DRAFT BASIC ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

N'Komati Anthracite Mine – Block L Opencast Area

And

Amendment to the Environmental Management Programme Report for Mangweni Operations and Plant Area

February 2022

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N'Komati Anthracite (Pty) Ltd – N'Komati Anthracite Mine

Draft Basic Assessment Report for Block L Opencast Area and Draft Amended Environmental Management Programme Report for Mangweni Operations and Plant Area

DMR Reference: MP 30/5/1/2/2/89 MR

February 2022

Prepared by: Kai Petty and Alta van Dyk

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The opinions expressed in this Report have been based on the information supplied to Alta van Dyk Environmental Consultants cc (AvDEnvironmental) by company officials. The opinions in this Report are provided in response to a specific request from company officials to do so. AvDEnvironmental has exercised all due care in reviewing the supplied information. Whilst AvDEnvironmental has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. AvDEnvironmental does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of AvDEnvironmental's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which AvDEnvironmental had no prior knowledge nor had the opportunity to evaluate.

VERSION CONTROL

Alta van Dyk Environmental cc

Author: Kai Petty and Alta van Dyk

Approved by: Alta van Dyk

Signed: 

Position: Environmental Specialist

Date: February 2022

mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT BASIC ASSESSMENT REPORT

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N'Komati Anthracite Mine – Block L Opencast Area

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Amendment to the Environmental Management Programme Report for Mangweni Operations and Plant Area

DMR Reference: MP 30/5/1/2/2/89 MR

NAME OF APPLICANT: Nkomati Anthracite (Pty) Ltd - Nkomati Anthracite Mine

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FILE REFERENCE NUMBER SAMRAD: MP 30/5/1/2/2/89 MR

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EXECUTIVE SUMMARY

The N'Komati Anthracite Mine (N'Komati) is an operational mine located south east of Komatipoort in the Mpumalanga Province. The Mine has an existing approved mining right (DMR Ref: MP 30/5/1/2/2/89 MR) which allows for both opencast and underground mining to take place.

The Mine is divided into the following operational areas: Madadeni; Mangweni and the Processing Plant. The Mine currently abstracts anthracite by means of opencast and underground mining methods at the Madadeni operations and opencast and underground mining methods at the Mangweni operations. Ore is then hauled via trucks along the internal haul road to the Processing Plant, where it is washed and sorted for transportation off site to clients.

The Madadeni Operations are covered by a 2019 Madadeni Environmental Management Programme (EMP), whilst the Processing Plant and Mangweni Operations are covered by the 2020 Mangweni EMP (Alta van Dyk Environmental Consultants cc). It is not possible to consolidate both EMPs through this Basic Assessment Process and a consolidation process will be initiated post the approval of Block L. As a result, the Mangweni 2020 EMP will be amended to include the proposed Block L Opencast Operations.

Due to the complex geological structuring and availability of the anthracite seams in the region, the utilisation of an opencast pit at Block L is required in conjunction with continued mining at Mangweni and Madadeni in order for the required volumes of anthracite to be reached to keep the mine operational.

The focus of the Environmental Impact Assessment is on the development of the proposed Block L Opencast section which lies within the bounds of the 2020 Mangweni EMP due to its close proximity to the existing Processing Plant area that is covered by this EMP. Block L will consist of a small opencast pit to be mined for approximately 60 months five (5) years.

The development of Block L will trigger the following listed activities for which a Basic Assessment will be required:

- Listing Notice GNR 983 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No 40772 as Government Notice No 327:
    - ***Activity 27*** - *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan*;
        - 18 Ha of indigenous vegetation will be cleared for the development of the Block L Open pit.
        - 1.5 Ha of indigenous vegetation will be cleared to realign the existing haul road between the Madadeni Open Pit Operations, Block L and the Beneficiation Plant.

      40 Ha of sugarcane farming area will be affected for the placement of overburden material (not indigenous vegetation).
    - ***Activity 56*** – *The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – (i) where the existing reserve is wider then 13.5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 meters; excluding where the widening or lengthening occur inside urban areas.*
        - existing haul road will be aligned to the west of the proposed Block L open pit as to allow for continual haulage of mining anthracite from the Madadeni operations.

