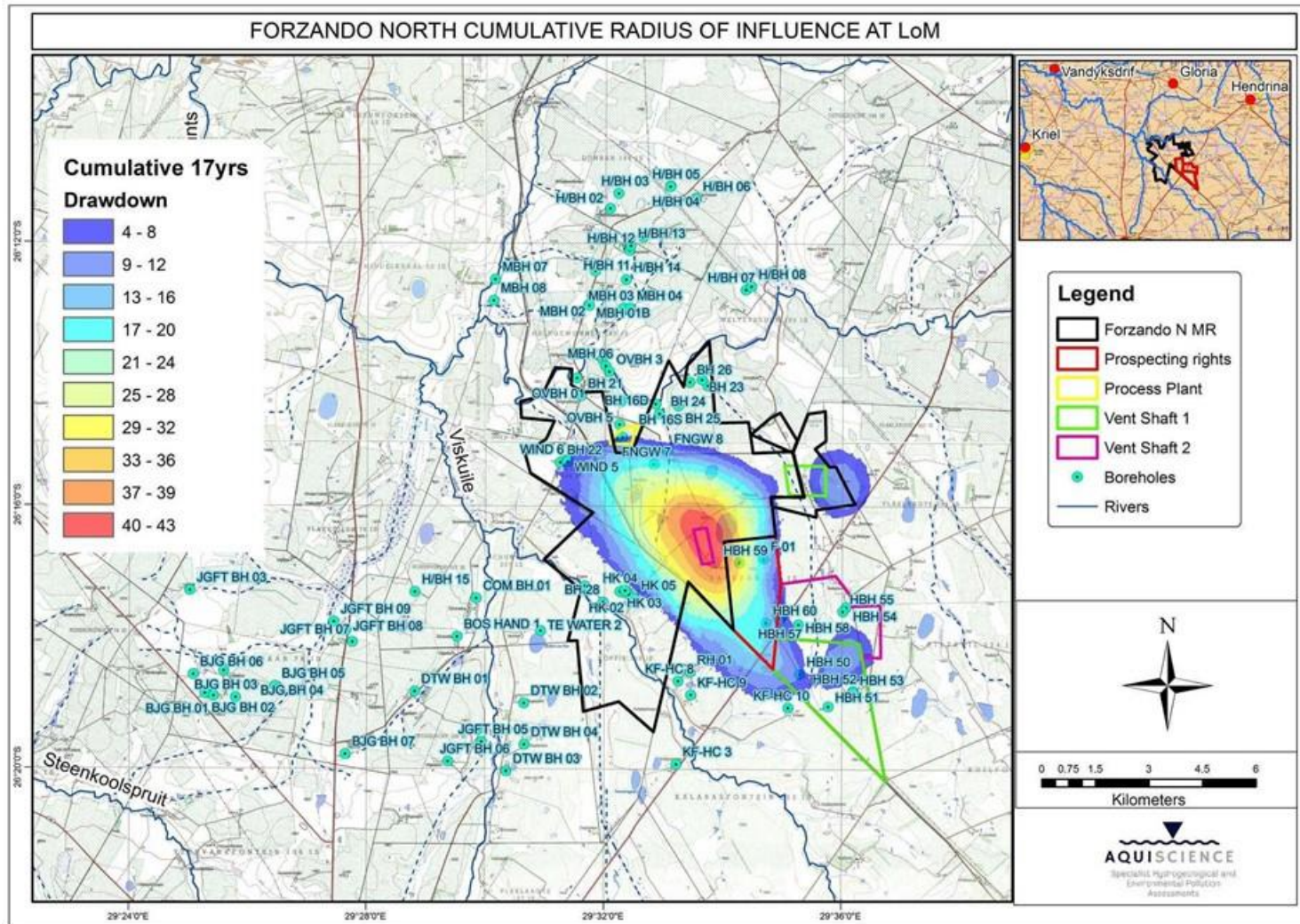




Plan 34: Groundwater level drawdown after 10 years (Aquiscience, 2023)



Plan 35: Groundwater level drawdown at end of LoM (Aquiscience, 2023)



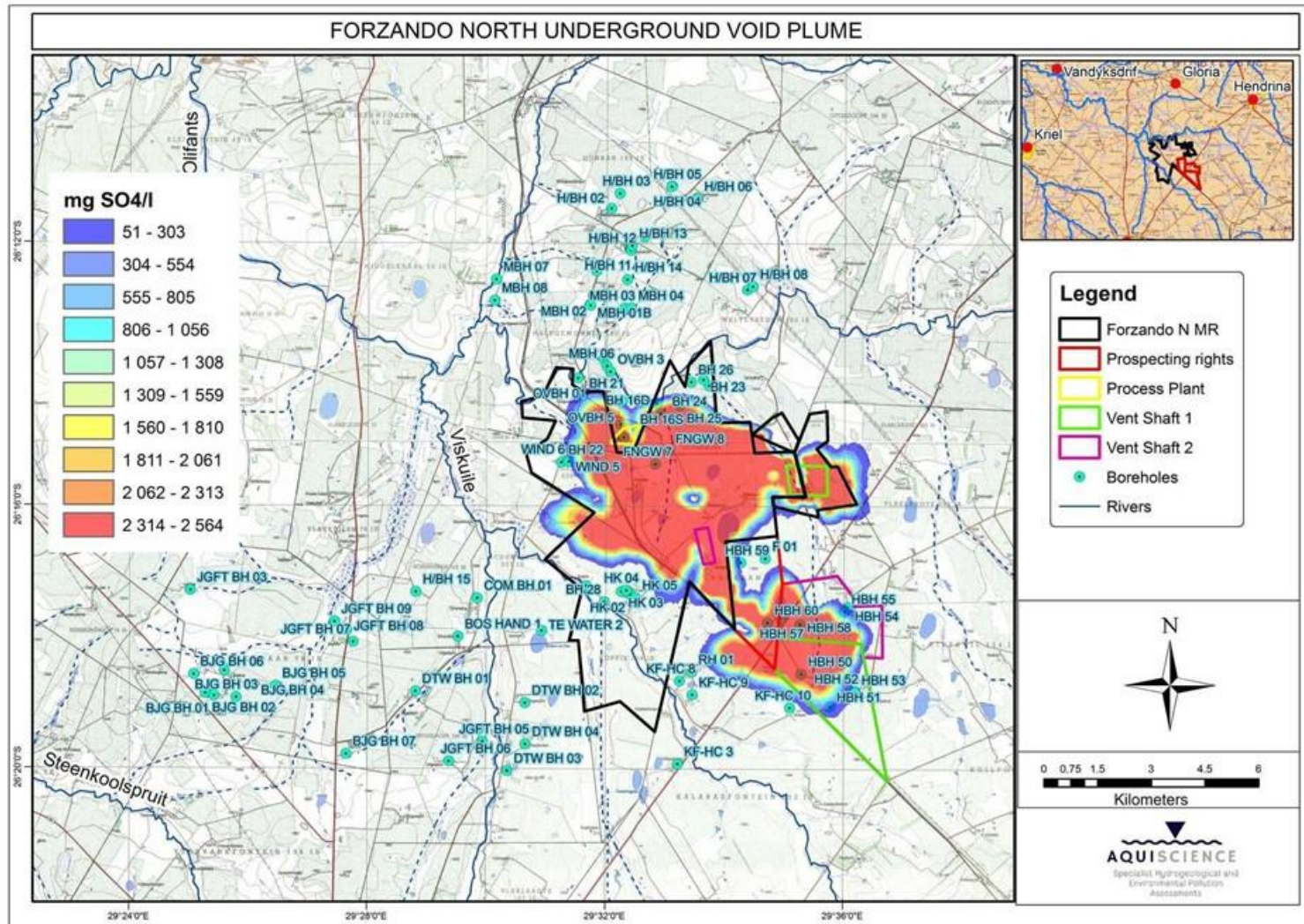
Plan 36: Cumulative impact of dewatering at Forzando North (Aquiscience, 2023)

At the end of LoM dewatering activities will cease and the underground voids will fill with groundwater to restore equilibrium with surrounding aquifers. It is important to minimize infiltration into these voids to prevent higher rates of contaminated water, which would require management.

The only significant impact on groundwater quantity during Closure is the potential for subsidence, creating flow paths between aquifers and subsequent draining. No roof collapse and cracking/fracturing of roof strata or subsidence is however expected to occur because of the proposed bord-and-pillar mining and extraction ratios. The mine plan was designed in such a manner as to prevent the destabilisation of the roof. Therefore, the impact on groundwater quantity during Closure is minimal, and no specific mitigation is proposed (Aqiscience, 2023).

Based on the results of the geohydrological model no direct decant from the underground mine workings is predicted. However, this prediction does not take into account the possibility of unknown pathways that connect the mine workings to the surface through unsealed exploration boreholes, historical declines or shafts, or complications that may have arisen from mining activities, such as large cracks or fractures. These fractures can potentially become conduits for decant to occur. In other words, should such preferential flow paths exist, direct decant from the underground workings may occur (Aqiscience, 2023).

The water levels are expected to take a considerable time to recover and pollution movement away from the mine will only start to occur once the mine has filled to near surface/pre-mining elevations. The pollution plume was modelled for 100 years (Plan 37) and it is evident that it remains mostly within MRA with little migration outwards. Also, the majority of receptor boreholes are drilled shallower than the coal seams and therefore are not expected to be impacted on with regards to quality (Aqiscience, 2023).



Plan 37: Plume Migration at 100 years (Aquiscience, 2023)

### 11.3.7 Terrestrial Biodiversity

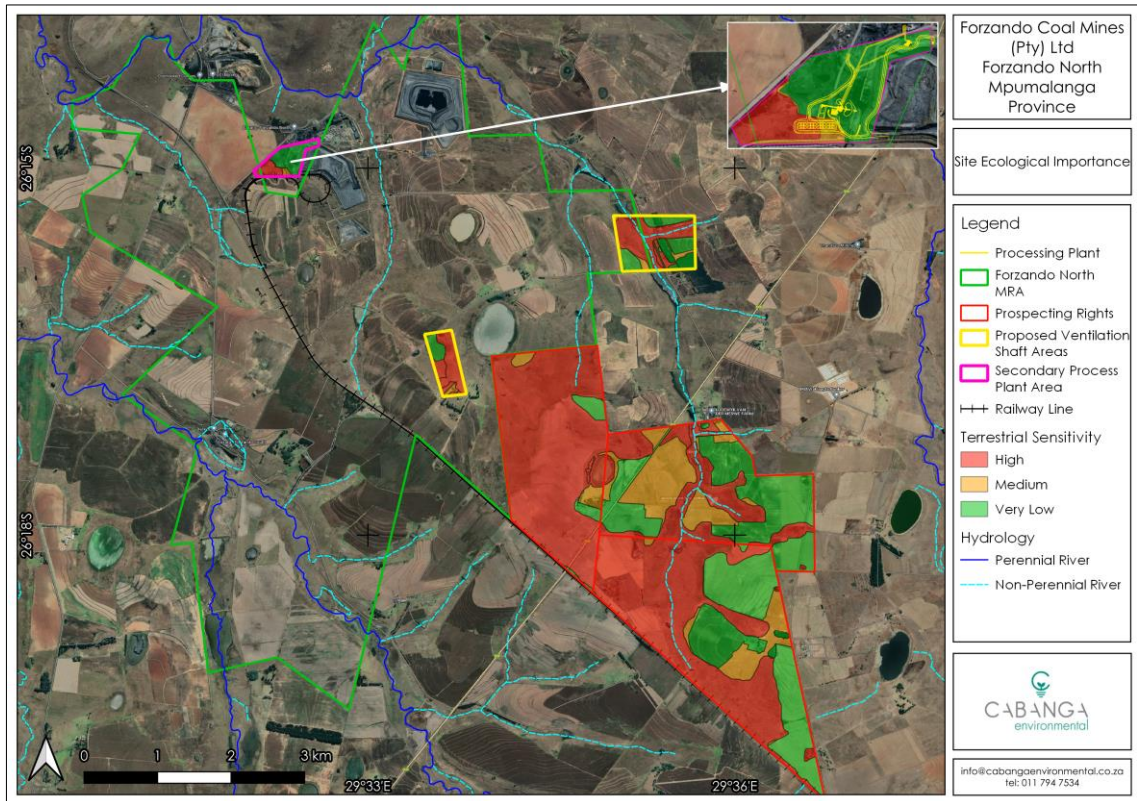
The site falls within the Eastern Highveld Grassland which is listed as Endangered on the revised national list of ecosystems that are threatened and in need of protection (DFFE, 2022). The grasslands have been designated a Medium SEI, except where it overlaps with CBA 2 areas, and thus designated a High SEI. Other areas mapped as having a High SEI include wetlands, watercourses and rocky outcrops. Despite the levels of disturbance present, these habitats still maintain their functional integrity and contribute to valuable ecosystem services. They are also highly likely to support fauna and flora SCC (TBC, 2023d). Despite the limited footprint associated with the Project, cumulative impacts associated with habitat loss and ecological processes is considered High.

Impacts associated with the Construction phase are associated with habitat loss and fragmentation, and the destruction of SCC. A Search and Rescue plan must be developed and executed for any and all SCC and protected species identified during a site visit in September (when species with a moderate likelihood of occurrence are flowering), as well as any protected species present on site. These plants should be relocated to an area identified as suitable by the specialist (TBC, 2023d).

The main impacts on fauna are associated with displacement due to disturbance and habitat loss and/or direct mortalities. The construction of the infrastructure associated with the proposed Project will result in the direct loss of approximately ~2 Ha of High SEI/habitat sensitivity (Plan 38). This impact has been rated as Significant pre-mitigation and as Moderate to High post-mitigation.

Introduction or spread of alien invasive species must be curbed. These species out-compete natural indigenous flora and displace and alter natural biodiversity. Post mitigation the impacts associated with AIPs is considered Low.

Impacts identified in the Decommissioning and Closure phase are largely positive as the disturbed surface area will be rehabilitated, fertilized and vegetated. Biodiversity in the area should increase as animals begin to return back to the area.



**Plan 38: SEI in relation to the proposed Infrastructure**

### 11.3.8 Heritage, Archaeology and Palaeontology

The four heritage sites will not be directly impacted by the proposed infrastructure or underground mining activities; however, there is always the possibility of a secondary impact due to underground mining activities (subsidence etc.) (Archaeos, 2023). Based on the current mine plan and proposed Safety Factors the possibility of subsidence is considered unlikely.

Based on the fossil record and confirmed by the specialist survey no fossils were identified in the Project area. The study concluded that it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary (Bamford, 2023).

No cumulative impacts are anticipated.

It should be noted that the subterranean presence of fossils, archaeological and/or historical sites, features or artefacts is always a distinct possibility. In this regard a Chance Find Procedure is recommended and has been included as Appendix G 5.

### 11.3.9 Air Quality

Dustfall, PM<sub>10</sub> and PM<sub>2.5</sub> are key pollutants of concern associated with operational activities (existing and proposed) at Forzando North Coal Mine and will likely be emitted from the following key sources:

- Construction activities (limited to proposed additional infrastructure);

- Conveyor transfer points;
- Crushing and screening; and
- Wind erosion from material stockpiles and discard dumps.

An Air Quality Impact Assessment was conducted for the Project (Appendix F 10), whereby the following two scenarios were modelled (Rayten, 2023):

- a) The construction phase scenario, where emissions associated with construction activity (e.g. drilling of ventilation shafts; establishment of access roads to ventilation shafts, infrastructure at new plant area, water reticulation pipelines, installation of additional slurry pipeline, haul road extensions, etc) due to the development of the proposed additional infrastructure associated with the mine, were modelled.
- b) The actual operating scenario, where emissions from existing and proposed surface activities associated with operations at the mine were modelled. This scenario represents the potential impacts if the mine were emitting under normal operating conditions.

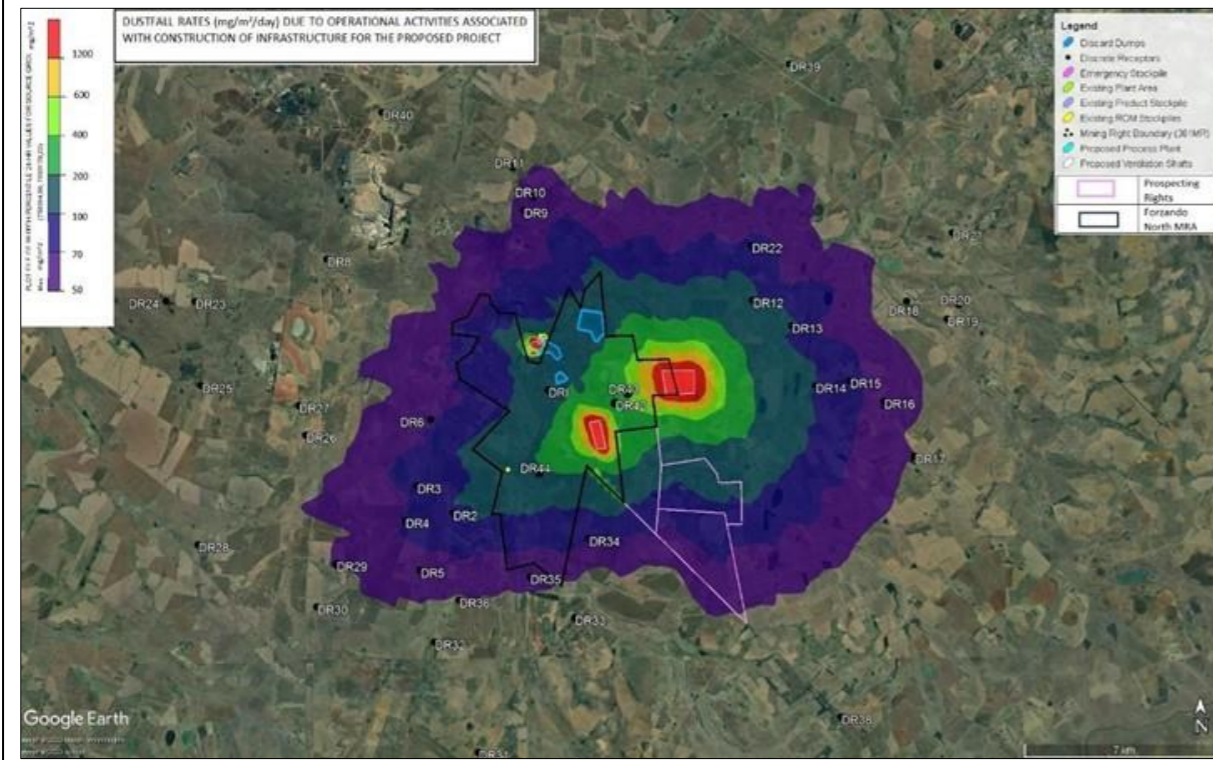
According to the dispersion model, the construction phase of the proposed infrastructure will result in high levels of dustfall, PM<sub>10</sub>, and PM<sub>2.5</sub>, but they will mostly comply with the applicable limits within the 15km x 15km modelling domain. Higher concentrations, including exceedances of applicable standards are mostly projected in localised areas close to the proposed areas of construction for dustfall, PM<sub>2.5</sub> and annual PM<sub>10</sub>. While the projected exceedances for these pollutants extend to nearby offsite locations towards the north and east, they are restricted to maximum radii of 1.3km for dustfall and PM<sub>2.5</sub> and 900m for annual PM<sub>10</sub>. Additionally, daily PM<sub>10</sub> concentrations outside the mining right boundary will mostly comply with the standard towards the northwest and southwest but exceed it towards the northeast and southeast, up to 5km away (Rayten, 2023).

During the operational phase, the dispersion model predicts higher levels of dustfall, PM<sub>10</sub>, and PM<sub>2.5</sub> compared to the construction phase. However, these levels still comply with the applicable standards for most of the Project area. The incremental yearly concentrations of PM<sub>10</sub>, PM<sub>2.5</sub>, and dustfall in nearby surrounding areas are expected to be below the respective standards, except just outside the northern boundary where exceedances are projected due to existing and proposed surface operations. However, these exceedances are limited to a maximum radius of 1.6km for dustfall, 1.1km for annual PM<sub>10</sub>, and 800m for annual PM<sub>2.5</sub>. As for daily PM<sub>10</sub> and PM<sub>2.5</sub>, the predicted incremental concentrations are expected to exceed the applicable standards in nearby areas located up to 3.6km north and northwest of the boundary (for daily PM<sub>2.5</sub>) and up to 6km northwest to northeast of the boundary (for daily PM<sub>10</sub>) (Rayten, 2023).

The dispersion model predicts low incremental pollutant concentrations at nearly all identified discrete receptors located within a 15km radius for both scenarios. However, receptors DR1 and DR42 to DR44, which are dwellings/farmhouses located within the Mining Right boundary, are at risk of being impacted by exceedances of the daily PM<sub>10</sub> standard. Therefore, it is recommended that dust mitigation measures be implemented to limit the impact on these receptors as much as possible (Rayten, 2023).