The following EMP document is thus amended and superseded:

2020 Mangweni EMP (Alta van Dyk Environmental Consultants cc) - Mangweni Mini-Pit BA and Amendment to the Environmental Management Programme Report for the Mangweni Operations and Plant Area

GLOSSARY AND TERMINOLOGY

Constitution – Refers to the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996).

Contractor - A person or company appointed by Serengeti to carry out stipulated activities.

Development – means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.

Development footprint – means any evidence of physical alteration as a result of the undertaking of any activity.

Development setback – means a setback line defined or adopted by the competent authority.

Expansion – means the modification, extension, alteration or upgrading of a facility, structure, or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

Environment – The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group; these circumstances include biophysical, social, economic, historical, cultural, and political aspects. Environment means the surroundings within which humans exist and that are made up of-

i. the land, water, and atmosphere of the earth;
ii. micro-organisms, plant, and animal life;
iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

In terms of the National Environmental Management Act (NEMA) (No 107 of 1998), "environment" means the surroundings within which humans exist and that are made up of:

- The land, water, and atmosphere of the earth;
- Micro-organisms, plant, and animal life, and
- Any part or combination of (i) of (ii) and the interrelationships among and between them; and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Management Plan - A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life-cycle of a project.

Maintenance – means actions performed to keep a structure or system functioning or in service on the same location, capacity, and footprint.

Maintenance Management Plan – means a management plan for maintenance purposes defined or adopted by the competent authority.

Impact - A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

Incident - An undesired event which may result in significant environmental impacts but can be managed through internal response.

Land Use - means the purpose for which land and buildings is or may be used lawfully in terms of a land use scheme, existing scheme or in terms of any other authorisation, permit or consent issued by a competent authority, and includes any conditions related to such land use purposes

Mitigation - Measures designed to avoid, reduce, or remedy adverse impacts.

Layout Plan - means a plan indicating information relevant to a land development application and the land intended for development and includes the relative location of erven, public places, or roads, subdivision or consolidation, and the purposes for which the erven are intended to be used.

Property - means any erf, erven, lot, plot or stand, portion or part of farm portions or agricultural holdings, registered in the deeds registry as such.

The Department - Means Department of Mineral Resources and Energy

Tributaries - A stream or river which flows directly into a larger river or stream.

Watercourse means - (a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

Wetland – means 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.

Water quality means the physical, chemical, toxicological, biological (including microbiological) and aesthetic properties of water that determine sustained (1) healthy functioning of aquatic ecosystems and (2) fitness for use (e.g., domestic, recreational, agricultural, and industrial). Water quality is therefore reflected in (a) concentrations or loads of substances (either dissolved or suspended) or micro-organisms, (b) physico-chemical attributes (e.g., temperature) and (c) certain biological responses to those concentrations, loads or physico-chemical attributes.

Water Use License - An authorisation from the Department to a designated water user to use water. The authorisation will provide details on the time-frames and conditions for the designated water use.

ABBREVIATIONS

ADT	Articulated Dump Truck
AMD	Acid Mine Drainage
BAR	Basic Assessment Report
CARA	Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)
CBA	Critical Biodiversity Area
DBAR	Draft Basic Assessment Report
EAP	Environmental Assessment Practitioner
EDM	Ehlanzeni District Municipality
EMP	Environmental Management Programme
FEL	Front End Loader
FEPA	Freshwater Ecosystem Priority Areas
GN	Government Notice
I&APs	Interested and Affected Parties
IUCMA	Inkomati Usuthu Catchment Management Agency
IWWMP	Integrated Water and Waste Management Plan
LoM	Life of Mine
Mamsl	metres above mean sea level
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
MRA	Mining Rights Area
NBA	National Biodiversity Assessment
NFEPA	National Freshwater Ecosystem Priority Areas
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NEM:BA	National Environmental Management Act, 2004 (Act 10 of 2004)
NLM	Nkomazi Local Municipality
NWA	National Water Act, 1998 (Act 36 of 1998)
O/C	Opencast
PCD	Pollution Control Dam
PPE	Personal Protective Equipment
PES	Present Ecological State
ROM	Run of Mine
SANS	South Africa National Standards
SWMP	Storm Water Management Plan
TAM	Total Available Moisture
TA	Traditional Authorities
The Mine	N'Komati Anthracite Mine
U/G	Underground
VAT	Value Added tax
WUL	Water Use License

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IMPORTANT NOTICE

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

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

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

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

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

1 OBJECTIVES OF THE BASIC ASSESSMENT PROCESS AND PROJECT OVERVIEW

1.1 Objectives of the Basic Assessment Process

The objective of the basic assessment process is to, through a consultative process–

a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
b) identify the alternatives considered, including the activity, location, and technology alternatives;
c) describe the need and desirability of the proposed alternatives,
d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:
    i. the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    ii. the degree to which these impacts—
        (aa) can be reversed;
        (bb) may cause irreplaceable loss of resources; and
        (cc) can be managed, avoided, or mitigated;
e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
f) identify and motivate a preferred site, activity, and technology alternative;
(ii) identify suitable measures to manage, avoid or mitigate identified impacts; and
(iii) identify residual risks that need to be managed and monitored.

1.2 General Project Overview

Alta van Dyk Environmental Consultants cc have been appointed by N 'Komati Anthracite (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment process in support of the development of the Block L opencast area. This open pit area will be included as part of the updated Mine Works Programme and an Amendment to the existing Environmental Management Programme (EMP) Report. A Section 102 Amendment will be required to include Block L.

The N 'Komati Anthracite Mine (N'Komati) has an existing mining right (MP30/5/1/2/2/89 MR), which was renewed on 26 January 2022 and is valid for a period of 30 years and allows for both open cast and underground mining.

The Mine is currently abstracting anthracite by means of both underground and opencast mining methods at the Mangweni and Madadeni Operations. Ore is hauled via trucks to the existing Beneficiation Plant, where it is washed and sorted and transported to clients.

Due to the complex geological structuring and availability of the coal seams in the region, the utilisation of opencast mining at the Mangweni Operations is required in conjunction with continued underground mining for the mine to be able to maintain its committed tonnages and the market and as such remain operational.

The focus of the Environmental Impact Assessment is on the development of the proposed ***Mangweni Block L Opencast operations***. Block L will consist of a small opencast pit to be mined for approximately five (5) years. The existing operations are covered by the 2020 EMP which are focussed towards both opencast and underground mining operations as well as the rehabilitation and use of the old opencast operations to the North of the Komati River (North Void) for water storage and abstraction purposes. Slurry and discard are currently be disposed of in the open void areas at the plant.

The development of Block L will trigger the following listed activities for which a Basic Assessment will be required:

- Listing Notice GNR 983 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No 40772 as Government Notice No 327:
    - Activity 27 - The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan;
        - 18 Ha of indigenous vegetation will be cleared for the development of the Block L Open pit.
        - 1.5 Ha of indigenous vegetation will be cleared to realign the existing haul road between the Madadeni Open Pit Operations, Block L and the Beneficiation Plant.

      40 Ha of sugarcane farming area will be affected for the placement of overburden material (not indigenous vegetation).

    - Activity 56 – The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometre (i) where the existing reserve is wider than 13.5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres:"
        - existing haul road will be aligned to the west of the proposed Block L open pit as to allow for continual haulage of mining anthracite from the Madadeni operations

The following EMP documentation is thus amended and superseded:

- 2020 Mangweni EMP (Alta van Dyk Environmental Consultants cc) - Mangweni Mini-Pit BA and Amendment to the Environmental Management Programme Report for the Mangweni Operations and Plant Area.

These activities along with the Section 102 Amendment of the existing EMPs require a Basic Assessment Process.