**Construction Phase**



**Operational Phase**

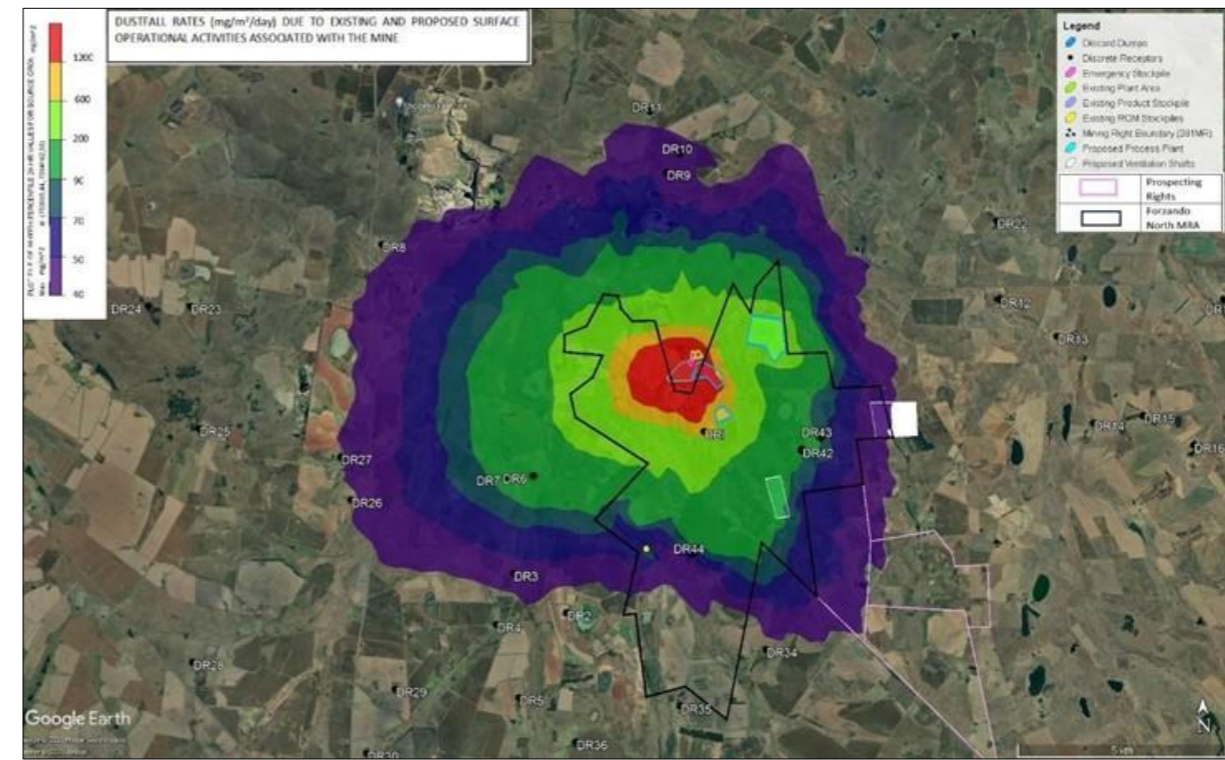


Figure 42: Summary of predicted dust fallout rates (Rayten, 2023)

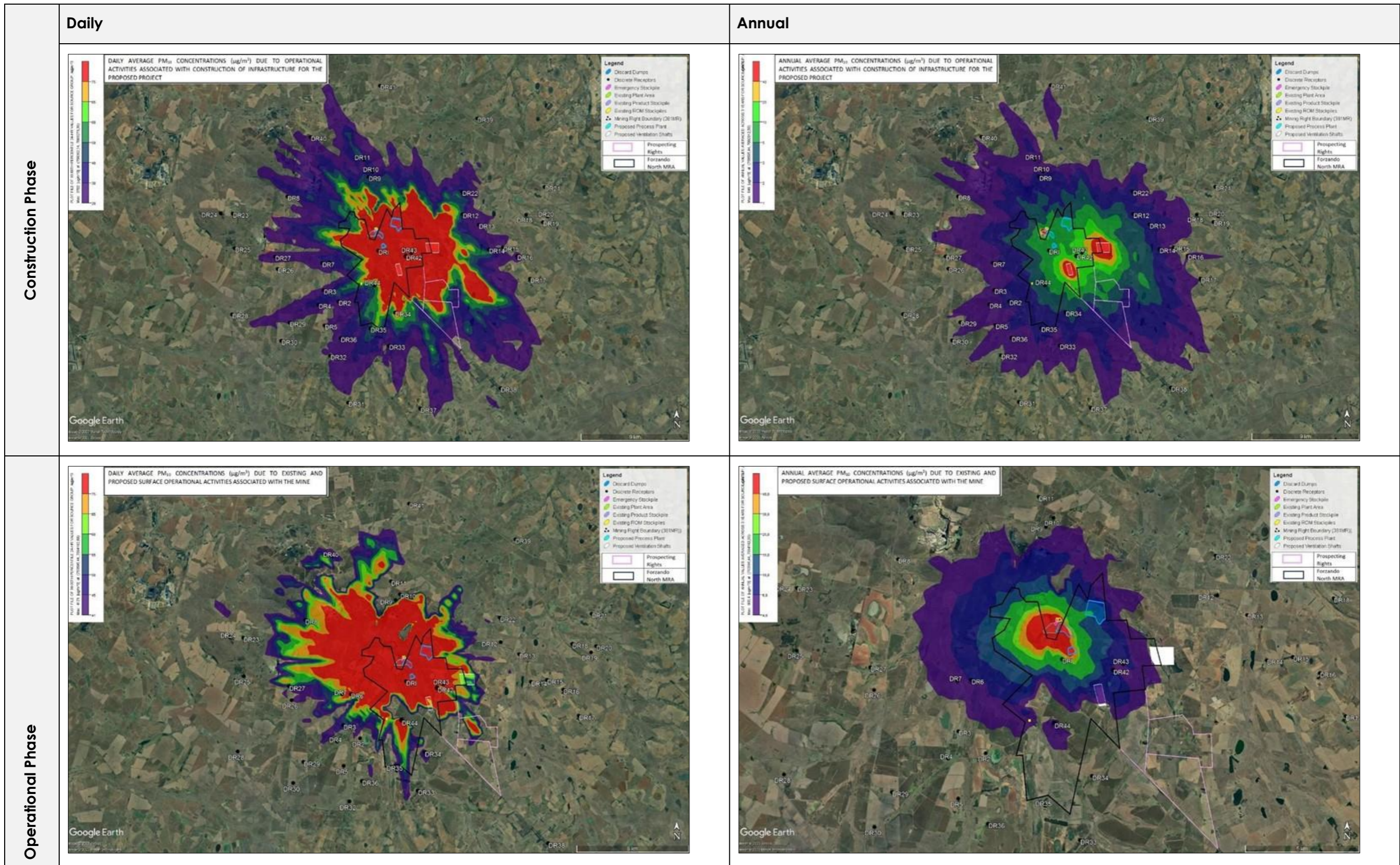


Figure 43: Summary of predicted incremental PM<sub>10</sub> concentrations (Rayten, 2023)

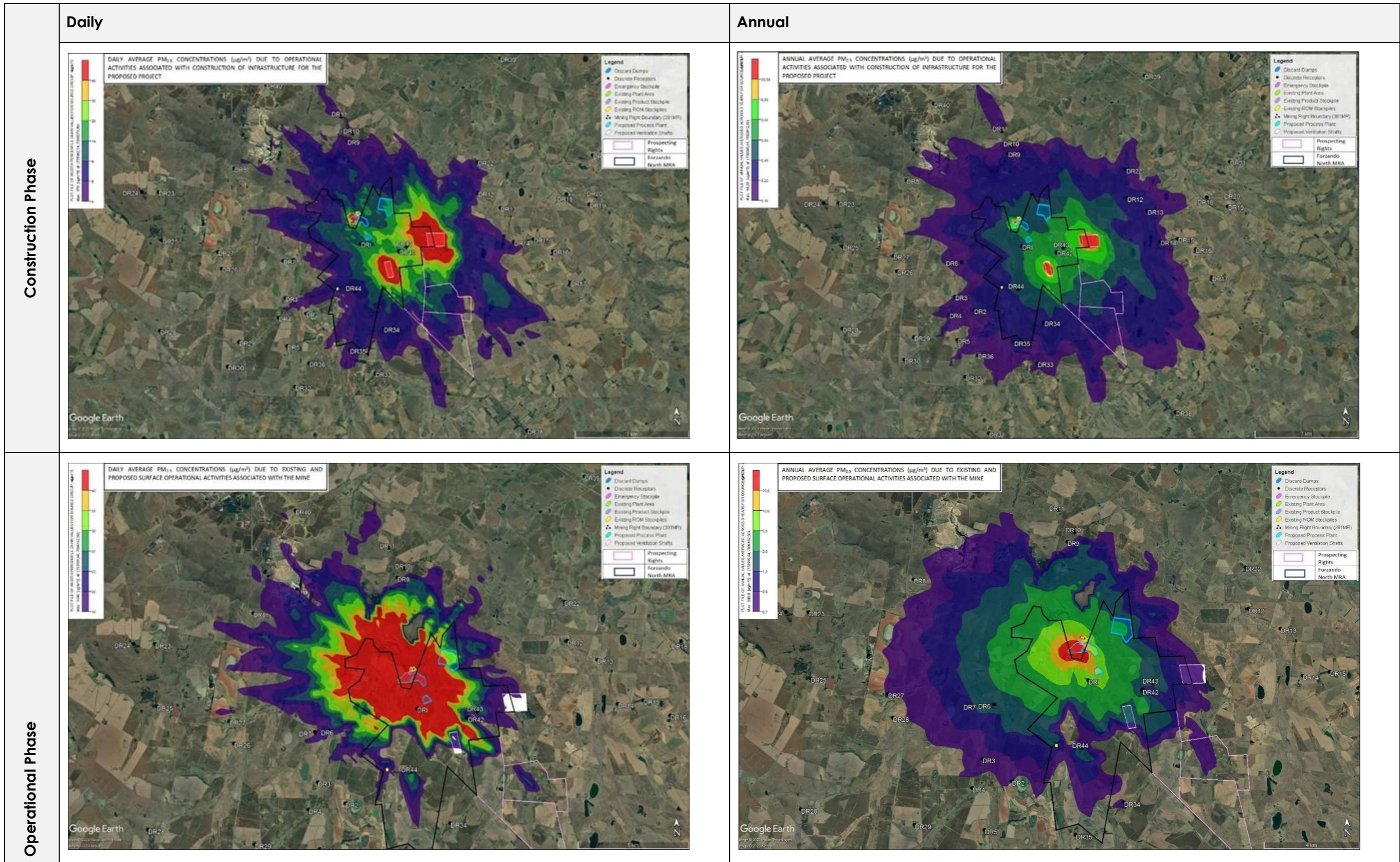


Figure 44: Summary of predicted incremental PM<sub>2.5</sub> concentrations (Rayten, 2023)

### 11.3.10 Environmental Noise

A noise model (worst case scenario) was developed considering the proposed Project. Based on the noise models (Figure 45 - Figure 46), it was determined that the potential noise impacts associated with the Project would be:

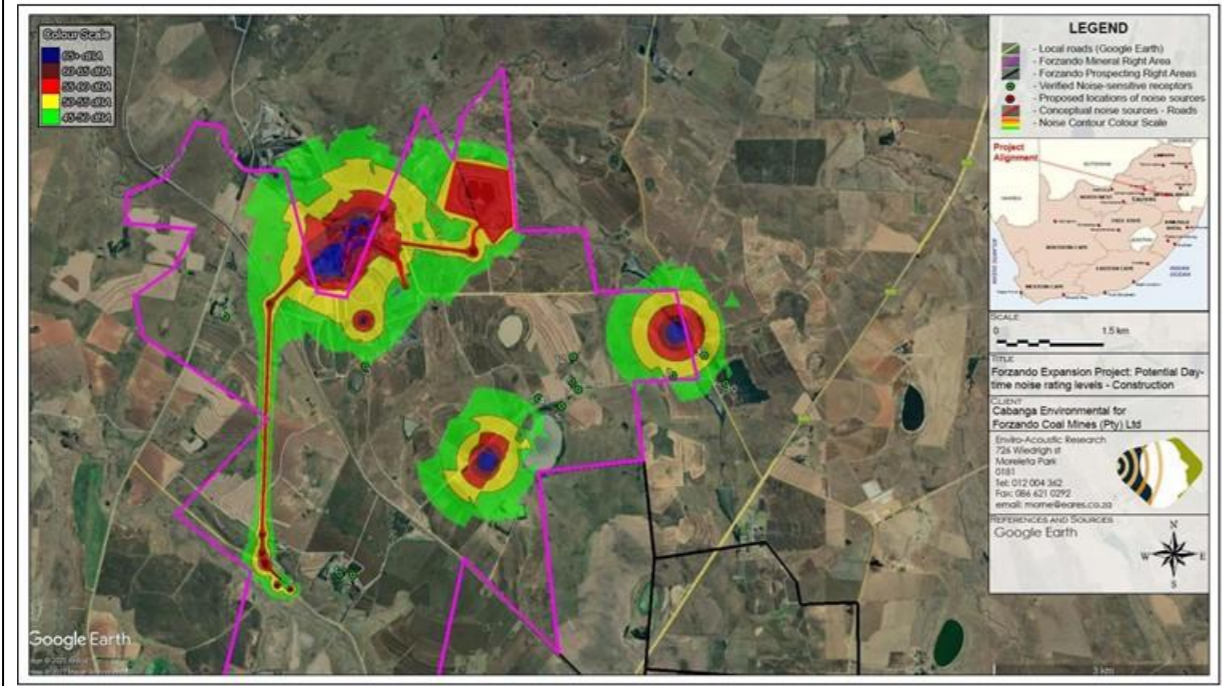
- of a low significance for daytime construction/mining activities;
- of a high significance for night-time construction activities. Potential mitigation measures are available and, if implemented, could reduce the significance of the noise impact to low;
- of a low significance for daytime operational activities; and
- of a low significance for night-time operational activities, though this is subject to the condition that the mine limit the sound power emission level of the ventilation fan to less than 110 dBA (re 1 pW).

The proposed Project is expected to increase noise levels at the nearest NSR, with the most significant impact anticipated for receptors within a 1,000-metre radius of the Project activities. The noise generated by the project may be audible up to 2,000 meters away from the project area. Local community members may perceive the heightened noise levels as bothersome, particularly at night, with the beeping of reverse alarms frequently reported as highly aggravating by receptors. The construction and operational scenarios consider various activities at surrounding mining activities, that would increase cumulative effects (E.A.R, 2023).

Final decommissioning activities will have a noise impact lower than either the construction or operational phases. This is because decommissioning and closure activities normally take place during the day using minimal equipment (due to the decreased urgency of the project) (E.A.R, 2023).

Please refer to Appendix F 11 for the detailed study.

**Daytime**



**Night-time**

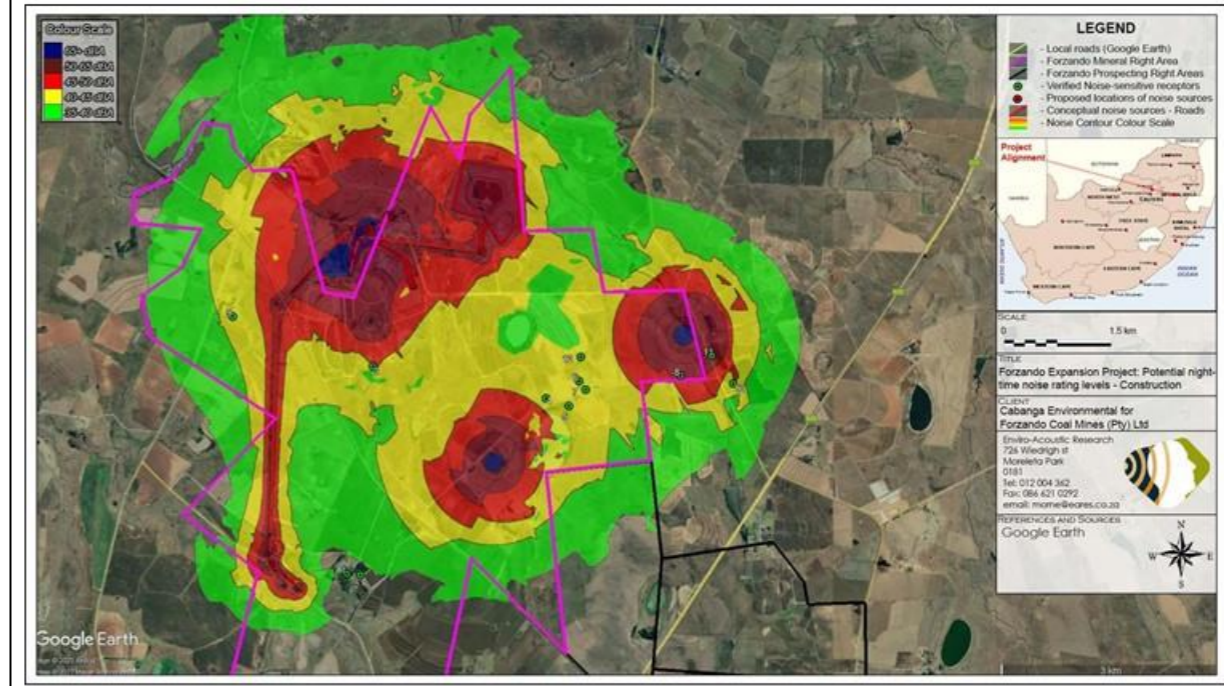
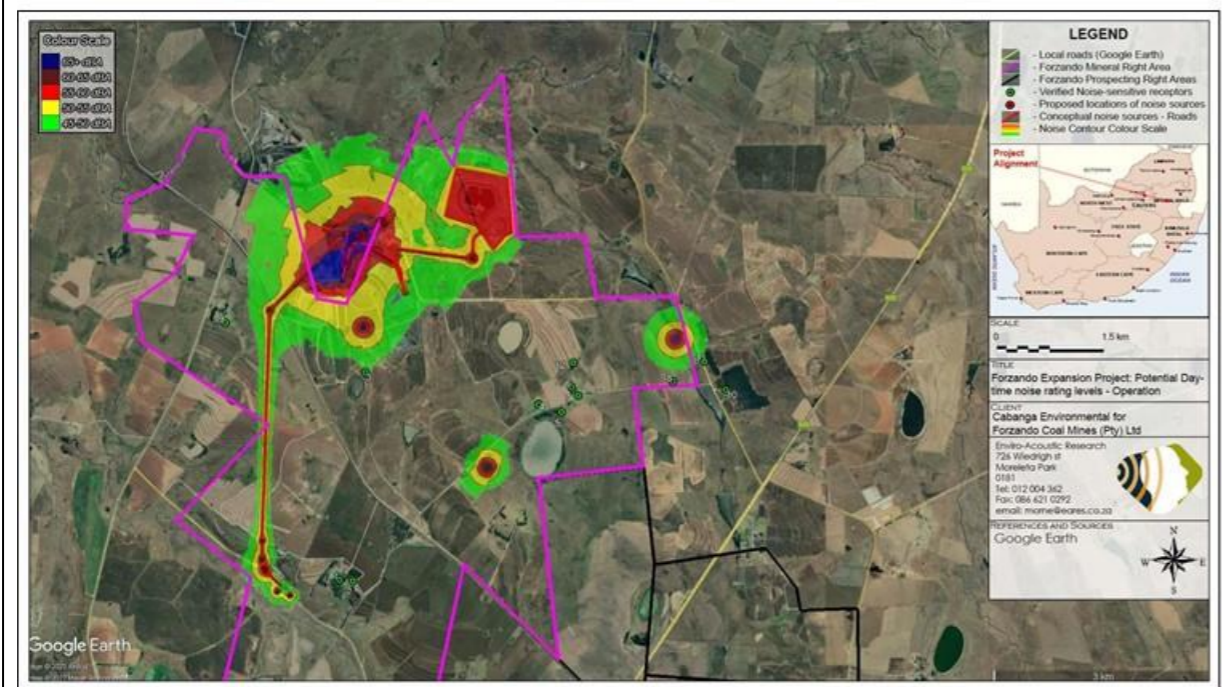


Figure 45: Modelled worst case scenario noise rating levels during the Construction Phase (E.A.R, 2023)

**Daytime**



**Night-time**

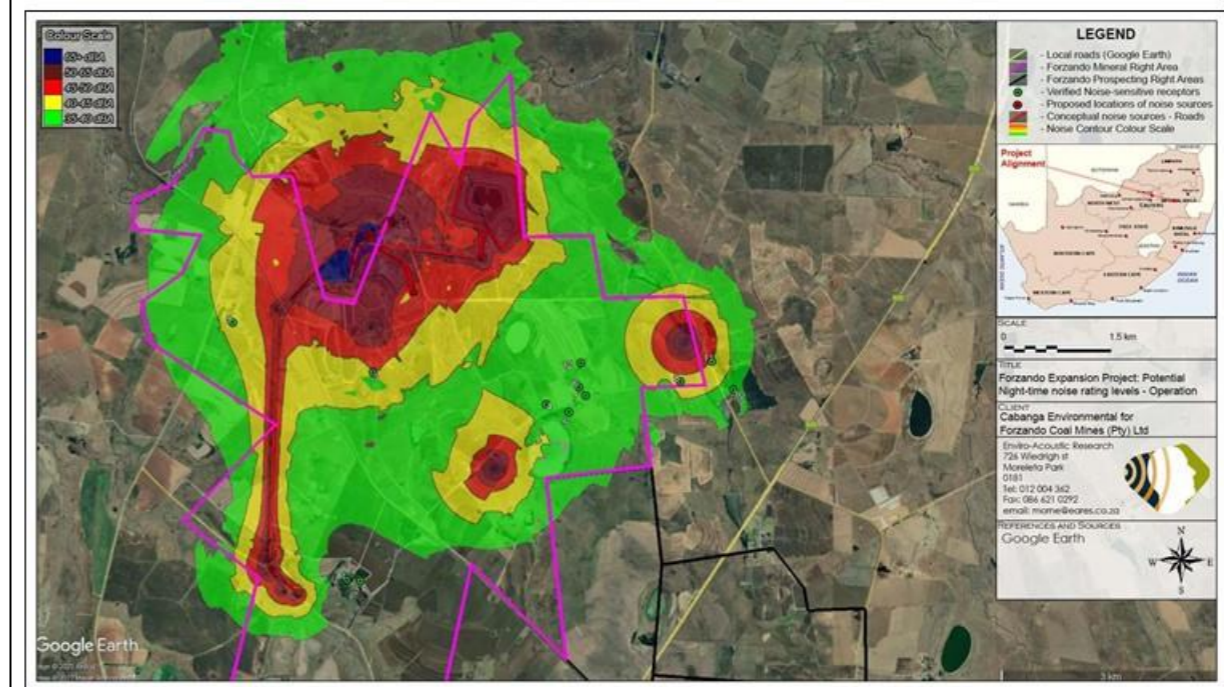


Figure 46: Modelled worst case scenario noise rating levels during the Operational Phase (E.A.R, 2023)

### 11.3.11 Visual Aesthetics

The degree of visibility of an object informs the level and intensity of the visual impact, but factors such as the landscape and aesthetic context of the environment in which the object is placed, as well as the perception of the viewer, also influence the nature of the visual impact.

During the construction phase, visual impacts will be experienced due to the presence of large construction vehicles, equipment, laydown areas and material stockpiles. Site clearance and earthworks create visual scarring of the landscape while dust emissions from construction activities and traffic, and potential littering from construction camps also alter the visual resource negatively. The significance of visual impacts during construction are expected to be Moderate pre-mitigation.

The proposed plant will be constructed adjacent to the existing plant and infrastructure area and will therefore not be contrasting to the existing land use. However, the proposed ventilation shafts will be in contrast to its surrounds (grasslands and cultivated fields) and will likely be visible to passing motorists and adjacent land users.

During decommissioning and closure the visual impact will decrease as the mining structures and infrastructure is removed, and the areas disturbed by mining rehabilitated.

### 11.3.12 Social / Socio-economic

Although no specialist study was specifically undertaken to assess the Socio-economic impacts of the Project, impacts that the proposed Project could have on people were identified and assessed by Cabanga Environmental. These include:

- Increased risk of unfamiliar people on site, which may result in a risk of safety to the landowner/user and increased risk of stock theft/loss;
- Increased risk for veldt fires;
- Physical injuries at the workplace, road traffic incidences and other accidental injuries;
- Resultant health system issues (increased pressure on health services and infrastructure);
- Exposure to potentially hazardous materials, waste and malodours; and
- Potential for pests and vermin as a result of poor waste management.

Positive impacts associated with the continued employment (both direct and indirect) as a result of the extended LoM is acknowledged in the impact assessment matrix. During the decommissioning and closure phase negative impacts will be associated with retrenchments/job losses.

### 11.3.13 Traffic and Transport

The current demand on the existing road network in the vicinity of the site is low and the road network and intersections operate at acceptable levels of service. Additional traffic will be generated during the construction phase as equipment and machinery is brought onto site for the development of the new plant and ventilation shafts. However this is expected to be limited to ~40 trips. Once construction is complete the traffic levels are anticipated to revert to the current low intensity levels. The impact significance is considered low.

**Table 46: Impact Assessment**

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Probability		Sensitivity of the Aspect		Severity of the Impact (Magnitude)		Duration		Scale / Extent		Significance (without Mitigation)		Probability		Sensitivity of the Aspect		Severity of the Impact		Duration		Scale / Extent		Significance (with Mitigation)	
1	Clearance of vegetation, stripping and stockpiling of soils	Degradation, destruction and fragmentation of portions of sensitive habitats (including wetlands)	Terrestrial Biodiversity	Construction	Neg	5	Definite	4	Very sensitive	4	Moderate to High	5	Permanent	3	Local	80	Significant	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	60	High
		Displacement of faunal community due to habitat loss and disturbance (noise, dust and vibration) and/or direct mortalities	Terrestrial Biodiversity	Construction	Neg	5	Definite	4	Very sensitive	4	Moderate to High	5	Permanent	3	Local	80	Significant	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	2	Site	56	Moderate
		Destruction of SCC	Terrestrial Biodiversity	Construction	Neg	4	Highly Probable	4	Very sensitive	5	High	5	Permanent	3	Local	68	High	2	Possible	4	Very sensitive	5	High	5	Permanent	2	Site	32	Low
		Increased runoff and erosion ultimately resulting in loss of vegetation communities, and leading to the sedimentation of downstream water resources	Surface water, wetlands & associated aquatic ecosystems Terrestrial Biodiversity	Construction, Operational, Decommissioning & Closure	Neg	5	Definite	4	Very sensitive	3	Moderate	4	Long Term	3	Local	70	High	2	Possible	4	Very sensitive	2	Slight to Moderate	4	Long Term	2	Site	24	Low
		Spread or establishment of alien invasive species	Terrestrial Biodiversity	Construction, Operational, Decommissioning & Closure	Neg	4	Highly Probable	4	Very sensitive	3	Moderate	4	Long Term	3	Local	56	Moderate	2	Possible	4	Very sensitive	2	Slight to Moderate	4	Long Term	2	Site	24	Low
		Stockpiles will alter the topographical nature and visual characteristics of the area	Topography, Visual Aesthetics	Construction & Operational	Neg	5	Definite	2	Somewhat sensitive	3	Moderate	4	Long Term	2	Site	55	Moderate	4	Highly Probable	2	Somewhat sensitive	2	Slight to Moderate	4	Long Term	2	Site	40	Moderate
		Loss of land capability / land potential	Soils, Land Use & Land Capability	Construction	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	2	Site	56	Moderate	3	Probable	4	Very sensitive	4	Moderate to High	4	Long Term	1	Isolated	39	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Probability		Sensitivity of the Aspect		Severity of the Impact (Magnitude)		Duration		Scale / Extent		Significance (without Mitigation)		Probability		Sensitivity of the Aspect		Severity of the Impact		Duration		Scale / Extent		Significance (with Mitigation)	
		Loss of topsoil - increased potential for soil erosion	Soils, Land Use & Land Capability	Construction, Operational, Decommissioning	Neg	3	Probable	4	Very sensitive	4	Moderate to High	4	Long Term	2	Site	42	Moderate	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	1	Isolated	26	Low
		Increased infiltration to aquifers	Groundwater	Construction	Neg	3	Probable	3	Sensitive	1	Slight	1	Short Term	1	Isolated	18	Insignificant	3	Probable	3	Sensitive	1	Slight	1	Short Term	1	Isolated	18	Insignificant
		Increased dust, PM10 & PM2.5	Air Quality	Construction	Neg	4	Highly Probable	2	Somewhat sensitive	4	Moderate to High	2	Short to Medium Term	3	Local	44	Moderate	3	Probable	2	Somewhat sensitive	3	Moderate	2	Short to Medium Term	3	Local	30	Low
		Loss of and disturbance to archaeological, palaeontological and heritage sites	Heritage & Palaeontology	Construction	Neg	2	Possible	5	Irreplaceable	5	High	5	Permanent	3	Local	36	Low	1	Unlikely	5	Irreplaceable	5	High	5	Permanent	3	Local	18	Insignificant
2	Operation of machinery and vehicle movement	Impact on global climate change due to GHG emissions	Climate Change	Construction, Operational, Decommissioning	Neg	4	Highly Probable	5	Irreplaceable	4	Moderate to High	4	Long Term	4	Regional	68	High	3	Probable	5	Irreplaceable	3	Moderate	4	Long Term	4	Regional	48	Moderate
		Compaction and alteration of soil characteristics	Soils, Land Use & Land Capability	Construction, Operational, Decommissioning	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	1	Isolated	52	Moderate	3	Probable	4	Very sensitive	4	Moderate to High	4	Long Term	1	Isolated	39	Low
		Potential for environmental pollution due to leaky equipment/vehicles	Soils, Land Use & Land Capability Surface water, wetlands & associated aquatic ecosystems, Groundwater	Construction, Operational, Decommissioning	Neg	4	Highly Probable	4	Very sensitive	3	Moderate	4	Long Term	1	Isolated	48	Moderate	2	Possible	4	Very sensitive	3	Moderate	4	Long Term	1	Isolated	24	Low
		Increased dust, PM10 & PM2.5	Air Quality	Construction	Neg	4	Highly Probable	2	Somewhat sensitive	4	Moderate to High	2	Short to Medium Term	3	Local	44	Moderate	3	Probable	2	Somewhat sensitive	3	Moderate	2	Short to Medium Term	3	Local	30	Low
		Emissions into the atmosphere from machinery, vehicles and generators: Nox, SO2, CO emissions	Air Quality	Construction, Operational, Decommissioning	Neg	4	Highly Probable	2	Somewhat sensitive	4	Moderate to High	4	Long Term	3	Local	52	Moderate	3	Probable	2	Somewhat sensitive	3	Moderate	4	Long Term	3	Local	36	Low



No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Probability		Sensitivity of the Aspect		Severity of the Impact (Magnitude)		Duration		Scale / Extent		Significance (without Mitigation)		Probability		Sensitivity of the Aspect		Severity of the Impact		Duration		Scale / Extent		Significance (with Mitigation)	
		Traffic will result in road degradation and increased potential for road incidences.	Traffic, Social, Health & Safety	Construction, Operational, Decommissioning	Neg	2	Possible	5	Irreplaceable	4	Moderate to High	4	Long Term	3	Local	32	Low	1	Unlikely	5	Irreplaceable	3	Moderate	4	Long Term	3	Local	15	Insignificant
3	Presence of personnel onsite	Staff interacting with potentially dangerous fauna (i.e. snakes, bushpigs etc.)	Traffic, Social, Health & Safety	Construction, Operational, Decommissioning	Neg	2	Possible	3	Sensitive	4	Moderate to High	4	Long Term	2	Site	26	Low	1	Unlikely	3	Sensitive	3	Moderate	4	Long Term	1	Isolated	11	Insignificant
		Increased risk of unfamiliar people may result in a risk of safety to the landowner/user. Increased risk of stock theft/loss.	Social, Health & Safety	Construction, Operational, Decommissioning	Neg	3	Probable	3	Sensitive	4	Moderate to High	4	Long Term	2	Site	39	Low	2	Possible	3	Sensitive	3	Moderate	4	Long Term	2	Site	24	Low
		Increased risk for veldt fires	Social, Health & Safety	Construction, Operational, Decommissioning	Neg	3	Probable	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	45	Moderate	2	Possible	4	Very sensitive	3	Moderate	4	Long Term	3	Local	28	Low
		Physical injuries at the workplace, road traffic incidences and other accidental injuries. Resultant health system issues (increased pressure on health services and infrastructure).	Social, Health & Safety	Construction, Operational, Decommissioning	Neg	4	Highly Probable	5	Irreplaceable	4	Moderate to High	4	Long Term	3	Local	64	High	3	Probable	5	Irreplaceable	2	Slight to Moderate	4	Long Term	2	Site	39	Low
4	Extension of existing haul roads at the plant area (in already disturbed footprint area)	Compaction and alteration of soil characteristics	Soils, Land Use & Land Capability	Construction, Operational, Decommissioning	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	1	Isolated	52	Moderate	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	1	Isolated	26	Low
5	Service tracks/access routes to the ventilation shafts	Compaction and alteration of soil characteristics	Soils, Land Use & Land Capability	Construction, Operational, Decommissioning	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	1	Isolated	52	Moderate	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	1	Isolated	26	Low
		Destruction of SCC.	Terrestrial Biodiversity	Construction, Operational, Decommissioning	Neg	4	Highly Probable	4	Very sensitive	5	High	5	Permanent	3	Local	68	High	2	Possible	4	Very sensitive	5	High	5	Permanent	2	Site	32	Low
		Loss of and disturbance to archaeological, palaeontological and heritage sites	Heritage & Palaeontology	Construction	Neg	2	Possible	5	Irreplaceable	5	High	5	Permanent	3	Local	36	Low	1	Unlikely	5	Irreplaceable	5	High	5	Permanent	3	Local	18	Insignificant
6	Construction of the proposed	Coal stockpiles and plant will alter the	Topography, Visual Aesthetics	Operational	Neg	5	Definite	2	Somewhat sensitive	3	Moderate	4	Long Term	3	Local	60	High	3	Probable	2	Somewhat sensitive	3	Moderate	4	Long Term	2	Site	33	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Probability		Sensitivity of the Aspect		Severity of the Impact (Magnitude)		Duration		Scale / Extent		Significance (without Mitigation)		Probability		Sensitivity of the Aspect		Severity of the Impact		Duration		Scale / Extent		Significance (with Mitigation)	
	Plant and expansion of existing stockpile area	topographical nature and visual characteristics of the area																											
		Direct disturbance / degradation / loss to wetland due to the expansion of the stockpile area	Wetlands & associated aquatic ecosystems	Construction	Neg	5	Definite	4	Very sensitive	4	Moderate to High	5	Permanent	3	Local	80	Significant	5	Definite	4	Very sensitive	4	Moderate to High	5	Permanent	2	Site	75	High
		Increased erosion and sedimentation	Surface water, wetlands & associated aquatic ecosystems	Construction	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	2	Short to Medium Term	3	Local	52	Moderate	3	Probable	4	Very sensitive	4	Moderate to High	2	Short to Medium Term	2	Site	36	Low
		Potential contamination of water resources/wetlands with machine oils and construction materials	Surface water, wetlands & associated aquatic ecosystems	Construction	Neg	3	Probable	4	Very sensitive	4	Moderate to High	2	Short to Medium Term	2	Site	36	Low	2	Possible	4	Very sensitive	4	Moderate to High	2	Short to Medium Term	1	Isolated	22	Low
		Increased dust, PM10 & PM2.5	Air Quality	Construction	Neg	4	Highly Probable	2	Somewhat sensitive	4	Moderate to High	2	Short to Medium Term	3	Local	44	Moderate	3	Probable	2	Somewhat sensitive	3	Moderate	2	Short to Medium Term	3	Local	30	Low
		Deterioration in visual aesthetics	Visual Aesthetics	Construction, Operation, Decommissioning	Neg	4	Highly Probable	2	Somewhat sensitive	2	Slight to Moderate	4	Long Term	3	Local	44	Moderate	3	Probable	2	Somewhat sensitive	1	Slight	4	Long Term	2	Site	27	Moderate
		Increase in environmental noise levels due to construction activities	Noise	Construction	Neg	3	Probable	2	Somewhat sensitive	3	Moderate	1	Short Term	3	Local	27	Low	3	Probable	2	Somewhat sensitive	2	Slight to Moderate	1	Short Term	3	Local	24	Low
7	Raise bore drilling of 2x Ventilation Shafts, construction and installation of ventilation fans	Direct disturbance / degradation / loss to wetland due to the construction of the shafts.	Wetlands & associated aquatic ecosystems	Construction	Neg	4	Highly Probable	4	Very sensitive	5	High	4	Long Term	3	Local	64	High	2	Possible	4	Very sensitive	5	High	4	Long Term	3	Local	32	Low
		Increased erosion and sedimentation	Surface water, wetlands & associated aquatic ecosystems	Construction	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	2	Short to Medium Term	3	Local	52	Moderate	2	Possible	4	Very sensitive	4	Moderate to High	2	Short to Medium Term	3	Local	26	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Probability		Sensitivity of the Aspect		Severity of the Impact (Magnitude)		Duration		Scale / Extent		Significance (without Mitigation)		Probability		Sensitivity of the Aspect		Severity of the Impact		Duration		Scale / Extent		Significance (with Mitigation)	
		Potential contamination of water resources/wetlands with machine oils and construction materials	Surface water, wetlands & associated aquatic ecosystems	Construction	Neg	3	Probable	4	Very sensitive	4	Moderate to High	2	Short to Medium Term	2	Site	36	Low	2	Possible	4	Very sensitive	4	Moderate to High	2	Short to Medium Term	1	Isolated	22	Low
		Increased dust, PM10 & PM2.5	Air Quality	Construction	Neg	4	Highly Probable	2	Somewhat sensitive	4	Moderate to High	2	Short to Medium Term	3	Local	44	Moderate	3	Probable	2	Somewhat sensitive	3	Moderate	2	Short to Medium Term	3	Local	30	Low
		Deterioration in visual aesthetics	Visual Aesthetics	Construction, Operation, Decommissioning	Neg	4	Highly Probable	3	Sensitive	2	Slight to Moderate	4	Long Term	3	Local	48	Moderate	3	Probable	3	Sensitive	1	Slight	4	Long Term	2	Site	30	Low
		Increase in environmental noise levels due to construction activities - day time	Noise	Construction	Neg	3	Probable	2	Somewhat sensitive	3	Moderate	1	Short Term	3	Local	27	Low	3	Probable	2	Somewhat sensitive	2	Slight to Moderate	1	Short Term	3	Local	24	Low
		Increase in environmental noise levels due to construction activities - night time	Noise	Construction	Neg	5	Definite	4	Very sensitive	5	High	1	Short Term	4	Regional	70	High	3	Probable	3	Sensitive	3	Moderate	1	Short Term	4	Regional	33	Low
8	Operation of vent shafts & fans	Potential for increased stormwater runoff leading to increased erosion and sedimentation.	Surface water, wetlands & associated aquatic ecosystems	Operational	Neg	3	Probable	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	45	Moderate	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	2	Site	28	Low
		Increase in environmental noise levels due to operation of the ventilation fan - day time	Noise	Operational	Neg	1	Unlikely	2	Somewhat sensitive	1	Slight	4	Long Term	3	Local	10	Insignificant	1	Unlikely	2	Somewhat sensitive	1	Slight	4	Long Term	3	Local	10	Insignificant
		Increase in environmental noise levels due to operation of the ventilation fan - night time	Noise	Operational	Neg	2	Possible	4	Very sensitive	3	Moderate	4	Long Term	4	Regional	30	Low	2	Possible	2	Somewhat sensitive	3	Moderate	4	Long Term	4	Regional	26	Low
9	Underground mining (incl. dewatering for the safe)	Impact on global climate change due to fugitive GHG emissions	Climate Change	Operational	Neg	4	Highly Probable	5	Irreplaceable	4	Moderate to High	4	Long Term	4	Regional	68	High	3	Probable	5	Irreplaceable	3	Moderate	4	Long Term	4	Regional	48	Moderate