Table 1-1 Content of the Basic Assessment Report

SCOPE OF ASSESSMENT AND CONTENT OF ENVIRONMENTAL IMPACT ASSESSMENT REPORTSEIA Regulations 2017 - Appendix 3 – Scope of assessment and content of environmental impact assessment reports	**Location in this Report**
(a) details of-	Part A Section 2.1
(i) the EAP who prepared the report; and	
(ii) the expertise of the EAP, including a curriculum vitae;	
(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report including:	Part A Section 3.1
(i) the 21 digit Surveyor General code of each cadastral land parcel;	
(ii) where available, the physical address and farm name;	
(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	Part A Figure 4.1
(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	
(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d) a description of the scope of the proposed activity, including-	Part A Section 4
(i) all listed and specified activities triggered and being applied for; and	
(ii) a description of the associated structures and infrastructure related to the development;	

(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	Part A Section 5
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report.	Part A Section 6
(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report.	Part A Section 6
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:	Part A Section 6
(i) details of the development footprint alternatives considered;	
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	
(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	
(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
(v) the impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	
(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;	
(viii) the possible mitigation measures that could be applied and level of residual risk;	
(ix) if no alternatives, including alternative footprints for the activity were investigated, the motivation for not considering such and	
(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity the associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including -	Part A Section 9, Table 9.2
(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and;	
(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	
(j) an assessment of each identified potentially significant impact and risk, including;	Part A Section 9, Table 9.7
i) cumulative impacts	
ii) the nature, significance and consequences of the impact and risk;	
iii) the extent and duration of the impact and risk	
iv) the probability of the impact and risk occurring	
v) the degree to which the impact and risk can be reversed	
vi) the degree to which the impact and risk may cause irreplaceable loss of resources and;	
vii) the degree to which the impact and risk can be mitigated	
(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 of these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report	Part A Section 9.7
(l) an environmental impact statement which contains-	Part A
i) a summary of the key findings of the environmental impact assessment:	

ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers and;	Section 9.8
iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m) based on the assessment and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMP as well as for inclusion as conditions of authorisation	Part A Section 9.7
(n) the final proposed alternatives which respond to the impact management measures, avoidance and mitigation measures identified through the assessment	Part A Section 9.9
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are not to be included as conditions of authorisation	n/a
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed	Part A Section 9.11
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of the authorisation	Part A Section 9.11
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised	Part A Section 9.11
(s) an undertaking under oath or affirmation by the EAP in relation to -	Part B Section 6
(i) the correctness of the information provided in the report;	
(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	
iii) the inclusion of inputs and recommendations from the specialist reports where relevant	
(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(t) where applicable, details of any financial provision(s) for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts	Part A Section 10.1
(u) an indication of any deviation from the approved scoping report, including the plan of study including-	n/a
i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks and	
ii) a motivation for the deviation	
(v) any specific information that may be required by the competent authority and	Part A Section 10.2
(w) any other matter required in terms of section 24(4)(a) and (b) of the Act.	n/a

PART A

SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

2 CONTACT PERSON AND CORRESPONDENCE ADDRESS

2.1 Details

2.1.1 Details of the EAP

The details of the Environmental Assessment Practitioner is indicated in the Table below.

Table 2-1 Details of the EAP

Contact Person	Company Details	Postal Address	Physical Address	Main Authors
Alta van Dyk Email: alta@avde.co.za	Alta van Dyk Environmental Consultants cc 2011/059764/23 Tel: +27 12 940 9457 Fax: 086 634 3967	Postnet Suite 745 Private Bag X1007 Lyttelton 0140	Stand 3698 4 Garcia Peak Midlands Estate Centurion	Alta van Dyk and Kai Petty