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Without Mitigation					With Mitigation																		
						Probability	Sensitivity of the Aspect	Severity of the Impact (Magnitude)	Duration	Scale / Extent	Significance (without Mitigation)	Probability	Sensitivity of the Aspect	Severity of the Impact	Duration	Scale / Extent	Significance (with Mitigation)												
	continuation of mining)	Alteration of geological nature and sequence	Geology	Operational	Neg	5	Definite	5	Irreplaceable	3	Moderate	5	Permanent	2	Site	75	High	5	Definite	5	Irreplaceable	3	Moderate	5	Permanent	2	Site	75	High
		Alteration of topography and hydrological characteristics through potential subsidence	Topography Surface water, wetlands & associated aquatic ecosystems	Operational, Decommissioning & Closure	Neg	3	Probable	4	Very sensitive	4	Moderate to High	5	Permanent	3	Local	48	Moderate	1	Unlikely	4	Very sensitive	4	Moderate to High	5	Permanent	3	Local	16	Insignificant
		Altered hydrological regime due to dewatering	Surface water, wetlands & associated aquatic ecosystems	Operational	Neg	3	Probable	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	45	Moderate	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	30	Low
		Cone of depression as a result of active dewatering activities - groundwater quantity	Groundwater	Operational	Neg	4	Highly Probable	3	Sensitive	4	Moderate to High	4	Long Term	3	Local	56	Moderate	4	Highly Probable	3	Sensitive	4	Moderate to High	4	Long Term	3	Local	56	Moderate
		Impacts on groundwater quality due to poor quality seepage from the mining area	Groundwater	Operational	Neg	3	Probable	3	Sensitive	4	Moderate to High	4	Long Term	3	Local	42	Moderate	2	Possible	3	Sensitive	4	Moderate to High	4	Long Term	3	Local	28	Low
		Destruction of potential palaeontological resources	Heritage & Palaeontology	Operational	Neg	2	Possible	5	Irreplaceable	5	High	5	Permanent	3	Local	36	Low	1	Unlikely	5	Irreplaceable	5	High	5	Permanent	3	Local	18	Insignificant
		Annexation of Prospecting Rights will extend the LoM by an additional 11 years, thus resulting in continued employment for the current workforce	Social	Operational	Pos	5	Definite	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	75	High	5	Definite	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	75	High
10	Coal handling and stockpiling incl. conveyances and the beneficiation process	Soil pollution as a result of irresponsible handling of coal or generation of coal dust, coal spillages and coal dust deposition	Soils, Land Use & Land Capability	Operational	Neg	3	Probable	4	Very sensitive	4	Moderate to High	4	Long Term	2	Site	42	Moderate	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	2	Site	28	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Probability		Sensitivity of the Aspect		Severity of the Impact (Magnitude)		Duration		Scale / Extent		Significance (without Mitigation)		Probability		Sensitivity of the Aspect		Severity of the Impact		Duration		Scale / Extent		Significance (with Mitigation)	
	(operation of the plant)	Potential for increased stormwater runoff leading to increased erosion and sedimentation	Surface water, Wetlands & associated aquatic ecosystems	Operational	Neg	3	Probable	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	45	Moderate	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	2	Site	28	Low
		Potential for increased contaminants entering the wetland systems	Surface water, wetlands & associated aquatic ecosystems	Operational	Neg	3	Probable	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	45	Moderate	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	2	Site	28	Low
		Impacts on water quality due to poor quality seepage and runoff from the coal handling and stockpile areas	Surface water, wetlands & associated aquatic ecosystems Groundwater	Operational	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	4	Regional	64	High	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	30	Low
		Increased dust, PM10 & PM2.5	Air Quality	Operational	Neg	4	Highly Probable	2	Somewhat sensitive	4	Moderate to High	4	Long Term	3	Local	52	Moderate	3	Probable	2	Somewhat sensitive	3	Moderate	4	Long Term	3	Local	36	Low
		Increase in environmental noise levels due to numerous, simultaneous operational activities	Noise	Operational	Neg	4	Highly Probable	2	Somewhat sensitive	3	Moderate	4	Long Term	3	Local	48	Moderate	3	Probable	2	Somewhat sensitive	3	Moderate	4	Long Term	3	Local	36	Low
11	Mine residue handling and disposal: discard and slurry will be disposed of onto the existing, licensed discard dump	Potential for spontaneous combustion and associated emissions	Air Quality	Operational	Neg	4	Highly Probable	3	Sensitive	4	Moderate to High	4	Long Term	4	Regional	60	High	2	Possible	3	Sensitive	4	Moderate to High	4	Long Term	4	Regional	30	Low
		Impacts on water quality due to poor quality seepage and uncontrolled runoff	Surface water, wetlands & associated aquatic ecosystems, Groundwater	Operational, Decommissioning & Closure	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	4	Regional	64	High	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	30	Low
12	Installation and operation of the slurry pipeline	Environmental pollution due to potential leaks	Soils, land use & land capability, surface water, wetlands & associated aquatic ecosystems,	Operational	Neg	3	Probable	4	Very sensitive	4	Moderate to High	4	Long Term	4	Regional	48	Moderate	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	2	Site	28	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Probability		Sensitivity of the Aspect		Severity of the Impact (Magnitude)		Duration		Scale / Extent		Significance (without Mitigation)		Probability		Sensitivity of the Aspect		Severity of the Impact		Duration		Scale / Extent		Significance (with Mitigation)	
			Groundwater																										
13	Installation and operation of water reticulation pipelines	Environmental pollution due to potential leaks	Soils, land use & land capability, surface water, wetlands & associated aquatic ecosystems, Groundwater	Operational	Neg	3	Probable	4	Very sensitive	3	Moderate	4	Long Term	4	Regional	45	Moderate	2	Possible	4	Very sensitive	3	Moderate	4	Long Term	2	Site	26	Low
14	Installation and operation of electricity distribution infrastructure	Destruction of SCC	Terrestrial Biodiversity	Construction	Neg	4	Highly Probable	4	Very sensitive	5	High	5	Permanent	3	Local	68	High	2	Possible	4	Very sensitive	5	High	5	Permanent	2	Site	32	Low
		Loss of and disturbance to archaeological, palaeontological and heritage sites	Heritage & Palaeontology	Construction	Neg	2	Possible	5	Irreplaceable	5	High	5	Permanent	3	Local	36	Low	1	Unlikely	5	Irreplaceable	5	High	5	Permanent	3	Local	18	Insignificant
		Deterioration in visual aesthetics	Visual Aesthetics	Construction, Operation, Decommissioning	Neg	4	Highly Probable	2	Somewhat sensitive	2	Slight to Moderate	4	Long Term	3	Local	44	Moderate	3	Probable	2	Somewhat sensitive	1	Slight	4	Long Term	2	Site	27	Low
15	Refuse and waste management	Potential contamination through littering and/or incorrect waste disposal	Surface water, wetlands & associated aquatic ecosystems, Terrestrial Biodiversity, Soils	Construction, Operational, Decommissioning & Closure	Neg	3	Probable	4	Very sensitive	3	Moderate	4	Long Term	3	Local	42	Moderate	2	Possible	4	Very sensitive	3	Moderate	4	Long Term	2	Site	26	Low
		Deterioration in visual aesthetics	Visual Aesthetics	Construction, Operational, Decommissioning & Closure	Neg	4	Highly Probable	2	Somewhat sensitive	2	Slight to Moderate	4	Long Term	3	Local	44	Moderate	2	Possible	2	Somewhat sensitive	2	Slight to Moderate	4	Long Term	2	Site	20	Low
		Potential for pests and vermin	Social, Health & Safety	Construction, Operational, Decommissioning & Closure	Neg	2	Possible	3	Sensitive	3	Moderate	4	Long Term	3	Local	26	Low	2	Possible	3	Sensitive	2	Slight to Moderate	4	Long Term	2	Site	22	Low
		Potential contamination of surrounding environment with sewage	Surface water, wetlands & associated aquatic ecosystems, Terrestrial	Construction, Operational, Decommissioning & Closure	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	60	High	2	Possible	4	Very sensitive	2	Slight to Moderate	4	Long Term	2	Site	24	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Probability		Sensitivity of the Aspect		Severity of the Impact (Magnitude)		Duration		Scale / Extent		Significance (without Mitigation)		Probability		Sensitivity of the Aspect		Severity of the Impact		Duration		Scale / Extent		Significance (with Mitigation)	
			Biodiversity, Soils																										
		Exposure to potentially hazardous materials, waste and malodours	Social, Health & Safety	Construction, Operational, Decommissioning & Closure	Neg	3	Probable	3	Sensitive	2	Slight to Moderate	4	Long Term	2	Site	33	Low	2	Possible	3	Sensitive	2	Slight to Moderate	4	Long Term	1	Isolated	20	Low
16	Maintenance and operation of existing Mine infrastructure and facilities	Impact on global climate change due to GHG emissions	Climate Change	Operational	Neg	4	Highly Probable	5	Irreplaceable	4	Moderate to High	4	Long Term	4	Regional	68	High	3	Probable	5	Irreplaceable	3	Moderate	4	Long Term	4	Regional	48	Moderate
		Continued fragmentation and degradation of ecosystems	Terrestrial Biodiversity	Operational	Neg	5	Definite	4	Very sensitive	3	Moderate	5	Permanent	3	Local	75	High	4	Highly Probable	4	Very sensitive	3	Moderate	4	Long Term	3	Local	56	Moderate
		Spread or establishment of alien invasive species	Terrestrial Biodiversity	Construction, Operational, Decommissioning & Closure	Neg	4	Highly Probable	4	Very sensitive	3	Moderate	4	Long Term	3	Local	56	Moderate	2	Possible	4	Very sensitive	2	Slight to Moderate	4	Long Term	2	Site	24	Low
		Erosion and resulting loss of vegetation communities	Terrestrial Biodiversity	Operational	Neg	4	Highly Probable	4	Very sensitive	3	Moderate	4	Long Term	3	Local	56	Moderate	2	Possible	4	Very sensitive	2	Slight to Moderate	4	Long Term	2	Site	24	Low
		Ongoing displacement and direct mortalities of faunal community due to disturbance (road collisions, noise, light)	Terrestrial Biodiversity	Operational	Neg	5	Definite	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	75	High	3	Probable	4	Very sensitive	3	Moderate	4	Long Term	2	Site	39	Low
17	Storage and use of dangerous goods / Hazardous Substances	Environmental pollution due to hydrocarbon/chemical contamination into the natural environment.	Soils, Land Use & Land Capability Surface water, wetlands & associated aquatic ecosystems, Groundwater	Operational, Decommissioning	Neg	4	Highly Probable	4	Very sensitive	3	Moderate	4	Long Term	3	Local	56	Moderate	2	Possible	4	Very sensitive	3	Moderate	4	Long Term	1	Isolated	24	Low
18	Operation and maintenance of the existing stormwater	Reduction in catchment yield due to containment of dirty water on site	Surface water, wetlands & associated aquatic ecosystems	Operational	Neg	4	Highly Probable	3	Sensitive	2	Slight to Moderate	4	Long Term	1	Isolated	40	Moderate	4	Highly Probable	3	Sensitive	1	Slight	4	Long Term	1	Isolated	36	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Probability		Sensitivity of the Aspect		Severity of the Impact (Magnitude)		Duration		Scale / Extent		Significance (without Mitigation)		Probability		Sensitivity of the Aspect		Severity of the Impact		Duration		Scale / Extent		Significance (with Mitigation)	
	management system	Potential for poor quality water impacting on groundwater and/or surface water and wetlands if pipelines or dams/trenches burst, spill or leak.	Surface water, wetlands & associated aquatic ecosystems, Groundwater	Operational, Decommissioning	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	60	High	3	Probable	4	Very sensitive	3	Moderate	4	Long Term	2	Site	39	Low
19	Water use	Irresponsible use of water and water wastage.	Surface water, Groundwater	Construction, Operational, Decommissioning	Neg	3	Probable	4	Very sensitive	3	Moderate	4	Long Term	4	Regional	45	Moderate	2	Possible	4	Very sensitive	3	Moderate	4	Long Term	4	Regional	30	Low
20	Sealing and closure of underground portal. Backfilling of boxcut adit. Removal of surface infrastructure and general rehabilitation. Decommissioning and Closure of Mine	Profiling and restoration of free drainage	Topography, Hydrology	Decommissioning	Pos	4	Highly Probable	3	Sensitive	4	Moderate to High	4	Long Term	3	Local	56	Moderate	4	Highly Probable	3	Sensitive	4	Moderate to High	4	Long Term	3	Local	56	Moderate
		Potential loss or degradation of nearby wetlands through inappropriate closure	Surface water, wetlands & associated aquatic ecosystems	Decommissioning	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	60	High	2	Possible	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	30	Low
		Increased runoff and erosion ultimately resulting in loss of vegetation communities, and leading to the sedimentation of downstream water resources	Surface water, wetlands & associated aquatic ecosystems Terrestrial Biodiversity	Decommissioning	Neg	4	Highly Probable	4	Very sensitive	3	Moderate	4	Long Term	3	Local	56	Moderate	2	Possible	4	Very sensitive	2	Slight to Moderate	4	Long Term	2	Site	24	Low
		Continued fragmentation and degradation of ecosystems	Terrestrial Biodiversity	Decommissioning	Neg	5	Definite	4	Very sensitive	3	Moderate	5	Permanent	3	Local	75	High	4	Highly Probable	4	Very sensitive	3	Moderate	4	Long Term	2	Site	52	Moderate
		Spread or establishment of alien invasive species	Terrestrial Biodiversity	Decommissioning	Neg	4	Highly Probable	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	60	High	2	Possible	4	Very sensitive	3	Moderate	4	Long Term	2	Site	26	Low
		Ongoing displacement and direct mortalities of faunal community due to disturbance (road collisions, noise, light)	Terrestrial Biodiversity	Decommissioning	Neg	5	Definite	4	Very sensitive	4	Moderate to High	4	Long Term	3	Local	75	High	3	Probable	4	Very sensitive	2	Slight to Moderate	4	Long Term	2	Site	36	Low
		Increased dust, PM10 & PM2.5	Air Quality	Decommissioning	Neg	4	Highly Probable	2	Somewhat sensitive	4	Moderate to High	3	Medium Term	3	Local	48	Moderate	3	Probable	2	Somewhat sensitive	3	Moderate	3	Medium Term	3	Local	33	Low
		Increase in environmental noise levels decommissioning	Noise	Decommissioning	Neg	3	Probable	2	Somewhat sensitive	3	Moderate	4	Long Term	3	Local	36	Low	2	Possible	2	Somewhat sensitive	3	Moderate	4	Long Term	3	Local	24	Low



No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Probability	Sensitivity of the Aspect	Severity of the Impact (Magnitude)	Duration	Scale / Extent	Significance (without Mitigation)	Probability	Sensitivity of the Aspect	Severity of the Impact	Duration	Scale / Extent	Significance (with Mitigation)
		and rehabilitation activities															
		Retrenchment/loss of employment and procurement opportunities	Social	Decommissioning & Closure	Neg	5 Definite	4 Very sensitive	4 Moderate to High	4 Long Term	3 Local	75 High	5 Definite	4 Very sensitive	4 Moderate to High	4 Long Term	3 Local	75 High
		Void recharge and potential for decant	Groundwater, Surface water, wetlands & associated aquatic ecosystems	Closure	Neg	3 Probable	3 Sensitive	4 Moderate to High	4 Long Term	3 Local	42 Moderate	2 Possible	3 Sensitive	4 Moderate to High	4 Long Term	3 Local	28 Low
		Soil replacement, amelioration and seeding. Vegetative cover and plant community succession. Influx of Animals to the area once vegetation establishes.	Terrestrial Biodiversity	Closure	Pos	5 Definite	3 Sensitive	4 Moderate to High	4 Long Term	2 Site	65 High	5 Definite	3 Sensitive	4 Moderate to High	4 Long Term	2 Site	65 High
		Improvement in visual aesthetics	Visual Aesthetics	Closure	Pos	4 Highly Probable	2 Somewhat sensitive	3 Moderate	4 Long Term	3 Local	48 Moderate	4 Highly Probable	2 Somewhat sensitive	3 Moderate	4 Long Term	3 Local	48 Moderate

## 12 MANAGEMENT AND MITIGATION MEASURES

The significance of impacts associated with the project is discussed in Section 11 in terms of the probability of the impact occurring, the intensity, the duration and the spatial scale of the impact.

Impact Management should be proportionate to the significance of an impact prior to the implementation of mitigation measures and will aim to reduce either the probability of an impact occurring, or the consequence of an impact (in terms of its duration, scale or intensity).

### 12.1 Impact Management Actions and Outcomes

The objectives of impact mitigation and management are to:

- Primarily pre-empt impacts and prevent the realisation of these impacts -PREVENTION.
- To ensure activities that are expected to impact on the environment are undertaken and controlled in such a way so as to minimise their impacts – MODIFY and/or CONTROL.
- To ensure a system is in place for treating and/or rectifying any significant impacts that will occur due to the proposed activity – REMEDY.
- Implement an adequate monitoring programme to:
  - Ensure that mitigation and management measure are effective.
  - Allow quick detection of potential impacts, which in turn will allow for quick response to issue/impacts.
  - Reduce duration of any potential negative impacts.

Table 47 indicates the Environmental impact management actions and outcomes for inclusion in the EMPr (Appendix G).

**Table 47: Impact Management Actions and Outcomes**

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
1	Clearance of vegetation, stripping and stockpiling of soils	Degradation, destruction and fragmentation of portions of sensitive habitats (including wetlands)	Terrestrial Biodiversity	Construction	Negative	Significant	<p>Demarcate the construction footprint and laydown area.</p> <p>Limit construction activities to this area.</p> <p>All vehicles and personnel must make use of existing routes/roads as far as possible.</p> <p>Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.</p> <p>All grazing mammals must be kept out of the areas that have recently been re-planted.</p> <p>Dust suppression to be undertaken in all construction areas, this includes wetting of exposed soft soil surfaces and the use of environmentally friendly dust suppressant products (if required).</p>	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	High
		Displacement of faunal community due to habitat loss and disturbance (noise, dust and vibration) and/or direct mortalities	Terrestrial Biodiversity	Construction	Negative	Significant	<p>Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments to allow animals to move or be moved out of these areas before breaking ground activities occur</p> <p>Construction activities must take place systemically and the perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed.</p> <p>Animal permeable fencing should be used to prevent collisions with fences and retardation of faunal movement. Holes 30 cm x 30 cm should be placed at regular intervals along the fence line.</p> <p>Markers to be placed on fencing.</p> <p>The area must be walked through prior to construction to ensure no faunal species remain in the habitat and get killed.</p> <p>Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.</p> <p>No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense.</p>	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Moderate
		Destruction of SCC	Terrestrial Biodiversity	Construction	Negative	High	<p>A search and rescue plan must be developed and executed to relocate plant species of conservation concern (that should be confirmed through a site visit in September) into the on-site relocation areas already used for transplantation of rescued plants or if not available, then to similar habitat recommended by a specialist.</p>	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Low
		Increased runoff and erosion ultimately resulting in loss of vegetation communities, and leading to the sedimentation of downstream water resources	Surface water, wetlands & associated aquatic ecosystems Terrestrial Biodiversity	Construction, Operational, Decommissioning & Closure	Negative	High	<p>Ensure proper storm water management is in place prior to construction.</p> <p>Only strip vegetation as necessary.</p> <p>Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.</p> <p>Vegetate soil stockpiles.</p> <p>Revegetate all denuded areas as soon as possible.</p>	Prevent erosion from occurring, thereby preventing loss of soil (and siltation of downstream water bodies).	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Spread or establishment of alien invasive species	Terrestrial Biodiversity	Construction, Operational, Decommissioning & Closure	Negative	Moderate	<p>Implement the alien management plan, which must highlight control priorities and areas and provide a programme for long-term control.</p> <p>Progressive rehabilitation of areas that have been cleared of invasive plants will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank.</p> <p>Undertake regular monitoring to detect alien invasions early so that they can be controlled.</p> <p>Implement control measures based on monitoring results to enable adaptive management in terms of alien invasive plant control.</p>	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Low
		Stockpiles will alter the topographical nature and visual characteristics of the area	Topography, Visual Aesthetics	Construction & Operational	Negative	Moderate	<p>Stockpiles must be kept to a maximum height of 4m if space allows.</p> <p>Vegetate all long term stockpiles and berms.</p>	Limit the visual impacts on surrounding land users.	Moderate
		Loss of land capability / land potential	Soils, Land Use & Land Capability	Construction	Negative	Moderate	<p>Demarcate the construction footprint and laydown area. Limit construction activities to this area.</p> <p>Topsoil is to be stripped when the soil is dry, as to reduce compaction.</p> <p>Topsoil must only be handled twice, once to strip, and once to enable rehabilitation.</p> <p>Bush clearing contractors will only clear bushes and trees larger than 1m; the remaining vegetation will be stripped with the top 0.3 m of topsoil to conserve as much of the nutrient cycle, organic matter and seed bank as possible.</p> <p>The subsoil approximately 0.3 – 0.8 m thick can then be stripped and stockpiled separately.</p> <p>Stockpiles must be kept to a maximum height of 4m if space allows.</p> <p>Soil can be stockpiled to a height of 10m where it is absolutely necessary, keeping the 10m footprint as small as possible.</p> <p>Rehabilitate disturbed areas as soon as possible.</p> <p>After construction activities are completed, all areas no longer required for operations will be fully rehabilitated.</p> <p>Rehabilitated areas must be contoured and free draining to prevent pooling of water and vegetated with indigenous species to prevent erosion.</p> <p>Compacted areas are to be ripped to loosen the soil structure.</p> <p>A soil fertility and post-mining land capability assessment must be done to address any compaction or fertility issues that may arise from the stockpiling (post-rehabilitation).</p>	Protect the soil physical and chemical properties as far as possible.	Low
		Loss of topsoil - increased potential for soil erosion	Soils, Land Use & Land Capability	Construction, Operational, Decommissioning	Negative	Moderate	<p>Ensure proper storm water management is in place prior to construction.</p> <p>Only strip vegetation as necessary.</p> <p>Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.</p> <p>Vegetate soil stockpiles.</p>	Prevent erosion from occurring, thereby preventing loss of soil (and siltation of downstream water bodies).	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
							Revegetate all denuded areas as soon as possible.		
		Increased infiltration to aquifers	Groundwater	Construction	Negative	Insignificant	No specific mitigation required.	-	Insignificant
		Increased dust, PM10 & PM2.5	Air Quality	Construction	Negative	Moderate	Demarcate the construction footprint and laydown area. Limit construction and vegetation clearance activities to this area. Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation. A water cart will be used to spray gravel roads and relevant areas when dust levels are high. Speed limits will be established to minimise dust generation.	Minimise emissions from vehicles and machinery on site. Minimise nuisance dust.	Low
		Loss of and disturbance to archaeological, palaeontological and heritage sites	Heritage & Palaeontology	Construction	Negative	Low	All graves and heritage sites to be demarcated. <u>50m buffer to be implemented.</u> A heritage specialist must be appointed to compile a site preservation management plan. All vehicles and personnel must make use of existing routes/roads as far as possible. Should any graves/fossils/archaeological artefacts be unearthed, all work must stop and the chance find procedure implemented. All employees and contractors should receive Health and Safety induction which must include an environmental awareness component, including information on the chance find protocol.	Ensure preservation of graves, heritage sites and fossils.	Insignificant
2	Operation of machinery and vehicle movement	Impact on global climate change due to GHG emissions	Climate Change	Construction, Operational, Decommissioning	Negative	High	Implement a payload management system or investigate options to improve the current system if such a system is already in place. Implement a diesel energy-efficiency management programme. Optimise the loading of haul trucks and adjust construction truck engines to ensure optimal energy efficiency. Investigate the use of alternative fuels (i.e. biofuels, ethanol fuels) where possible.	Reduce the combined GHG emissions. Target of 5% per annum.	Moderate
		Compaction and alteration of soil characteristics	Soils, Land Use & Land Capability	Construction, Operational, Decommissioning	Negative	Moderate	Only designated routes to be used so as to limit the possibility of compaction.	Reduce compaction of soils and maintain land capability.	Low
		Potential for environmental pollution due to leaky equipment/vehicles	Soils, Land Use & Land Capability Surface water, wetlands & associated aquatic	Construction, Operational, Decommissioning	Negative	Moderate	Machines to be parked at a hard park area. Drip trays to be placed under any leaky vehicles or machinery. All vehicles and machinery must be maintained and regularly serviced in accordance with the manufacturers guidelines. Servicing of vehicles and machinery is only permitted within designated workshop areas.	To ensure protection of water resources and continued functioning of aquatic ecosystems. Maintain land capability.	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
			ecosystems, Groundwater				Spill kits to be provided at all areas where hydrocarbons, chemicals etc are stored and/or handled and site personnel trained on the use thereof. All spills must be report to the Environmental Manager and cleaned up immediately. All contaminated soil / yard stone shall be treated <i>in situ</i> or removed and be placed in containers for disposal at an appropriately licensed site.		
		Increased dust, PM10 & PM2.5	Air Quality	Construction	Negative	Moderate	A water cart will be used to spray gravel roads and relevant areas when dust levels are high. Speed limits will be established to minimise dust generation. Trucks transporting coal must not be overloaded and must be covered.	Minimise gaseous emissions into the atmosphere.	Low
		Emissions into the atmosphere from machinery, vehicles and generators: Nox, SO2, CO emissions	Air Quality	Construction, Operational, Decommissioning	Negative	Moderate	Vehicles and machinery will be regularly serviced as per the manufacturers guidelines. Where possible, use cleaner fuels.	Minimise emissions from vehicles and machinery on site. Minimise nuisance dust.	Low
		Traffic will result in road degradation and increased potential for road incidences.	Traffic, Social, Health & Safety	Construction, Operational, Decommissioning	Negative	Low	Regular inspections by the Mine of the main routes to and from the site, along with regular reporting to and liaison with the relevant roads authorities. Maintain a complaints register and record community complaints regarding the state of roads. Resolve complaints in consultation with the roads authorities.	To minimise disruption to existing road network and traffic. To prevent road safety incidents.	Insignificant
3	Presence of personnel onsite	Staff interacting with potentially dangerous fauna (i.e. snakes, bushpigs etc.)	Traffic, Social, Health & Safety	Construction, Operational, Decommissioning	Negative	Low	All employees and contractors should receive Health and Safety induction which must include an environmental awareness component,	Limit occupation hazards and potential for incidences.	Insignificant
		Increased risk of unfamiliar people may result in a risk of safety to the landowner/user. Increased risk of stock theft/loss.	Social, Health & Safety	Construction, Operational, Decommissioning	Negative	Low	Contractors and site personnel must carry company identification. All farm gates must be kept closed. Any employee or contractor found guilty of stock theft and/or misconduct will be dealt with according to Forzando Coal Mine's disciplinary procedures. No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this.	Limit possibilities for opportunistic criminals.	Low
		Increased risk for veldt fires	Social, Health & Safety	Construction, Operational, Decommissioning	Negative	Moderate	No open fires will be permitted on site. Fire extinguishers will be provided. All contractors and site personnel must undergo induction and environmental awareness training. Forzando Coal Mines will join the local fire protection association. In the event that there is no fire protection association Forzando will join local community groups to stay in contact with local landowners and users.	Prevent and control fires.	Low
		Physical injuries at the workplace, road traffic incidences and other accidental injuries. Resultant health system issues (increased pressure on health	Social, Health & Safety	Construction, Operational, Decommissioning	Negative	High	All employees and contractors should receive Health and Safety induction. Employees will be provided with the necessary personal protective equipment (PPE).	Limit occupation hazards and potential for incidences.	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		services and infrastructure).							
4	Extension of existing haul roads at the plant area (in already disturbed footprint area)	Compaction and alteration of soil characteristics	Soils, Land Use & Land Capability	Construction, Operational, Decommissioning	Negative	Moderate	Only designated routes to be used so as to limit the possibility of compaction.	Reduce compaction of soils and maintain land capability.	Low
5	Service tracks/access routes to the ventilation shafts	Compaction and alteration of soil characteristics	Soils, Land Use & Land Capability	Construction, Operational, Decommissioning	Negative	Moderate	Use existing farm roads as far as possible.	Reduce compaction of soils and maintain land capability.	Low
		Destruction of SCC	Terrestrial Biodiversity	Construction, Operational, Decommissioning	Negative	High	Sign-off of all off-road routes to be obtained from the Environmental Manager and Land Owner prior to use. All routes must be walked through at least once, by a registered Ecologist, prior to any activities commencing. A search and rescue plan must be developed and executed to relocate plant species of conservation concern (that should be confirmed through a site visit in September) into the on-site relocation areas already used for transplantation of rescued plants or if not available, then to similar habitat recommended by a specialist.	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Low
		Loss of and disturbance to archaeological, palaeontological and heritage sites	Heritage & Palaeontology	Construction	Negative	Low	All graves and heritage sites to be demarcated. <u>50m buffer to be implemented.</u> A heritage specialist must be appointed to compile a site preservation management plan. All vehicles and personnel must make use of existing routes/roads as far as possible. All routes must be walked through at least once prior to any activities commencing on site, to ensure no graves were missed during the HIA. Should any graves/fossils/archaeological artefacts be unearthed, all work must stop and the chance find procedure implemented. All employees and contractors should receive Health and Safety induction which must include an environmental awareness component, including information on the chance find protocol.	Ensure preservation of graves, heritage sites and fossils.	Insignificant
6	Construction of the proposed Plant and expansion of existing stockpile area	Coal stockpiles and plant will alter the topographical nature and visual characteristics of the area	Topography, Visual Aesthetics	Operational	Negative	High	Move coal stockpiles on a first-in-first-out basis to reduce extent of coal stockpile areas. Coal stockpile and handling must be in the designated areas only.	Limit the visual impacts on surrounding land users. Maintain the construction areas to be as visually unobtrusive as possible.	Low
		Direct disturbance / degradation / loss to wetland due to the expansion of the stockpile area	Wetlands & associated aquatic ecosystems	Construction	Negative	Significant	A wetland rehabilitation plan must be compiled and implemented for the relative components.	To rehabilitate the affected wetland area and ensure continued functioning of the aquatic ecosystems.	High

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Increased erosion and sedimentation	Surface water, wetlands & associated aquatic ecosystems	Construction	Negative	Moderate	<p>Ensure proper storm water management is in place prior to construction.</p> <p>Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.</p> <p>No activities are permitted within the wetland and associated buffer areas, unless authorised.</p> <p>Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.</p>	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low
		Potential contamination of water resources/wetlands with machine oils and construction materials	Surface water, wetlands & associated aquatic ecosystems	Construction	Negative	Low	<p>Machines to be parked at a hard park area.</p> <p>Drip trays to be placed under any leaky vehicles or machinery.</p> <p>All vehicles and machinery must be maintained and regularly serviced in accordance with the manufacturers guidelines.</p> <p>Servicing of vehicles and machinery is only permitted within designated workshop areas.</p> <p>Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility.</p> <p>Store all chemicals and hydrocarbons in designated and sufficiently bunded areas (110% capacity if roofed, and 120% if not roofed).</p> <p>Access to these areas will be restricted to those personnel who have received training in the storage and handling of hazardous substances, and the emergency clean-up procedure.</p> <p>Spill kits to be provided at all areas where hydrocarbons, chemicals etc are stored and/or handled and site personnel trained on the use thereof.</p> <p>All spills must be report to the Environmental Manager and cleaned up immediately. All contaminated soil / yard stone shall be treated <i>in situ</i> or removed and be placed in containers for disposal at an appropriately licensed site.</p> <p>All vehicles must remain on demarcated roads.</p> <p>All construction waste must be removed from site at the closure of the construction phase.</p> <p>Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.</p>	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low
		Increased dust, PM10 & PM2.5	Air Quality	Construction	Negative	Moderate	<p>Demarcate the construction footprint and laydown area. Limit construction and vegetation clearance activities to this area. Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.</p> <p>A water cart will be used to spray gravel roads and relevant areas when dust levels are high. Speed limits will be established to minimise dust generation.</p>	Minimise emissions from vehicles and machinery on site. Minimise nuisance dust.	Low
		Deterioration in visual aesthetics	Visual Aesthetics	Construction, Operation, Decommissioning	Negative	Moderate	<p>Demarcate the construction footprint and laydown area.</p> <p>Limit construction activities to this area.</p>	Limit the visual impacts on surrounding land users. Maintain the construction areas to be as visually unobtrusive as possible.	Moderate



No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
							After construction activities are completed, all areas no longer required for operations will be fully rehabilitated.		
		Increase in environmental noise levels due to construction activities	Noise	Construction	Negative	Low	<p>All employees and contractors should receive Health and Safety induction which must include an environmental awareness component, including noise.</p> <p>Implement a line of communication (i.e. helpline where complaints can be lodged).</p> <p>Investigate any reasonable and valid noise complaint if registered by a receptor within 2,000m.</p> <p>Feedback must be provided to the affected stakeholder(s) with steps taken to mitigate the impact (if valid complaint) or preventative steps to minimise this from happening again.</p> <p>Investigate the use of white-noise alarms instead of tonal reverse alarms on heavy vehicles operating on roads, within the mining area and at the plant and stockpile areas.</p> <p>Minimise active night-time construction activities within 600m from verified NSR.</p>	Minimise the generation of nuisance noises and address complaints where possible. The operation may not increase the existing ambient sound levels by more 7dB at dwellings used for residential purposes (a disturbing noise and prohibited by the South African Noise Control Regulations).	Low
7	Raise bore drilling of 2x Ventilation Shafts, construction and installation of ventilation fans	Direct disturbance / degradation / loss to wetland due to the construction of the shafts.	Wetlands & associated aquatic ecosystems	Construction	Negative	High	<p>Adhere to the prescribed wetland buffer of 50m for the vent shafts.</p> <p>Demarcate the construction footprint and laydown area. Limit construction activities to this area.</p> <p>Minimise and restrict site clearing to areas required for construction purposes only and prevent disturbance to adjacent undisturbed vegetation.</p> <p>Design and implement stormwater measures, reporting clean water to the downslope wetlands.</p> <p>Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the overall master plan (indicating no-go areas).</p> <p>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.</p>	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low
		Increased erosion and sedimentation	Surface water, wetlands & associated aquatic ecosystems	Construction	Negative	Moderate	<p>Ensure proper storm water management is in place prior to construction.</p> <p>Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.</p> <p>No activities are permitted within the wetland and associated buffer areas, unless authorised.</p> <p>Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.</p>	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Potential contamination of water resources/wetlands with machine oils and construction materials	Surface water, wetlands & associated aquatic ecosystems	Construction	Negative	Low	<p>Machines to be parked at a hard park area.</p> <p>Drip trays to be placed under any leaky vehicles or machinery.</p> <p>All vehicles and machinery must be maintained and regularly serviced in accordance with the manufacturers guidelines.</p> <p>Servicing of vehicles and machinery is only permitted within designated workshop areas.</p> <p>Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility.</p> <p>Appropriately contain any generator diesel storage tanks within a bunded facility (110% capacity if roofed, and 120% if not roofed).</p> <p>Access to these areas will be restricted to those personnel who have received training in the storage and handling of hazardous substances, and the emergency clean-up procedure.</p> <p>Spill kits to be provided at all areas where hydrocarbons, chemicals etc are stored and/or handled and site personnel trained on the use thereof.</p> <p>All spills must be report to the Environmental Manager and cleaned up immediately. All contaminated soil / yard stone shall be treated <i>in situ</i> or removed and be placed in containers for disposal at an appropriately licensed site.</p> <p>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.</p> <p>Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site</p>	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low
		Increased dust, PM10 & PM2.5	Air Quality	Construction	Negative	Moderate	<p>Demarcate the construction footprint and laydown area. Limit construction and vegetation clearance activities to this area. Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.</p> <p>A water cart will be used to spray gravel roads and relevant areas when dust levels are high. Speed limits will be established to minimise dust generation.</p>	Minimise emissions from vehicles and machinery on site. Minimise nuisance dust.	Low
		Deterioration in visual aesthetics	Visual Aesthetics	Construction, Operation, Decommissioning	Negative	Moderate	<p>Demarcate the construction footprint and laydown area. Limit construction activities to this area.</p> <p>After construction activities are completed, all areas no longer required for operations will be fully rehabilitated.</p>	Limit the visual impacts on surrounding land users. Maintain the construction areas to be as visually unobtrusive as possible.	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Increase in environmental noise levels due to construction activities - day time	Noise	Construction	Negative	Low	All employees and contractors should receive Health and Safety induction which must include an environmental awareness component, including noise. Implement a line of communication (i.e. helpline where complaints can be lodged). Investigate any reasonable and valid noise complaint if registered by a receptor within 2,000m. Feedback must be provided to the affected stakeholder(s) with steps taken to mitigate the impact (if valid complaint) or preventative steps to minimise the this from happening again.	Minimise the generation of nuisance noises and address complaints where possible. The operation may not increase the existing ambient sound levels by more 7dB at dwellings used for residential purposes (a disturbing noise and prohibited by the South African Noise Control Regulations).	Low
		Increase in environmental noise levels due to construction activities - night time	Noise	Construction	Negative	High	If possible, locate vent shaft 1 (eastern most shaft) further than 800m from the closest NSR, OR use available material (such as topsoil) to construct a berm between the active raise-bore drilling activities and NSR08 and NSR11. This berm should be as high as possible (at least 2m higher than the drivetrain of the compressor / drilling machine, to maximum height of 4m). Discuss drilling activities with the receptors at NSR08 and NSR11, highlighting the expected noise levels as well as the duration of the drilling activities.	Ensure that night-time noise levels are less than 45dBA at all potential NSR at night-time. Night-time noise levels must be less than 60 dBA at the boundary of the mine.	Low
8	Operation of vent shafts & fans	Potential for increased stormwater runoff leading to Increased erosion and sedimentation.	Surface water, wetlands & associated aquatic ecosystems	Operational	Negative	Moderate	Ensure proper storm water management is in place and operated in terms of GN 704. Regularly clean drains. Landscape and re-vegetate all denuded areas as soon as possible. Avoid excessive compaction of the ground.	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low
		Increase in environmental noise levels due to operation of the ventilation fan - day time	Noise	Operational	Negative	Insignificant	No specific mitigation required.	Minimise the generation of nuisance noises and address complaints where possible. The operation may not increase the existing ambient sound levels by more 7dB at dwellings used for residential purposes (a disturbing noise and prohibited by the South African Noise Control Regulations).	Insignificant
		Increase in environmental noise levels due to operation of the ventilation fan - night time	Noise	Operational	Negative	Low	Install a fan that has a total sound power emission level of less than 110 dBA (re 1 pW). Alternatively fit attenuators to the ventilation system to ensure this noise emission level. Point the fan away from the closest NSR.	Ensure that night-time noise levels are less than 45dBA at all potential NSR at night-time. Night-time noise levels must be less than 60 dBA at the boundary of the mine.	Low
9	Underground mining (incl. dewatering for the safe continuation of mining)	Impact on global climate change due to fugitive GHG emissions	Climate Change	Operational	Negative	High	Investigate and implement technologies, if found to be feasible, which would contribute towards combatting CH <sub>4</sub> emissions from coal mining operations (examples of possible technologies are listed in Appendix F 1).	Reduce the combined GHG emissions. Target of 5% per annum.	Moderate
		Alteration of geological nature and sequence	Geology	Operational	Negative	High	No mitigation possible. This is the nature of mining.	No mitigation possible. This is the nature of mining.	High

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Alteration of topography and hydrological characteristics through potential subsidence	Topography Surface water, wetlands & associated aquatic ecosystems	Operational, Decommissioning & Closure	Negative	Moderate	No high extraction mining proposed. Carry out a detailed investigation to determine the stability and rock engineering factors. Apply reasonable mining techniques with appropriate safety factors. Should cracks be identified on surface, these are to be filled and rehabilitated. Should subsidence occur, these areas should be profiled and made free-draining.	Measures aim to reduce the potential for roof / pillar failure and surface subsidence.	Insignificant
		Altered hydrological regime due to dewatering	Surface water, wetlands & associated aquatic ecosystems	Operational	Negative	Moderate	Flow meters to be installed on the dewatering point. Routinely refine, update and validate the conceptual and numerical models by incorporating ongoing monitoring data. In addition, such a model should take into consideration the stipulated RQO's flows for the nearest downstream node.	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low
		Cone of depression as a result of active dewatering activities - groundwater quantity	Groundwater	Operational	Negative	Moderate	The localised dewatering of the deep aquifer cannot be prevented. If the impact is confirmed by monitoring, impacts to the surrounding water user's supply must be mitigated by providing an alternative reliable, clean water supply.	Ensure that surrounding water users have access to a reliable and clean water supply.	Moderate
		Impacts on groundwater quality due to poor quality seepage from the mining area	Groundwater	Operational	Negative	Moderate	Maintain water pumped from the underground in a closed circuit Dirty water to be prioritised for re-use as process water PCDs to be lined and operated in accordance with GN 704 Groundwater monitoring programme to be reviewed annually by a professional geohydrologist Should environmentally unacceptable concentrations of constituents of concern be identified during monitoring of the seepage plume, hydraulic plume containment should be initiated.	Prevent groundwater quality deterioration	Low
		<u>Loss of and disturbance to archaeological, palaeontological and heritage sites</u>	Heritage & Palaeontology	Operational	Negative	Low	Should any graves/fossils/archaeological artefacts be unearthed, all work must stop and the chance find procedure implemented. All employees and contractors should receive Health and Safety induction which must include an environmental awareness component, which must include information on the chance find protocol.	Ensure preservation of graves, heritage sites and fossils.	Insignificant
		Annexation of Prospecting Rights will extend the LoM by an additional 11 years, thus resulting in continued employment for the current workforce	Social	Operational	Positive	High	Although the project is not expected to result in any new job opportunities, the extended LoM will result in the continued employment of mine personnel. Implement the approved Social and Labour Plan. Manage job-seeker expectations and ensure clear communication.	Ensure positive socio-economic impacts are maximised.	High