2.1.2 Expertise of the EAP

2.1.2.1 Qualifications of the EAP (with evidence)

Alta van Dyk holds a master's degree in Environmental Management from the University of North-West and has a Master of Law (LLM) International Commercial Law degree from the University of Salford in Manchester. In terms of professional affiliation, Alta is registered with the South African Council for Natural Scientific Professions (SACNASP) in Ecological Science, as well as Environmental Science fields of practice. Alta has been involved as the project manager in various EIAs in terms of the National Environmental Management Act (NEMA) (No 107 of 1998), the National Environmental Management Waste Act (NEMWA) (No 59 of 2008), the National Water Act (NWA) (No 36 of 1998) as well as the Minerals and Petroleum Resources Development Act (MPRDA) (No 28 of 2002) and has a significant understanding of the legislative processes and frequently acts as project manager on several large projects where these different processes are conducted in parallel. Her responsibilities included the overall management of the project, the identification and assessment of environmental impacts and the development of environmental management plans.

Please refer to Annexure A for CV of the EAP and Professional Registration.

2.1.2.2 Summary of the EAPS's past experience (in carrying out the Environmental Impact Assessment Procedure)

Please refer to Annexure A for CV of the EAP and Professional Registration.

3 LOCATION OF THE OVERALL ACTIVITY

3.1 Location of Activity

The locality of the N'Komati Anthracite Mine is indicated in the Table below.

Table 3-1 Location of Overall Activity

Farm Name	Un-surveyed state land under the jurisdiction of Tribal Authorities
Application area (Ha)	19.5 Ha of indigenous vegetation 40 Ha of sugarcane
Magisterial district	Kamhlushwa, Mpumalanga Elanzeni District Municipality Nkomazi Local Municipality
Distance and direction from nearest town	Tonga – 6.5km North Mozambique Border – 10km East Komatipoort – 50km North
21 digit Surveyor General Code for each farm portion	The property does not have a 21 digit Surveyor General Code as it is unsurveyed state land under the jurisdiction of the Tribal Authorities. The outer coordinates of the surface area are provided below.

25º47'36.32"S 31º48'07.11"E	25º47'52.30"S 31º48'21.37"E	
25º47'52.41"S 31º48'07.34"E	25º47'36.31"S 31º48'21.27"E	

3.2 Locality Map

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

Refer to the Figure below for the locality map.