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
10	Coal handling and stockpiling incl. conveyances and the beneficiation process (operation of the plant)	Soil pollution as a result of irresponsible handling of coal or generation of coal dust, coal spillages and coal dust deposition	Soils, Land Use & Land Capability	Operational	Negative	Moderate	<p>Dust management measures, such as spraying with water, mist aerosoling, must be considered at the coal processing and storage areas.</p> <p>Trucks transporting coal must not be overloaded and must be covered.</p> <p>Conveyor to be covered with dog housing.</p> <p>All coal spillages around site and along conveyors and/or roads must be cleared and placed in designated coal handling areas.</p>	Protect the soil physical and chemical properties as far as possible.	Low
		Potential for increased stormwater runoff leading to increased erosion and sedimentation	Surface water, Wetlands & associated aquatic ecosystems	Operational	Negative	Moderate	<p>Ensure proper storm water management is in place and operated in terms of GN 704.</p> <p>Release only clean water into the environment.</p> <p>Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in).</p> <p>Dirty water to be contained on site within the PCDs and prioritised for re-use.</p> <p>Regularly clean drains.</p> <p>Landscape and re-vegetate all denuded areas as soon as possible.</p> <p>Minimise the extent of concreted / paved / gravel areas.</p>	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low
		Potential for increased contaminants entering the wetland systems	Surface water, wetlands & associated aquatic ecosystems	Operational	Negative	Moderate	<p>Machines to be parked at a hard park area.</p> <p>All vehicles and machinery must be maintained and regularly serviced in accordance with the manufacturers guidelines.</p> <p>Servicing of vehicles and machinery is only permitted within designated workshop areas.</p> <p>Drip trays to be placed under any leaky vehicles or machinery.</p> <p>Store all chemicals and hydrocarbons in designated and sufficiently bunded areas (110% capacity if roofed, and 120% if not roofed).</p> <p>Access to these areas will be restricted to those personnel who have received training in the storage and handling of hazardous substances, and the emergency clean-up procedure.</p> <p>Spill kits to be provided at all areas where hydrocarbons, chemicals etc are stored and/or handled and site personnel trained on the use thereof.</p> <p>All spills must be report to the Environmental Manager and cleaned up immediately. All contaminated soil / yard stone shall be treated <i>in situ</i> or removed and be placed in containers for disposal at an appropriately licensed site.</p> <p>No dirty water is permitted to be discharged into the neighbouring wetlands.</p>	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Impacts on water quality due to poor quality seepage and runoff from the coal handling and stockpile areas	Surface water, wetlands & associated aquatic ecosystems Groundwater	Operational	Negative	High	Ensure proper storm water management is in place and operated in terms of GN 704. Dirty water to be contained on site within the PCDs and prioritised for re-use. PCDs and dirty water drains to be lined. Regularly clean drains. Storm water management features must be maintained on an on-going basis and all structures kept clear of obstructions.	To implement measures to prevent the contamination of surface and groundwater resources.	Low
		Increased dust, PM10 & PM2.5	Air Quality	Operational	Negative	Moderate	Reduce height of material transfer where possible (e.g. conveyor transfer points). Partial or full enclosure of conveyor material transfer points. Dust management measures, such as spraying with water, mist-aerosoling, must be considered at the coal processing and storage areas. Conveyor to be covered with dog housing. Regular maintenance of plant equipment, including dust suppression equipment such as sprayers, to ensure these are operating correctly. All coal spillages around site and along conveyors and/or roads must be cleared and placed in designated coal handling areas.	Minimise emissions from vehicles and machinery on site. Minimise nuisance dust.	Low
		Increase in environmental noise levels due to numerous, simultaneous operational activities	Noise	Operational	Negative	Moderate	All employees and contractors should receive Health and Safety induction which must include an environmental awareness component, including noise. Implement a line of communication (i.e. helpline where complaints can be lodged). Investigate any reasonable and valid noise complaint if registered by a receptor within 2,000m. Feedback must be provided to the affected stakeholder(s) with steps taken to mitigate the impact (if valid complaint) or preventative steps to minimise this from happening again. Investigate the use of white-noise alarms instead of tonal reverse alarms on heavy vehicles operating on roads, within the mining area and at the plant and stockpile areas.	Minimise the generation of nuisance noises and address complaints where possible. The operation may not increase the existing ambient sound levels by more 7dB at dwellings used for residential purposes (a disturbing noise and prohibited by the South African Noise Control Regulations).	Low
11	Mine residue handling and disposal: discard and slurry will be disposed of onto the existing,	Potential for spontaneous combustion and associated emissions	Air Quality	Operational	Negative	High	The sides of the discard dump are to be continuously be cladded, especially sides exposed to wind. These measures should reduce the risk of spontaneous combustion. Where spontaneous combustion takes place, fine subsoil material will be used to cover the surface and this must be compacted to douse the combustion.	Minimise gaseous emissions into the atmosphere.	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
	licensed discard dump	Impacts on water quality due to poor quality seepage and uncontrolled runoff	Surface water, wetlands & associated aquatic ecosystems, Groundwater	Operational, Decommissioning & Closure	Negative	High	<p>Discard dump to be constructed in accordance with the approved designs.</p> <p>Should poor quality seepage be noted at downstream environments through the water quality monitoring a cut-off trench can be constructed to capture poor quality seepage and this will either be channelled directly to the PCDs, or alternatively to a sump fitted with a pump to pump the water to the PCD.</p> <p>PCDs 6 and 7 to remain on decommissioning to manage water from the discard dump.</p>	To implement measures to prevent the contamination of surface and groundwater resources.	Low
12	Installation and operation of the slurry pipeline	Environmental pollution due to potential leaks	Soils, land use & land capability, surface water, wetlands & associated aquatic ecosystems, Groundwater	Operational	Negative	Moderate	<p>Pipelines should be laid within the dirty water footprint area or paddocks must be established in clean water area which will serve to contain any leaks.</p> <p>Pipelines should be tested with clean water to ensure no leaks before allowing piping of slurry.</p> <p>Additional containment measures must be provided at river crossings, such as placing pipelines within drains that drain into sumps or other acceptable containment infrastructure.</p> <p>Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur. Inspect, maintain and repair pipelines and pumps.</p> <p>Follow emergency response plan for spills.</p> <p>Keep back-up pumps and pipes on site.</p>	Protect the biophysical environment as far as possible, and limit the potential for environmental degradation.	Low
13	Installation and operation of water reticulation pipelines	Environmental pollution due to potential leaks	Soils, land use & land capability, surface water, wetlands & associated aquatic ecosystems, Groundwater	Operational	Negative	Moderate	<p>Pipelines should be laid within the dirty water footprint area or paddocks must be established in clean water area which will serve to contain any leaks.</p> <p>Pipelines should be tested with clean water to ensure no leaks before allowing piping of slurry.</p> <p>Additional containment measures must be provided at river crossings, such as placing pipelines within drains that drain into sumps or other acceptable containment infrastructure.</p> <p>Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur. Inspect, maintain and repair pipelines and pumps.</p> <p>Follow emergency response plan for spills.</p> <p>Keep back-up pumps and pipes on site.</p>	Protect the biophysical environment as far as possible, and limit the potential for environmental degradation.	Low
14	Installation and operation of electricity distribution infrastructure	Destruction of SCC	Terrestrial Biodiversity	Construction	Negative	High	<p>Sign-off of all powerline routes to be obtained from the Environmental Manager and Land Owner prior to use.</p> <p>All routes must be walked through at least once, by a registered Ecologist, prior to any activities commencing.</p> <p>A search and rescue plan must be developed and executed to relocate plant species of conservation concern (that should be confirmed through a site visit in September) into the on-site relocation areas already used for transplantation of rescued plants or if not available, then to similar habitat recommended by a specialist.</p>	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Loss of and disturbance to archaeological, palaeontological and heritage sites	Heritage & Palaeontology	Construction	Negative	Low	<p>All graves and heritage sites to be demarcated. <u>50m buffer to be implemented.</u></p> <p>A heritage specialist must be appointed to compile a site preservation management plan.</p> <p>All vehicles and personnel must make use of existing routes/roads as far as possible.</p> <p>All routes must be walked through at least once prior to any activities commencing on site, to ensure no graves were missed during the HIA.</p> <p>Should any graves/fossils/archaeological artefacts be unearthed, all work must stop and the chance find procedure implemented.</p> <p>All employees and contractors should receive Health and Safety induction which must include an environmental awareness component, including information on the chance find protocol.</p>	Ensure preservation of graves, heritage sites and fossils.	Insignificant
		Deterioration in visual aesthetics	Visual Aesthetics	Construction, Operation, Decommissioning	Negative	Moderate	Follow existing powerline routes as far as possible.	Limit the visual impacts on surrounding land users. Maintain the construction areas to be as visually unobtrusive as possible.	Low
15	Refuse and waste management	Potential contamination through littering and/or incorrect waste disposal	Surface water, wetlands & associated aquatic ecosystems, Terrestrial Biodiversity, Soils	Construction, Operational, Decommissioning & Closure	Negative	Moderate	<p>Provide adequate number of waste bins on site. Enable the separation of hazardous and general waste at source by providing separate colour-coded or labelled bins in appropriate areas.</p> <p>Bins and skips must be covered to prevent windblown litter, The hazardous waste storage area or skip must be established on a hard standing area.</p> <p>Ensure that waste manifest documentation (as per the draft Classification and Management Regulations, GNR.614 of 2012) is prepared and maintained for the generation, transportation and disposal of all waste streams.</p> <p>Ensure that waste receptacles are regularly collected by reputable service providers for proper recycling or disposal (as appropriate).</p> <p>All contractors and site personnel must undergo induction and environmental awareness training. Which training must include littering and waste management.</p>	To ensure the correct handling, storage, transportation and disposal of waste.	Low
		Deterioration in visual aesthetics	Visual Aesthetics	Construction, Operational, Decommissioning & Closure	Negative	Moderate	<p>Designated waste area must be established with the placement of skips to contain various waste streams.</p> <p>Provide adequate number of waste bins on site. Enable the separation of hazardous and general waste at source by providing separate colour-coded or labelled bins in appropriate areas.</p> <p>Bins and skips must be covered to prevent windblown litter, All contractors and site personnel must undergo induction and environmental awareness training. Which training must include littering and waste management.</p>	Limit the visual impacts on surrounding land users. Maintain the construction areas to be as visually unobtrusive as possible.	Low



No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Potential for pests and vermin	Social, Health & Safety	Construction, Operational, Decommissioning & Closure	Negative	Low	<p>Practise good housekeeping.</p> <p>Designated waste area must be established with the placement of skips to contain various waste streams.</p> <p>Provide adequate number of waste bins on site. Enable the separation of hazardous and general waste at source by providing separate colour-coded or labelled bins in appropriate areas.</p> <p>Bins and skips must be covered.</p> <p>Maximum domestic waste storage period will be 10 days.</p> <p>A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the likely presence of SCC</p>	To ensure that the negative socio-economic impacts are mitigated and managed.	Low
		Potential contamination of surrounding environment with sewage	Surface water, wetlands & associated aquatic ecosystems, Terrestrial Biodiversity, Soils	Construction, Operational, Decommissioning & Closure	Negative	High	<p>Ensure portable, chemical toilets are provided in all construction areas, and that these are regularly serviced by reputable contractors.</p> <p>All laydown areas, chemical toilets etc. should be restricted to existing areas of transformation, where possible.</p> <p>Portable toilets must be supplied at the ratio as provided in the Health and Safety Act.</p> <p>Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.</p>	To ensure the correct handling, storage, transportation and disposal of waste.	Low
		Exposure to potentially hazardous materials, waste and malodours	Social, Health & Safety	Construction, Operational, Decommissioning & Closure	Negative	Low	<p>Designated waste area must be established with the placement of skips to contain various waste streams.</p> <p>Provide adequate number of waste bins on site. Enable the separation of hazardous and general waste at source by providing separate colour-coded or labelled bins in appropriate areas.</p> <p>Bins and skips must be covered.</p> <p>All contractors and site personnel must undergo induction and environmental awareness training. Which training must include littering and waste management.</p>	Limit occupation hazards and potential for incidences.	Low
16	Maintenance and operation of existing Mine infrastructure and facilities	Impact on global climate change due to GHG emissions	Climate Change	Operational	Negative	High	<p>Prepare and implement an energy and GHG Management Plan to assist in analysing and identifying opportunities to reduce energy consumption; GHG emissions; and offset opportunities.</p> <p>This Plan should be updated regularly to ensure with applicable policies and legislation.</p> <p>As far as possible, use solar and/or wind-powered electricity instead of Eskom purchased electricity and diesel fuelled generators.</p>	Reduce the combined GHG emissions. Target of 5% per annum.	Moderate
		Continued fragmentation and degradation of ecosystems	Terrestrial Biodiversity	Operational	Negative	High	<p>All areas of increased ecological sensitivity outside of the approved development footprints are to be designated as "No-Go" areas and be off-limits to all unauthorised vehicles and personnel.</p> <p>Dust suppression to be undertaken in all construction areas, this includes wetting of exposed soft soil surfaces and the use of environmentally friendly dust suppressant products (if required).</p>	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Moderate

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Spread or establishment of alien invasive species	Terrestrial Biodiversity	Construction, Operational, Decommissioning & Closure	Negative	Moderate	<p>Implement the alien management plan, which must highlight control priorities and areas and provide a programme for long-term control.</p> <p>Progressive rehabilitation of areas that have been cleared of invasive plants will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank.</p> <p>Undertake regular monitoring to detect alien invasions early so that they can be controlled.</p> <p>Implement control measures based on monitoring results to enable adaptive management in terms of alien invasive plant control.</p>	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Low
		Erosion and resulting loss of vegetation communities	Terrestrial Biodiversity	Operational	Negative	Moderate	<p>Ensure proper storm water management is in place prior to construction.</p> <p>Only strip vegetation as necessary.</p> <p>Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.</p> <p>Vegetate soil stockpiles.</p> <p>Revegetate all denuded areas as soon as possible.</p>	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Low
		Ongoing displacement and direct mortalities of faunal community due to disturbance (road collisions, noise, light)	Terrestrial Biodiversity	Operational	Negative	High	<p>All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.</p> <p>Speed limits must still be enforced to ensure that road killings and erosion is limited.</p> <p>No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense.</p>	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
17	Storage and use of dangerous goods / Hazardous Substances	Environmental pollution due to hydrocarbon/chemical contamination into the natural environment.	Soils, Land Use & Land Capability Surface water, wetlands & associated aquatic ecosystems, Groundwater	Operational, Decommissioning	Negative	Moderate	<p>Machines to be parked at a hard park area.</p> <p>Drip trays to be placed under any leaky vehicles or machinery.</p> <p>All vehicles and machinery must be maintained and regularly serviced in accordance with the manufacturers guidelines.</p> <p>Servicing of vehicles and machinery is only permitted within designated workshop areas.</p> <p>Spill kits to be provided at all areas where hydrocarbons, chemicals etc are stored and/or handled and site personnel trained on the use thereof.</p> <p>All spills must be report to the Environmental Manager and cleaned up immediately. All contaminated soil / yard stone shall be treated <i>in situ</i> or removed and be placed in containers for disposal at an appropriately licensed site.</p> <p>Store all chemicals and hydrocarbons in designated and sufficiently bunded areas (110% capacity if roofed, and 120% if not roofed).</p> <p><u>Refuelling areas to be located on a hard surface to prevent soil and groundwater contamination.</u></p> <p>Securely fence and lock the storage areas that accommodate hazardous substances such as fuel, oils and chemicals. Access to these areas will be restricted to those personnel who have received training in the storage and handling of hazardous substances, and the emergency clean-up procedure.</p> <p>Bund areas to be fitted with an outflow valve and oil trap. Contaminated water to be drained under controlled circumstances only.</p> <p>Maintain oil traps or interceptors on a regular basis and maintain records.</p> <p>Strategically place the correct types of fire extinguishers onsite and near the hazardous material store. Train key personnel on basic firefighting skills</p>	To ensure the correct handling, storage, transportation and disposal of general waste and hazardous waste.	Low
18	Operation and maintenance of the existing stormwater management system	Reduction in catchment yield due to containment of dirty water on site	Surface water, wetlands & associated aquatic ecosystems	Operational	Negative	Moderate	<p>Dirty water footprint to be maintained as small as possible.</p> <p>All clean water to be diverted around site.</p> <p>SWMP must be adhered to throughout the project.</p>	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low
		Potential for poor quality water impacting on groundwater and/or surface water and wetlands if pipelines or dams/trenches burst, spill or leak.	Surface water, wetlands & associated aquatic ecosystems, Groundwater	Operational, Decommissioning	Negative	High	<p>Ensure proper storm water management is in place and operated in terms of GN 704.</p> <p>Dirty water to be contained on site within the PCDs and prioritised for re-use.</p> <p>PCDs and dirty water drains to be lined.</p> <p>As a preventative measure, all water containment facilities should be operated with a freeboard of at least 0.8 m.</p> <p>Regularly clean drains.</p> <p>Storm water management features must be maintained on an on-going basis and all structures kept clear of obstructions.</p>	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
19	Water use	Irresponsible use of water and water wastage.	Surface water, Groundwater	Construction, Operational, Decommissioning	Negative	Moderate	Saving water initiatives to be included in the environmental awareness training. Utilise water on site responsibly. Water use at the Mine must be measured and recorded. Inspect all water management facilities and pipelines for leakages and immediately repair.	Conserve and safe water.	Low
20	Sealing and closure of underground portal. Backfilling of boxcut adit. Removal of surface infrastructure and general rehabilitation. Decommissioning and Closure of Mine	Profiling and restoration of free drainage	Topography, Hydrology	Decommissioning	Positive	Moderate	Positive impact - no mitigation necessary.	Ensure successful rehabilitation. Return surface water runoff to the catchment.	Moderate
		Potential loss or degradation of nearby wetlands through inappropriate closure	Surface water, wetlands & associated aquatic ecosystems	Decommissioning	Negative	High	Develop and implement a rehabilitation and closure plan. Appropriately rehabilitate the project area by ripping, landscaping and re-vegetating with locally indigenous species. Restrict all activities to within the disturbed footprint area. Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the overall master plan (indicating no-go areas). 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.	To ensure protection of water resources and continued functioning of aquatic ecosystems.	Low
		Increased runoff and erosion ultimately resulting in loss of vegetation communities, and leading to the sedimentation of downstream water resources	Surface water, wetlands & associated aquatic ecosystems Terrestrial Biodiversity	Decommissioning	Negative	Moderate	Ensure proper storm water management is in place prior to construction. Only strip vegetation as necessary. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. Vegetate soil stockpiles. Revegetate all denuded areas as soon as possible.	Prevent erosion from occurring, thereby preventing loss of soil, vegetation communities and siltation of downstream water bodies.	Low
		Continued fragmentation and degradation of ecosystems	Terrestrial Biodiversity	Decommissioning	Negative	High	All areas of increased ecological sensitivity outside of the approved development footprints are to be designated as "No-Go" areas and be off-limits to all unauthorised vehicles and personnel. Dust suppression to be undertaken in all construction areas, this includes wetting of exposed soft soil surfaces and the use of environmentally friendly dust suppressant products (if required).	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Moderate
		Spread or establishment of alien invasive species	Terrestrial Biodiversity	Decommissioning	Negative	High	Implement the alien management plan, which must highlight control priorities and areas and provide a programme for long-term control. Progressive rehabilitation of areas that have been cleared of invasive plants will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Undertake regular monitoring to detect alien invasions early so that they can be controlled. Implement control measures based on monitoring results to enable adaptive management in terms of alien invasive plant control.	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Low

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Ongoing displacement and direct mortalities of faunal community due to disturbance (road collisions, noise, light)	Terrestrial Biodiversity	Decommissioning	Negative	High	All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. Speed limits must still be enforced to ensure that road killings and erosion is limited. No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense.	To prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.	Low
		Increased dust, PM10 & PM2.5	Air Quality	Decommissioning	Negative	Moderate	Revegetate bare areas as soon as possible. A water cart will be used to spray gravel roads and relevant areas when dust levels are high. Speed limits will be established to minimise dust generation.	Minimise emissions from vehicles and machinery on site. Minimise nuisance dust.	Low
		Increase in environmental noise levels decommissioning and rehabilitation activities	Noise	Decommissioning	Negative	Low	All employees and contractors should receive Health and Safety induction which must include an environmental awareness component, including noise. Implement a line of communication (i.e. helpline where complaints can be lodged). Investigate any reasonable and valid noise complaint if registered by a receptor within 2,000m. Feedback must be provided to the affected stakeholder(s) with steps taken to mitigate the impact (if valid complaint) or preventative steps to minimise this from happening again. Investigate the use of white-noise alarms instead of tonal reverse alarms on heavy vehicles operating on roads, within the mining area and at the plant and stockpile areas. Minimise active night-time activities within 600m from verified NSR.	Minimise the generation of nuisance noises and address complaints where possible. The operation may not increase the existing ambient sound levels by more 7dB at dwellings used for residential purposes (a disturbing noise and prohibited by the South African Noise Control Regulations).	Low
		Retrenchment/loss of employment and procurement opportunities	Social	Decommissioning & Closure	Negative	High	Before closure, communicate with employees the downscaling process to manage expectations. Assist with reference letters etc. where possible. Implement the S&LP.	To ensure that the negative socio-economic impacts are mitigated and managed.	High
		Void recharge and potential for decant	Groundwater, Surface water, wetlands & associated aquatic ecosystems	Closure	Negative	Moderate	Update the groundwater model following the completion of the mining activities. Seal the underground portal and all exploration boreholes Rehabilitate all high recharge footprints as soon as possible Minimise recharge of rainwater into underground voids by creating free draining slopes, no ponding should be allowed Installation and testing of additional groundwater monitoring boreholes within the underground mine voids to monitor rebounding water levels. Monitor water levels of the underground aquifer created so that emergency decant procedures can be put in place. This could include pumping to keep water levels below decant level Should decant occur this water should be treated prior to discharge	Minimise seepage and prevent groundwater quality deterioration Prevent or manage decant should it occur.	Low
		Soil replacement, amelioration and seeding. Vegetative cover and plant community succession.	Terrestrial Biodiversity	Closure	Positive	High	Positive impact - no mitigation necessary.	Ensure successful rehabilitation.	High

No	Activity	Impact / Risk Description	Aspect	Phase	Nature of Impact	Significance (without Mitigation)	Mitigation Measures / Management Actions	Impact Management Outcome	Significance (with Mitigation)
		Influx of Animals to the area once vegetation establishes.							
		Improvement in visual aesthetics	Visual Aesthetics	Closure	Positive	Moderate	Rehabilitate disturbed areas as soon as possible.	Limit the visual impacts on surrounding land users. Maintain the construction areas to be as visually unobtrusive as possible.	Moderate

## 13 FINANCIAL PROVISION

### 13.1 Closure Objectives

The approved EMPr (GCS, 2010) identifies the following closure objectives:

- To ensure an effective surface runoff control system to deal with the separation of clean and dirty water environment;
- Rehabilitate areas as soon as possible;
- The sustainable and safe rehabilitation of all activities, to address all environmental impacts as far as practical according to the EMPr;
- The sustainable rehabilitation of all activities and the mining area, as a whole, to ensure a sustainable end use for the majority of the activity sites/areas;
- Return of land to its pre-mining state where possible (i.e. agriculture/grazing for most of the mine's lease area);
- Make all areas safe for both humans and animals;
- Ensure that all areas remaining upon closure are stable, which will prevent dust and water erosion;
- Minimise the impact on the local community;
- Minimise the impact on the surrounding economic environment and other mining activities; and
- To ensure appropriate closure certification is obtained.

### 13.2 Closure Actions

Closure and rehabilitation of the Forzando North Coal Mine will involve the following activities:

#### Dismantling of Infrastructure (Phase 1):

Phase 1 of the rehabilitation plan will involve the dismantling of the coal beneficiation plants; rail line and loop; administration and related buildings; carports; pipelines; conveyors; power lines; fans and vent shafts (GCS, 2010).

All scrap metal will be removed and sold where possible or disposed of at an appropriate site. Calculations in this document do not account for any value recovered from the sale of the plant, scrap metal or other material.

Building rubble and material will be transported to an appropriately licensed disposal site. Where this material is neutral and will not produce leachate harmful to the groundwater environment, it can be utilised as infill material at the base of the void (boxcut Adit) if additional material is required. The footprint should be thoroughly cleaned and all building rubble and waste material should be removed. The footprint should be loosened by ripping or discing the surface soils.

All other waste will be separated and removed from site. It will be recycled where possible or removed by reputable contractors to appropriate waste facilities for the particular waste type.

All hydrocarbons and chemicals will be removed from site by registered and reputable contractors.

Roads or sections of roads that are no longer required after completion of mining will be identified and rehabilitated: Any contaminated surface material will be removed and disposed of.

#### Active Rehabilitation (Phase 2)

Where sites have been alienated of vegetation or where soils have been compacted or covered, these will be ripped and ploughed.

The shaft entrance will be sealed and the boxcut backfilled with available overburden material stockpiled from the construction of the original boxcut adit.

All coal stockpiled will be removed and residual carbonaceous material lifted and placed onto the discard dump. These areas will be ripped to a depth of 500mm and profiled to be free draining.

The discard dump will remain post-closure however, all steep slopes will be profiled and made safe. The dump must be compacted as it is developed to prevent spontaneous combustion. Final rehabilitation of the dump will involve compaction, cladding and vegetating the dump side slopes and top. The dump will be profiled for adequate water runoff and to reduce water ingress and with appropriate erosion control measures and water diversion to reduce risk of erosion.

The PCDs downslope of the dumps will remain onsite, and must be maintained, until such time as the runoff from the area is proven to meet the water quality standards for discharge.

Culverts will only be demolished should the area prove to be free draining.

#### Topsoil and Revegetation (Phase 3)

Disturbed surface areas will be shaped and profiled to be free draining and emulating the natural surface topography, as per the final landform design.

Topsoil should be appropriately fertilised to allow vegetation to grow rapidly. If a reasonable assessment indicates that vegetation re-establishment is unacceptably slow, the soil should be analysed and ameliorated, and the area seeded with a seed mix to specification.

Once the area has been rehabilitated and seeded, access to the area should be restricted for a time, to allow vegetation establishment and prevent over-grazing and trampling.

#### Post-closure monitoring (Phase 4)

Post-closure monitoring will be undertaken for a period of at least three years.

Boundary fences will be dismantled and either disposed of at a permitted disposal site or sold as scrap. Fences erected to cordon off dangerous areas will remain in place and maintained and will only be removed once such sites are considered safe and stable.

### **13.3 Quantum for Financial Provision**

The total calculated financial provision for the Forzando North Coal Mine, for the financial year ending February 2023, was calculated by Cabanga Environmental to be R70 564 661,30 (Excluding VAT). It is anticipated that the proposed Project changes will increase the liability to R83 437 692,52 (Excluding VAT). The quantum for financial provision is summarised below.



**Table 48: Quantum for Financial Provision**

Action	Infrastructure Area	Discard Dump(s)	Adit / Mine Area	Total Cost
Material Handling	R0,00	R6 429 599,49	R9 713 550,38	R16 143 149,87
Infrastructure demolition + removal	R39 629 244,36	R6 360 211,75	R24 565,55	R46 014 021,66
General Surface Rehabilitation	R7 483 817,68	R3 661 693,48	R203 275,09	R11 348 786,24
Latent Risks	R315 500,35	R4 315 735,46	R24 981,34	R4 656 217,15
Monitoring (for 5 years)	R1 758 505,87	R1 758 505,87	R1 758 505,87	R5 275 517,60
<b>Total Liability (Excl. CPI and VAT)</b>	<b>R49 187 068,25</b>	<b>R22 525 746,04</b>	<b>R11 724 878,23</b>	<b>R83 437 692,52</b>

Note: these costs do not make any allowance for contingencies or preliminary and general costs (P & G) as there is no regulatory requirement for inclusion of these costs.

## 14 ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

All specialist studies are conducted to certain levels of confidence, and in all instances known and accepted methodologies have been used and confidence levels are generally high. This means that in most cases the situation described in the pre-mining environment is accurate at high certainty levels, but there exists a low probability that some issues have not been identified during the studies. Such situations cannot be avoided simply due to the nature of field work and have therefore not been further discussed below.

In situations where species sampling or sensitive site assessment is conducted (fauna, flora, aquatic ecosystems and wetland assessments), it must be understood that time limitation and conditions on site means that not all species can be identified nor sites can be discovered during the surveys. Again, as accepted methodologies are used, this is not deemed to be a fatal flaw. Therefore this is not re-iterated below for each specialist study. It must be stressed that this has been considered within the EMPr, where measures are proposed to reduce impact on specifically protected species and heritage sites should these be discovered in addition to those identified during surveys.

There are inherent errors in GPS and mapping programmes which must be considered when transferring plans to on-site activities.

Furthermore, statistical analyses and mathematical models are merely tools that assist the researcher in assessing field observations and have innate assumptions which can reduce objectivity of the results obtained. This is not seen as a major flaw but should always be considered when assessing results. This is not reiterated below for each specialist who has formulated impact assessment based on modelling.

Lastly, impact assessment is a predictive tool to identify aspects of a development that need to be prevented, altered or controlled in a manner to reduce the impact to the receiving

environment, or determine where remediation activities will need to be incorporated into the overall development plan. This does not mean that the impact will occur at the predicted significance, but provides guidance on the formulation of the management and monitoring requirements which need to be incorporated into the EMPr.

Specific knowledge gaps identified by the various specialists and the appointed EAP include:

- The level of project detail presented in this report is sufficient to ensure a realistic identification of potential impacts. In assessing the potential significance of those impacts, the precautionary principle was implemented and a worst-case scenario assessed in each instance.
- Site boundary data and other information relating to the Project, as supplied by the client, is assumed to be correct.
- The GHG Inventory uses data and information provided by Cabanga Environmental (as provided by the Client). It is assumed that the data and information provided are correct.
- The Climate Change Impact Assessment only focusses on the proposed underground mine and does not include existing operations at Forzando, nor a comparison of the emissions associated with the existing and proposed operations.
- It is understood that the coal production numbers provided by the Client is RoM and not saleable coal.
- It is assumed that CH<sub>4</sub> gas is not planned to be flared as part of the underground mining extensions.
- The results of the hydrology study / flood line assessment are for the express purposes of planning, Environmental Authorisation and Environmental Impact Assessment. The flood lines should not be used for detailed engineering design. Recommendations made in the report are based on the information provided at the time.
- It is assumed that no subsidence will occur as a result of the underground mining.
- Only the slopes affected by the proposed development were assessed in the Hydropedological Study.
- In the absence of river systems within the regulated area of the project components, riverine attributes have only been presented at a desktop level. The affected resources have been classified as wetlands and have been assessed in the Freshwater Ecology Assessment accordingly.
- The TBC fieldwork component of the assessment comprised of one three-day summer (wet season) survey. The survey was conducted from the 27th to the 29th of March 2023. Therefore, the probability of detection of certain faunal species will be lowered as certain species or groups of fauna are inherently secretive and require extensive sampling periods. Spring and early summer season flowering flora may have been missed.
- Whilst every effort was made to cover as much of the Project Area as possible, representative sampling was completed for the Terrestrial Biodiversity Assessment, and by its nature it is possible that some plant and animal species that are present within the Project area were not recorded during the field investigations. Areas demarcated for the ventilation shafts were assessed at a desktop level only. Findings have been supplemented from previous assessments completed for the MRA.

- The GPS used for delineations is accurate to within five metres. Therefore, the delineation plotted digitally may be offset by at least five metres to either side.
- Field data is essential in developing the numerical model into a site-specific groundwater model. Specific assumptions related to the available field data include:
  - The top of the aquifer is represented by the generated groundwater heads.
  - The available geological / geohydrological information was used to describe the different aquifers. The available information on the geology and field tests is considered as correct.
  - Aquifer parameters that could not be determined through field measurements were assumed based on experience in similar environments and were adjusted during calibration.
- To develop a model of an aquifer system, certain assumptions had to be made. The following assumptions were made or included in the model:
  - The system is initially in equilibrium and therefore in steady state, even though natural conditions have been disturbed.
  - No abstraction boreholes were included in the initial model.
  - The boundary conditions assigned to the model are considered correct.
  - The impacts of surrounding activities (mining and/or agriculture) were not considered.
  - It is not possible with the available information, timeframe and budget to quantify every fault zone or intrusion or to quantify the heterogeneity present in the various aquifers. For this reason, there are inherent uncertainties in the model. The calibration results do, however, indicate that these uncertainties are within acceptable limits and that the model can be used to estimate the impacts.
  - The concept of the representative elementary volume (REV) was evoked using averaged values over an appropriate volume.
- The key objective of the geochemical assessment was to determine the risks posed by the overburden and mine residue stockpiles and backfill of the open pit. The key assumptions and limitations of this assessment are as follows:
  - It was assumed that the samples taken during the sampling operations are representative of the facilities.
  - No chemical reaction, for example ion exchange or adsorption, was taken into consideration during contaminant transport modelling. There is currently insufficient information available to quantify chemical reactions within the aquifers.
  - Laboratory data has been validated using accepted geochemical techniques. It is assumed that the laboratory results are not inaccurate due to errors or bias in sample collection, handling or analysis.
- It is almost impossible to locate all cultural resources in a given area with no margin for error or omission due to accessibility, vegetation density, other visibility considerations or the sub-terranean nature of some heritage resources. It is therefore possible that some heritage resources would not have been identified during the study.

- The surveyed site is largely disturbed by recent human activity, in the form of agricultural and mining activities, and therefore it is seen as a low-risk area to reveal heritage sites.
- Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and do contain fossil plant, insect, invertebrate and vertebrate material. The site visit and walk through on 06 June 2023 by palaeontologists confirmed that there are no fossils on the surface. Outcrops of shales were absent but it is not known what lies below the surface. The sands and soils of the Quaternary period that cover the entire area would not preserve fossils.
- Construction will be done mainly over areas designated for the proposed additional surface infrastructure (including drilling of ventilation shafts; establishment of access roads to ventilation shafts, infrastructure at new plant area, water reticulation pipelines, installation of additional slurry pipeline, haul road extensions, etc), using a phased approach. Thus, a total of 6 areas/sections were considered for the initial phase of construction. Construction was assumed to occur during the day for 10 hours a day for 7 days a week, 365 days a year, based on information provided by the client.
- All mining activities and processing plant operations were assumed to occur for 24 hours a day for 7 days a week, which represents the worst-case scenario.
- Material throughputs were based on the information provided by the client and include:
  - An hourly throughput of 220 tonnes of coal conveyed to each of the existing North and South ROM stockpiles for temporary storage before processing;
  - An hourly throughput of 500 tonnes of coal processed at the exiting crushing plant circuit;
  - An hourly throughput of 350 tonnes of coal tipped into the ROM crushing section at the proposed/new processing plant;
  - Hourly throughputs of 220 tonnes and 130 tonnes tipped into the Dense Medium Separator and bypass sections at the proposed new plant, respectively; and
  - An hourly throughput of 220 tonnes of product coal loaded into each of the rail wagons at the Rapid Load Out Terminal.
- Mitigation measures that were considered in the air quality dispersion model included:
  - Moisture content of the product coal and discard material, assumed to achieve 10% control efficiency.
- The location, dimensions - including maximum heights for stockpile areas, and exact footprints for some of the modelled sources were assumed based on the information provided by client. Where information was not provided or was unknown, assumptions were made.
- Detailed information for each emission source is required for input into the air quality dispersion model, such as the dimensions, material throughputs, material characteristics and the exact locality of the sources. In some instances, not all these details are known. To account for the emissions, assumptions and estimates were made where necessary.
- The Air Quality Impact Assessment is limited by the amount of detailed information that could be provided at the time of modelling.

- Noise experienced at a certain location is the cumulative result of innumerable sounds emitted and generated both far and close, each in a different time domain, each having a different spectral character at a different sound level. Each of these sounds is also impacted differently by surrounding vegetation, structures and meteorological conditions that result in a total cumulative noise level represented by a few numbers on a sound level meter. It is not the purpose of noise modelling to accurately determine a likely noise level at a certain receptor but to calculate a noise rating level that is used to identify potential issues of concern.
- It was assumed that the residential dwellings surrounding the proposed Project was occupied, unless otherwise confirmed during the site visit.

## 15 CONCLUSION AND RECOMMENDATIONS

Forzando North is an operational coal mine, located within the Bethal Magisterial District of Mpumalanga. The Mine has an approved Mining Right (MP30/5/1/2/2/381MR) and Environmental Management Programme (EMPr) in terms of the Mineral and Petroleum Resources Development Act, Act 28 of 2002 (MPRDA). As well as separate environmental authorisation(s) in terms of the National Environmental Management Act, Act 107 of 1998 (NEMA) and the National Environmental Management Waste Act, Act 59 of 2008 (NEMWA) for ancillary activities.

This application relates to the expansion of the Forzando North Mining Right Area, in terms of Section 102 of the MPRDA, to incorporate contiguous areas currently held under the following Prospecting Rights: 17030PR, 15106PR, and 14478PR on the farms Bankpan 225 IS and Killowen 465 IS.

The annexation of these Prospecting Rights into the existing Forzando North Mining Right (381MR) will extend the overall life of mine (LoM) by approximately 11 years (to 2039) (Forzando Coal Mines (Pty) Ltd, 2023).

In light of the above, Forzando Coal Mines (Pty) Ltd has submitted an application for Environmental Authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998 (NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). Furthermore, Forzando Coal Mines (Pty) Ltd intends to amend and update the existing EMPr as per the recommendations of the recent Compliance Audit (EIMS, 2022a).

This report was made available for public review and comment for a period of thirty (30) days, from 17 July 2023 – 17 August 2023, following which the report has been updated with comments received. This report constitutes the final BAR and is submitted to the DMRE for consideration. Where changes have been made, these have been underlined for ease of reference.

The purpose of the report is to provide information on the environmental and social consequences of the proposed Project to inform the decision making process.

The DMRE, is the Competent Authority in respect of these applications.

### **15.1 Summary of Specialist Studies Recommendations**

A number of Specialist Studies have been undertaken to assess the impacts associated with the proposed Project, these are included in Appendix F. Table 49 summarises the recommendations of the Specialist Studies, and cross references them to the relevant sections of the Report.

**Table 49: Summary of Specialist Studies Recommendations**

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	EAP COMMENT
<p>Climate Change Impact Assessment (Cornerstone, 2023) attached as Appendix F 1</p>	<ul style="list-style-type: none"> <li>• Prepare and implement a GHG Management Plan at Forzando North. The GHG Management Plan should include, but not be limited to, the following:               <ul style="list-style-type: none"> <li>- An energy and GHG emission management programme to assist in analysing and identifying opportunities at the operations to reduce energy consumption and GHG emissions. This should include measuring GHG emission on an annual basis, as is required for the Operational Phase in terms of the Methodological Guidelines.</li> <li>- GHG emissions reduction projects and offsetting opportunities</li> <li>- Allocate responsibility to a key employee(s) that will be responsible and accountable for managing and reporting on the GHG emissions performance of the operations on an annual basis.</li> <li>- The GHG management plan should be updated regularly to ensure that the Mine complies with the new South African policies and legislation relating to GHG emissions and climate change as it is promulgated.</li> </ul> </li> </ul> <p>Implement a payload management system or investigate options to improve the current system if such a system is already in place.</p> <p>Implement a diesel energy-efficiency management programme.</p> <p>Optimise the loading of haul trucks and adjust construction truck engines to ensure optimal energy efficiency.</p> <p>Investigate the use of biofuel as fuel enhancer or partial fossil fuel substitute for the Mine's diesel usage. Potential sources for biofuel could be used cooking oil or other vegetable oils such as palm oil, soybean oil, rapeseed oil or jatropha oil.</p> <p>Investigate the use of ethanol blends, as will be allowable in terms of the vehicles' warranty. Ethanol is less costly to produce than biodiesel due to lower feedstock costs. The most common feedstocks for ethanol in Africa are sugarcane and molasses.</p> <p>Investigate and implement a technology/ies, if found to be feasible, which would contribute towards combatting CH<sub>4</sub> emissions from coal mining operations. Examples of such activities include the following (Pandey et al, 2018):</p> <ul style="list-style-type: none"> <li>- CH<sub>4</sub> flaring: CH<sub>4</sub> collected from boreholes during mining can be flared. Through combustion, the CH<sub>4</sub> is converted to CO<sub>2</sub>, which has a lower GWP compared to CH<sub>4</sub>.</li> <li>- Methane purification: Utilization of mine CH<sub>4</sub> in its mixture form is not possible due to the presence of impurities such as N<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub>, and water vapor. Several processes are available which are commonly used for gas purification.</li> <li>- Power generation using methane: Coal mining is an energy- intensive process, which requires high electricity loads to run equipment. Mine CH<sub>4</sub>-fired stationary power generation technologies such gas engines, gas turbines, and fuel cells can be used in mining of coal. These not only promote the reutilization of generated CH<sub>4</sub> but also reduce the energy consumption during the processes.</li> <li>- Production of methanol and carbon black: Coal mine CH<sub>4</sub> can also be made available as a chemical feedstock for different chemical processes for the production of synthetic fuels and chemicals. Two potential applications in this field are methanol and carbon black production.</li> <li>- Thermal flow, catalytic flow, and catalytic monolith reactor technologies: Thermal flow (TFRR) and catalytic flow (CFRR) reversal reactors employ the flow reversal principle to transfer heat from combustion of the CH<sub>4</sub> to the incoming air through a solid heat storage medium. This raises the ventilation air temperature to the ignition temperature of CH<sub>4</sub>, resulting in emissions of CO<sub>2</sub> and water vapor. Catalytic monolith reactor (CMR) is a honeycomb type monolithic reactor, which performs a similar function but at low</li> </ul>	<p>Mitigation measures included in Table 46 and Appendix G Amended EMPr.</p>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	EAP COMMENT
	<p>pressure with high mass flows, high geometrical area, and high mechanical strength. Monoliths consist of a structure of parallel channels with walls coated by a porous support containing catalytically active particles. Therefore, compared with the TFRR and CFRR units, the CMR unit should be more compact in terms of processing the same amount of ventilation air. All the three technologies perform a similar function, they vary in structural pattern and operating behaviours.</p> <ul style="list-style-type: none"> <li>- Mine methane utilization in gas turbines: Following TFRR, CFRR, and CMR technologies, mitigation and utilization of mine CH<sub>4</sub> may also be achieved by using various gas turbines. Such turbines utilize heat from CH<sub>4</sub> combustion, which preheats the air in the range of 700 – 1000°C to drive the turbines.</li> </ul> <p>The High-Level Assessment / Initial CRV Screening should be built and elaborated on through undertaking a Mid-range CRV Assessment, as described in the CRV Assessment Framework (DFFE, 2020b), by undertaking additional studies, consultation, dialogue, etc. throughout the life of mine.</p>	
Soil and Agricultural Potential Assessment (TBC, 2023a) attached as Appendix F 2	<p>A rehabilitation plan must be completed for the operations as a whole to minimise the impact on the soil resources in the long term, and to ensure the end land use is returned as close as possible to the pre-mining land use.</p> <p>The high potential crop fields should be avoided for the project. However, if relocating of the proposed infrastructure is not feasible, then landowners should be engaged during the stakeholder process for an agreed form of compensation.</p>	It is likely that the Ventilation Shafts will affect crop fields, in an attempt to avoid sensitive habitat areas, CBA and water resources. These will however affect a maximum area of 5000m <sup>2</sup> (2500m <sup>2</sup> each) and will thus not exclude current land use from continuing.
Hydrology / Flood line Assessment (Appendix F 3) and Generic Stormwater Management Plan (Appendix G 1) (H&H, 2023)	<p>Detailed Stormwater Management Plan (SWMP) to be compiled before construction commences based on the principles of Appendix G 1 and GN704 of the NWA.</p> <p>Construction should be planned to occur during the dry season if possible and should stop during heavy rains.</p> <p>Vegetation clearing should be limited as much as possible and plants rescued for rehabilitation.</p> <p>Vehicles and equipment to be kept outside of watercourse buffer zones and flood lines as far as possible.</p> <p>Vehicles and equipment must be kept clean and serviced off site.</p> <p>Staff/workers on site must be educated on identifying potential erosion areas and best practise guidelines.</p> <p>Extra precautions for erosion control must be taken in areas where the soils are deemed to be highly erodible.</p> <p>Dust control during construction must be applied at all times.</p>	Mitigation measures included in Table 46 and Appendix G Amended EMPr.
Freshwater Ecology Assessment (Appendix F 4) (TBC, 2023b)	<p>A buffer zone is suggested of 32 m and 50 m for the processing plant and ventilation shafts respectively, this buffer is calculated assuming mitigation measures are implemented. A buffer zone is not applicable for the undermining of wetlands.</p> <p>Activities to stay outside of the delineated wetlands and their buffers, unless authorised.</p> <p>Should any direct disturbances to the delineated wetlands and buffer areas be authorised, a supporting rehabilitation plan must be compiled and implemented for the relative components.</p> <p>It is recommended that an alien invasive vegetation control and eradication plan be devised and implemented for the project area; and</p> <p>Conduct PES and ecosystem services assessments on HGM 1, HGM 4 and HGM 5.</p> <p>Monitoring to be undertaken annually (in January) against the REC.</p> <p>Monitoring to commence the year prior to construction.</p>	Due to limited space available on site, the stockpile expansion area (associated with the proposed plant) will encroach on a Seep wetland and the proposed 32m buffer cannot be applied. Authorisation is being sought in terms of NEMA and the NWA.
Level 2 Hydropedological study (Appendix F 5) (TBC, 2023c)	It is recommended that the proposed activities may proceed as have been planned with few general mitigation measures being suggested due to minimal impacts expected on most of the identified hillslopes in the assessment area. Few measures can be set on soils with some expected	Due to limited space available on site, the stockpile expansion area (associated with the proposed plant) will encroach on a Seep



LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	EAP COMMENT
	<p>changes in flow paths following the mining process. Flow impediment in interflow soil types can be managed well to minimise saturation conditions and surface return flows to promote subsurface groundwater recharge and storage. Some of the valley bottom soils have responsive hydromorphic soils due to long periods of saturation. Development should avoid areas with responsive (saturated) hydrogeological soil types mostly associated to, and found in areas like wetlands which act as water regime receptors for the water balance in the hillslopes' catchment. From a hydrogeological perspective, the impact of the development on hydrogeological flow paths would be limited and the impacts could be managed sustainably.</p> <p>Some measures can promote infiltration and percolation flows such as;</p> <ul style="list-style-type: none"> <li>- Minimise soil compaction and keeping the soil covered with residue and vegetative cover.</li> <li>- Infiltration basin or trench can minimise surface overflows or runoffs where infrastructures like the processing plant are located. Surface drains should be included as part of stormwater plans to minimize overland flow, return flows and promote re-infiltration.</li> <li>- Development footprint should adhere the buffer zones around mining areas also reapplication of good quality water which accumulates or is pumped from the mining tunnels on sections downstream to maintain saturation at the soil/bedrock zone for interflow soils.</li> </ul>	<p>wetland and the proposed 32m buffer cannot be applied. Authorisation is being sought in terms of NEMA and the NWA.</p>
<p>Geohydrological Assessment (Appendix F 6) (Aquiscience, 2023)</p>	<p>Investigation concluded and recommended the following:</p> <ul style="list-style-type: none"> <li>- Impacts are expected from dewatering related to aquifer depletion on some groundwater receptors.</li> <li>- No impacts are expected towards surface water resources.</li> <li>- No decant is expected from underground.</li> <li>- Pollution plume migration from underground is not expected to impact substantially on the upper aquifers.</li> <li>- The mine must commit to a zero-effluent operating principle whereby contaminated water will be prevented from entering the receiving surface water environment through actions like recycling, reuse or treatment during the short- and long-term.</li> <li>- Effectiveness of existing monitoring borehole positions should be re-evaluated on closure.</li> <li>- Continuation of the monitoring programme to establish post closure trends.</li> <li>- Groundwater levels near the mine should be monitored on a regular basis throughout and post closure phases.</li> <li>- Install monitoring boreholes into different parts of the mine voids to monitor the post-closure water levels.</li> <li>- The occurrence of potential groundwater seepages should be monitored regularly and contained if necessary.</li> <li>- Conduct surface inspections to ensure that surface subsidence does not occur.</li> <li>- If subsidence occurs and sinkholes are formed during operation or after closure, they should be rehabilitated as soon as possible to minimise water and oxygen inflow from the surface. This will minimise or avoid oxidation reactions and potential acid generation.</li> <li>- If decant does occur due to subsidence the mine must plan to continuously pump water out of underground mine voids to maintain water level below decant level, and then treat this water in a Water Treatment Plant.</li> <li>- The model must be routinely refined, updated and validated against the conceptual models developed by incorporating ongoing monitoring data.</li> </ul>	<p>Mitigation measures included in Table 46 and Appendix G Amended EMPr.</p>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	EAP COMMENT
	<ul style="list-style-type: none"> <li>A Water Management Plan is required to ensure that the infrastructure do not impact negatively on water quality to unacceptable levels. It will also serve as early warning systems to implement mitigation measures at early stages to reduce cumulative impacts. To ensure that the natural receiving environment is protected, monitoring is required on an on-going basis even during the closure phases.</li> </ul>	
Terrestrial Biodiversity Assessment (Appendix F 7) (TBC, 2023d)	<ul style="list-style-type: none"> <li>Areas of grassland, rock outcrop and water resource habitat should be avoided wherever possible and managed for conservation throughout the life of the project.</li> <li>The management outcomes put forward by the accompanying wetland report (TBC 2023) must be strictly adhered to.</li> <li>Avoidance mitigation wherever should be applied where possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable.</li> <li>Areas of Eastern Highveld Grassland should be rehabilitated and avoided as far as possible, ESPECIALLY where they overlap with CBA 2 areas. Where development must occur, such as in the case of the vent shafts, the smallest possible footprint must be utilised and no laydown activities may occur in these areas; and</li> <li>A Search and Rescue plan is to be developed and executed for any and all SCC and protected species identified during a site visit in September (when species with a moderate likelihood of occurrence are flowering), as well as any protected species present on site. These plants should be relocated to an area identified as suitable by the specialist</li> </ul>	<p>Due to limited space available on site, the stockpile expansion area (associated with the proposed plant) will encroach on a Seep wetland – High SEI.</p> <p>It is assumed that the Ventilation Shafts will be placed outside of the CBA2 areas and areas of High SEI.</p>
Phase I Heritage Impact Assessment (Appendix F 8) (Archaetnos, 2023)	<p>Sites no. 1-3 are all single graves. Graves are always regarded as having a high cultural significance. It should be included in the heritage register and mitigation measures must be implemented if any development activities take place in its vicinity.</p> <ul style="list-style-type: none"> <li>Two possibilities exist. The first option would be to fence the graves in or demarcate the site and have a management plan drafted for the sustainable preservation thereof. This should be compiled by a heritage expert. This option is relevant when the graves are in no danger of being damaged or destroyed by the development (direct impacts). Secondary impact due to the development activities may still exist and must be managed.</li> <li>The second option is to exhume the mortal remains and to have it relocated. This usually is relevant when the graves will be directly affected (damaged or destroyed) by the development. In this case specific procedures should be followed which includes social consultation. Graves younger than 60 years may be exhumed only by an undertaker. For those older than 60 years, and unknown graves, an undertaker and archaeologist should be appointed. Permits must be obtained from the Burial Grounds and Graves unit of SAHRA. This procedure is quite lengthy and involves social consultation.</li> </ul> <p>For site no. 1 – 3, Option 1 is recommended as the site will not be directly impacted. However, there always is a secondary impact due to adjacent mining activities (subsidence etc.). Option 1 includes the writing of a site preservation management plan.<sup>9</sup> Access to descendants will not be impacted, as the area falls outside the proposed mine infrastructure area. However, the mine will need to ensure that there is no direct impact to the graves. If this is the case Option 2 will be applicable.</p> <p>Site no. 4 is an old farmhouse and received a field rating of Local Grade IIIC. The description in the phase 1 heritage report is seen as sufficient recording (low significance) and it may be</p>	<p>Mitigation measures included in Table 46 and Appendix G Amended EMPr. Chance Find Protocol included as Appendix G 5.</p>

<sup>9</sup> It is standard protocol to either recommend option 1 or option 2 for graves. A management plan will address issues, such as accessibility.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	EAP COMMENT
	<p>granted destruction at the discretion of the relevant heritage authority without a formal permit application, subjected to the granting of Environmental Authorisation.</p> <p>It should be noted that the subterranean presence of archaeological and/or historical sites, features or artefacts is always a distinct possibility. Care should therefore be taken when development commences that if any of these are discovered, work on site cease immediately and a qualified archaeologist be called in to investigate the occurrence. In this regard the following 'Chance find Procedure' should be followed:</p> <ul style="list-style-type: none"> <li>- Upon finding any archaeological or historical material all work at the affected area must cease.</li> <li>- The area should be demarcated to prevent any further work there until an investigation has been completed.</li> <li>- An archaeologist should be contacted immediately to provide advice on the matter.</li> <li>- Should it be a minor issue, the archaeologist will decide on future action. Depending on the nature of the find, it may include a site visit.</li> <li>- SAHRA's APM Unit may also be notified.</li> <li>- If needed the necessary, permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist.</li> <li>- The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter.</li> <li>- Work on site will only continue after the archaeologist/ SAHRA has agreed to such a matter.</li> </ul>	
<p>Phase 2 Palaeontologic Study attached as Appendix F 9 (Bamford, 2023)</p>	<p>Based on the fossil record but confirmed by the site visit and walk through there are NO FOSSILS of any significance such as those of recognisable Glossopteris floral elements even though fossils have been recorded from rocks of a similar age and type in South Africa. It is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary.</p> <p>There is a very small chance that fossils may occur below the ground surface in the shales of the Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once construction and drilling have commenced for the surface infrastructure for the expansion project, then they should be rescued and SAHRA notified so that a palaeontologist can be called to assess and collect a representative sample.</p>	<p>Mitigation measures included in Table 46 and Appendix G Amended EMPr. Chance Find Protocol included as Appendix G 5.</p>
<p>Air Quality Impact Assessment (Appendix F 10)</p>	<p>The following dust mitigation measures can be considered at the mine (including the existing and proposed processing plants) to reduce dust emissions associated with surface activities:</p> <ul style="list-style-type: none"> <li>- Reduce height of material transfer at the processing plants (e.g. conveyor transfer points).</li> <li>- Water sprays for material handling operations (e.g. wet material before conveying/transferring coal).</li> <li>- Water sprays for stockpiles and material storage areas.</li> <li>- Wind breaks at coal storage areas that are prone to dust emissions.</li> <li>- Use of vegetation, topsoil and/or rock armour on large stockpiles and dumps that are prone to wind erosion.</li> <li>- Partial or full enclosure of conveyor material transfer points.</li> <li>- Regular maintenance of plant equipment, including dust suppression equipment such as water sprays, to ensure the equipment is operating properly.</li> <li>- Immediate clean-up of any material (i.e. ROM and product coal) spillages.</li> </ul>	<p>Mitigation measures included in Table 46, monitoring requirements are addressed in Appendix G - the Amended EMPr.</p>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	EAP COMMENT
	<ul style="list-style-type: none"> <li>- Conduct regular site inspections to ensure the dust mitigation measures are being implemented. Regular visual site inspections are recommended to assess whether further mitigation is required for any of the dust emission sources.</li> </ul> <p>Monthly dustfall monitoring and reporting as per the National Dust Control Regulations is required. It is further recommended that Forzando Coal expand the existing dustfall monitoring network to monitor for dustfall around the proposed/new plant. 3 additional points are recommended.</p>	
<p>Environmental Noise Impact Assessment (E.A.R, 2023) see Appendix F 11</p>	<p>If possible, the mine can locate the proposed ventilation shafts further than 800 m from the closest NSR; <u>OR</u> the mine can use available material (such as available topsoil) to construct a berm between the active raise-bore drilling activities and NSR08 and NSR11. This berm should be as high as possible (at least 2 m higher than the drivetrain of the compressor/drilling machine).</p> <p>The mine must select a ventilation fan that has a total sound power emission level less than 110 dBA (re 1 pW), or fit attenuators to the ventilation system to ensure this noise emission level.</p> <p>The mine should position the ventilation fan not to point towards the closest NSR.</p> <p>The mine must implement a noise monitoring programme at residential dwellings in the area (NSR04/05, NSR08, NSR09 and NSR11). Measurements should be collected over a period of at least 36 hours (two night-time periods).</p> <p>The mine should minimize active night-time mining/construction activities within 600 m from verified NSR.</p> <p>All employees and contractors should receive Health and Safety induction that includes an environmental awareness component (noise). This is to allow employees and contractors to the potential noise risks that activities (especially night-time activities) pose to the realise surrounding environment.</p> <p>The applicant must implement a line of communication (i.e., a helpline where complaints could be lodged). All potential sensitive receptors should be made aware of these contact numbers, or alternative means to communicate issues. The mine should maintain a commitment to the local community and respond to concerns in an expedient fashion. Sporadic and legitimate noise complaints could develop and if valid, should be investigated. Feedback must be provided to the affected stakeholder(s) with details of any steps taken to mitigate the impact (if valid complaint) or preventative steps to minimise this from happening again. The mine must investigate any reasonable and valid noise complaint if registered by a receptor staying within 2,000 m from the plant or active mining area.</p> <p>The mine investigates the use of white-noise alarms instead of tonal reverse alarms on heavy vehicles operating on roads, within the mining area and at the plant and stockpile areas<sup>3536</sup>. The advantages of white noise alarms above tonal alarms are:</p> <ul style="list-style-type: none"> <li>- It is as safe as a tonal alarm.</li> <li>- Highly audible close to the alarm (or reversing truck)<sup>38</sup>.</li> <li>- It generates a more uniform sound field behind a reversing vehicle<sup>39</sup>.</li> <li>- Greater directional information, workers can locate the source faster.</li> <li>- Significantly less environmental noise and it creates significantly less annoyance far away.</li> <li>- When properly installed, white noise alarms of a similar sound power emission level are more likely to comply with the ISO 9533 standard.</li> </ul>	<p>Mitigation measures included in Table 46 and Appendix G Amended EMPr.</p>

## 15.2 Environmental Impact Statement

No fatal flaws have been identified for the project. Impacts of Moderate to High significance (post-mitigation) include:

- Degradation, destruction and fragmentation of portions of sensitive habitats (including wetlands) - The footprint of the proposed plant will largely be located within the Mine's current infrastructure footprint with a very low Site Ecological Importance (SEI) however, the proposed expansion of the stockpile area will transgress into areas of Medium – High SEI.
- Direct disturbance / degradation / loss to wetland due to the expansion of the stockpile area - The proposed expansion of the stockpile area, associated with the new plant, will encroach on a Seep wetland and result in the direct loss of approximately 2 Ha of wetlands.
- Displacement of faunal community due to habitat loss and disturbance (noise, dust and vibration) and/or direct mortalities.
- Alteration of the topography, geological nature and deterioration of visual aesthetics.
- Impact on global climate change due to GHG emissions associated with the Project.
- Potential cone of depression as a result of active dewatering activities - groundwater quantity – the mining activities at Forzando North Coal Mine have the potential to affect several privately owned boreholes and the fountain located on Portion 8 of the farm Bankpan 225 IS during the Operational Phase.
- In general, positive impacts are associated with the extended LoM, resulting in the continued employment for the current workforce.

It is Cabanga Environmental's reasoned opinion that the activity be authorised on condition that the EMPr is fully adhered to, annually audited and amended where necessary based on audit findings.

## 15.3 Specific Aspects to be Included in the Environmental Authorisation

Should the proposed project be approved, it is recommended that the following specific conditions be included as per the specialist's findings:

- A final walk down must be undertaken by a registered ecologist to ensure the construction of the Project does not affect sensitive or protected plant or animal species within the footprint of the proposed development.
- The Search, Rescue and Relocation Plan (Appendix G 2) must be updated by a registered ecologist). The rescue and relocation plan should be compiled and implemented in consultation with the MTPA and the necessary permits obtained.
- An alien and invasive plant management plan must be developed and implemented throughout the LoM based on the principles outlined in Appendix G 3.
- Upon finding any fossils, archaeological, cultural or historical material all work at the affected area must cease and the chance find protocol followed (Appendix G 5).
- Should the operations impact on the water quality or quantity of other surrounding users, Forzando Coal Mines (Pty) Ltd must supply them with a sustainable water source of equal quality and quantity.
- The boreholes on Portions 0 (RE), 8 of the farm Bankpan 225 IS and Portion 0 (RE) of the farm Killowen 465 IS must be pump tested and the yields recorded, prior to the area being undermined.

- A wetland rehabilitation plan must be compiled and implemented for the area affected by the proposed plant / stockpile expansion area.
- Conduct PES and ecosystem services assessments on HGM 1, HGM 4 and HGM 5 annually (in January) against the REC. Monitoring to commence the year prior to construction.

## 16 UNDERTAKING BY THE AUTHOR

I, Jane Barrett, herewith confirm:

- That the information provided in this report are to the best of my knowledge true and correct;
- That comments and inputs from stakeholders and interested and affected parties that have been communicated to Cabanga Environmental to date, have been included in this report;
- That comments and inputs from stakeholders and interested and affected parties received at any time during the EIA process that is being undertaken for this project, will be included in subsequent reports or communicated to the relevant authorities;
- That the inputs and recommendations from specialist reports pertaining to the proposed project have been included in this report and its appendices.

I further declare that –

- I act as the independent environmental practitioner in this application;
- I have performed and will continue to perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant. I have no, and will not engage in, conflicting interests in the undertaking of the activity. I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;
- there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting EIAs, including knowledge of the relevant Acts, Regulations and any guidelines that have relevance to the proposed activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority;
- I will continue to ensure that participation by I&APs is facilitated so that all I&APs will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced for the application. I will keep a register of I&APs and ensure that the comments of all I&APs are recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by I&APs in respect of a final report may be attached to the report without further amendment to the report; and
- I realise that a false declaration is an offence and is punishable by law.

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Signature of the Author:

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Date:

Name of company: Cabanga Concepts CC (t/a Cabanga Environmental)

## 17 UNDERTAKING BY THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

I, Lelani Claassen, herewith confirm:

- That the information provided in this report are to the best of my knowledge true and correct;
- That comments and inputs from stakeholders and interested and affected parties that have been communicated to Cabanga Environmental to date, have been included in this report;
- That comments and inputs from stakeholders and interested and affected parties received at any time during the EIA process that is being undertaken for this project, will be included in subsequent reports or communicated to the relevant authorities;
- That the inputs and recommendations from specialist reports pertaining to the proposed project have been included in this report and its appendices.

I further declare that –

- I act as the independent environmental assessment practitioner in this application;
- I have performed and will continue to perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant. I have no, and will not engage in, conflicting interests in the undertaking of the activity. I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;
- there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting EIAs, including knowledge of the relevant Acts, Regulations and any guidelines that have relevance to the proposed activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority;
- I will continue to ensure that participation by I&APs is facilitated so that all I&APs will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced for the application .I will keep a register of I&APs and ensure that the comments of all I&APs are recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by I&APs in respect of a final report may be attached to the report without further amendment to the report; and
- I realise that a false declaration is an offence and is punishable by law.

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Signature of the EAP:

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Date:

Name of company: Cabanga Concepts CC (t/a Cabanga Environmental)



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**Appendix A: Copy of Existing Environmental Authorisations**

**Appendix B: NEMA Screening Tool Report**

**Appendix C: Curriculum Vitae of EAP Project Team**

**Appendix D: A3 Maps and Plans**

**Appendix E: Public Participation Report**

**Appendix F: Specialist Studies**

**Appendix F 1: Climate Change Impact Assessment (Cornerstone, 2023)**

**Appendix F 2: Soils and Agricultural Potential Assessment (TBC, 2023a)**

**Appendix F 3: Hydrology / Flood line Assessment (H&H, 2023)**

**Appendix F 4: Freshwater Ecology Assessment (TBC, 2023b)**

**Appendix F 5: Level 2 Hydro-pedological Study (TBC, 2023c)**

**Appendix F 6: Groundwater Study (Aquiscience, 2023)**

**Appendix F 7: Terrestrial Biodiversity Assessment (TBC, 2023d)**

**Appendix F 8: Heritage Impact Assessment (Archaeinos, 2023)**

**Appendix F 9: Palaeontological Impact Assessment (Bamford, 2023)**

**Appendix F 10: Air Quality Impact Assessment (Rayten, 2023)**

**Appendix F 11: Environmental Noise Impact Assessment (E.A.R, 2023)**

**Appendix F 12: Rock Engineer's Report (M.Mazibuko, 2023)**

**Appendix G: Forzando North EMPr**

**Appendix G 1: Generic Stormwater Management Plan**

**Appendix G 2: Preliminary Plant and Rescue Relocation Plan**

**Appendix G 3: High Level Alien Invasive Management Plan**

**Appendix G 4: Preliminary Rehabilitation and Re-vegetation Plan**

**Appendix G 5: Chance Find Procedure**