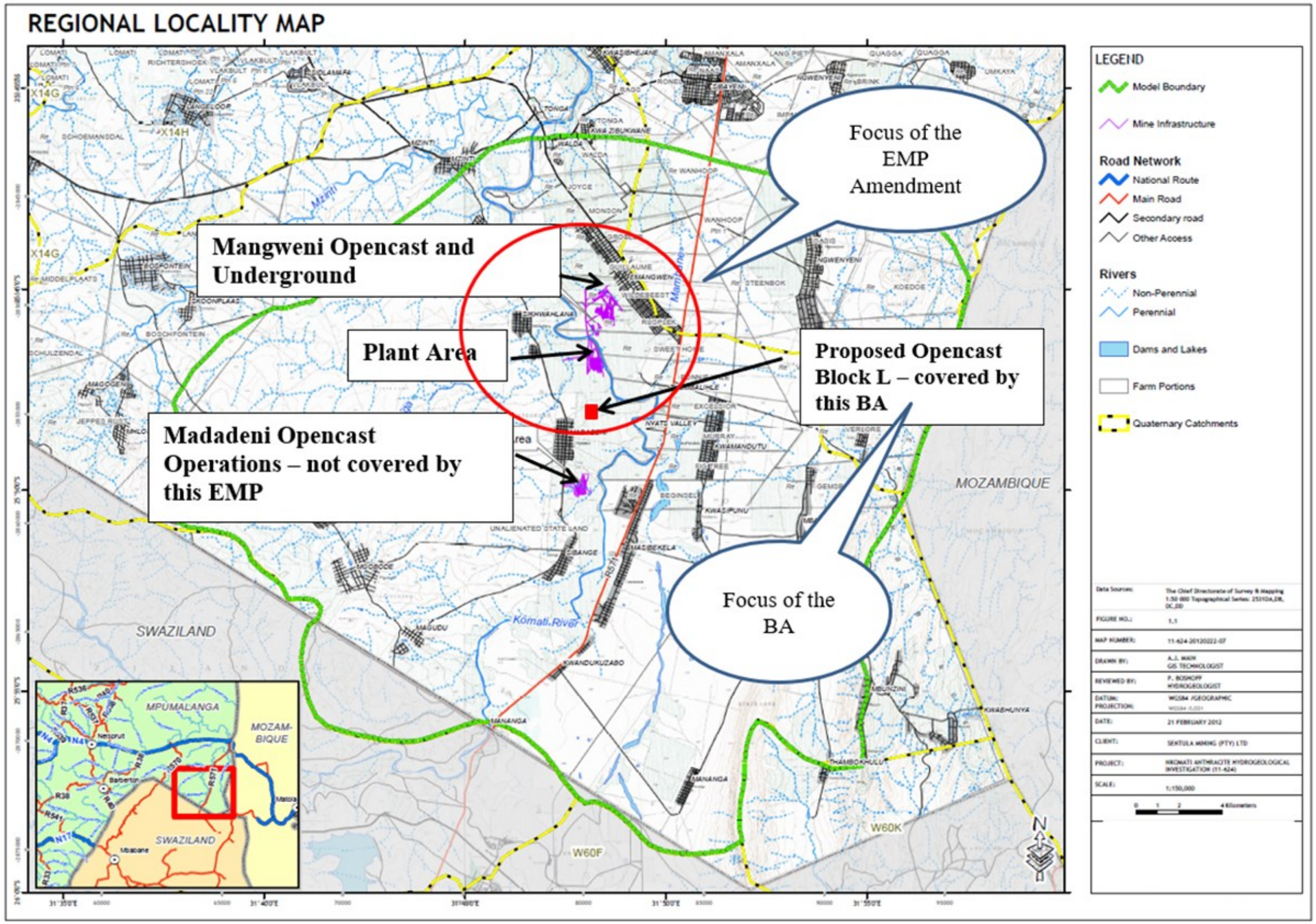

Figure 3-1: Locality Map

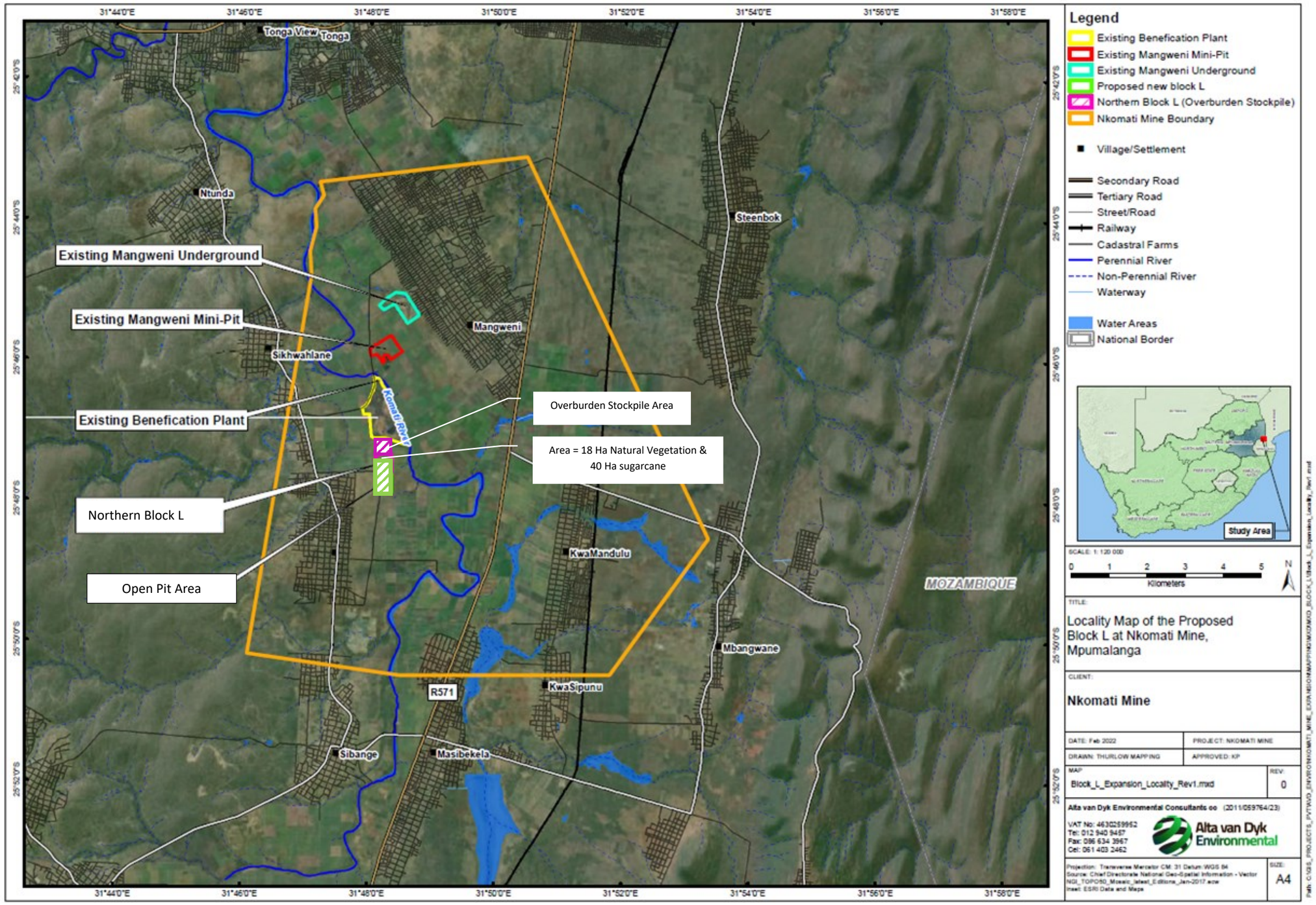

Figure 3-2: 1:60 000 Locality Map Indicating the Position of the Proposed Block L

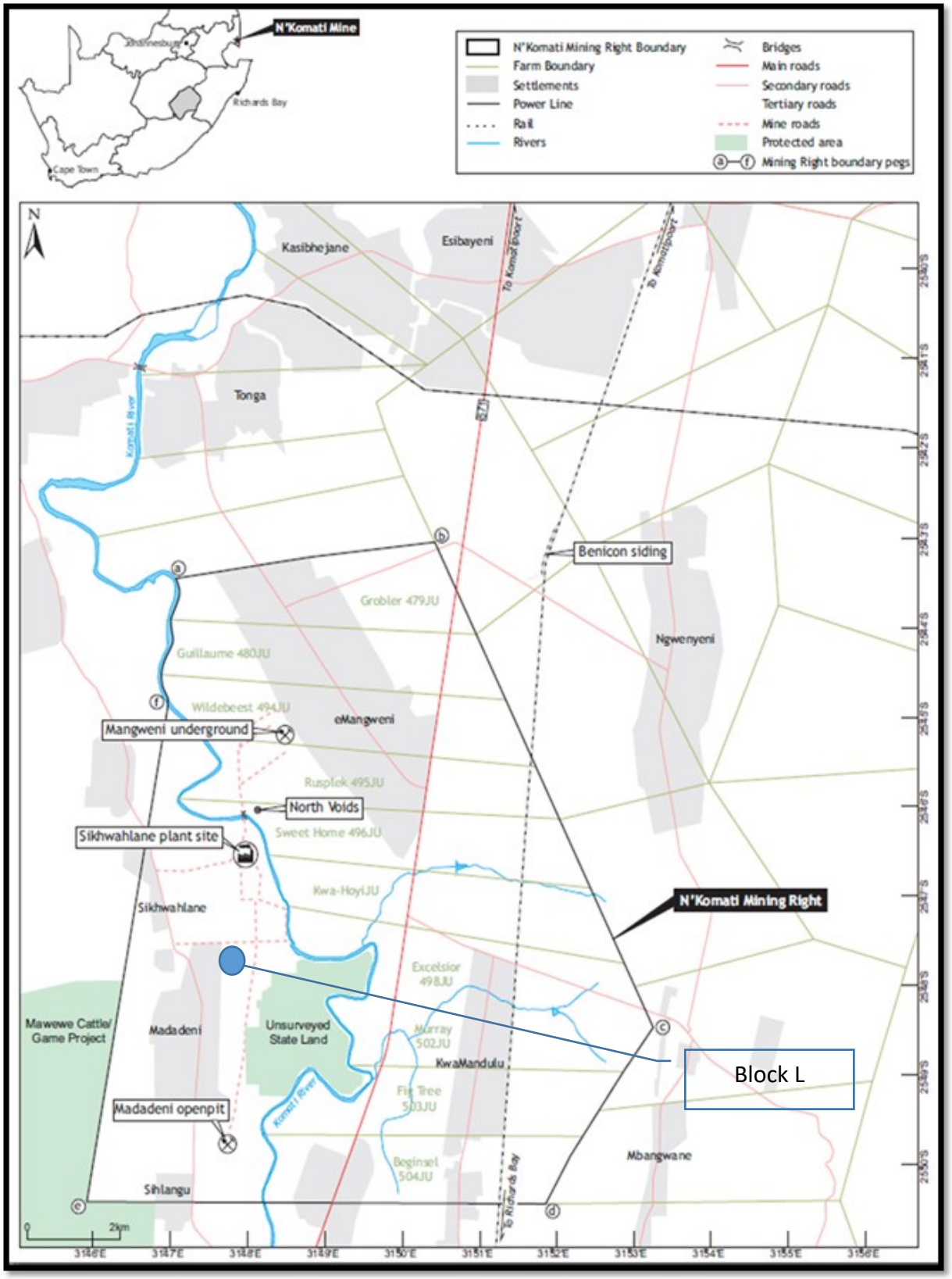

Figure 3-3: N'Komati Mining Right Area (in green) – Regulation 2,2 Map (Block L in Blue)

4 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

(Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site.)

4.1 Existing Mining Operations

The Mine is divided into the following operational areas, namely:

- Mangweni Operations (Underground, Mini-Pit (Included in this EMP)
- Beneficiation Plant (Included into this EMP)
- Madadeni Open Pit and Underground Operations (Separate EMP)

Table 4-1 2020 Mangweni EMP (The EMP Being Amended in This Document)

Properties	Grobler 479 JU; Guillaume 480; Wildebeest 494 JU; Rusplek 495 JU; Sweet Home 496 JU; Bonnie Vale 497 JU; Excelsior 498 JU; Murray 502 JU; Fig Tree 503 JU; Beginsel 504 JU; Unsurveyed State Land
Mineral	Anthracite and anthracite coal
Mining method	**Opencast** – lateral rollover technique; **Underground** – bord and pillar method of mining
Surface infrastructure	***Beneficiation Plant*** Access roads Weigh Bridge Mine offices and change house Workshop Area Laydown Area Run-of-Mine (ROM) stockpiles Crushing plant Washing plant Filter Press Product Stockpiles Eskom electricity supply & Substation Storm water management measures (dams, channels, clean and dirty water separation, and re-use of water for dust suppression) Slurry Settling Facilities Topsoil Stockpiles Mining voids and backfilled areas Overburden Stockpiles Magazine Area Fuel Bunker ***Mining Areas*** Mangweni underground mining area - access via a Box cut Mini-Pit – Open Pit development with supporting stockpiles Historical Mining areas – Void 1 and Void 2, North Void Water supply infrastructure – pump station and pipelines Topsoil and Overburden stockpiles Haul roads Water management facilities – clean and dirty Offices and workshops

The existing operations have the following life of mine:

- Mangweni Underground and Opencast
    - Mangweni underground current resource quantification and approvals allows for 2032;
    - Mangweni opencast mini pit planned to be completed end of 2022/early 2023. This may vary depending on resource and schedule.

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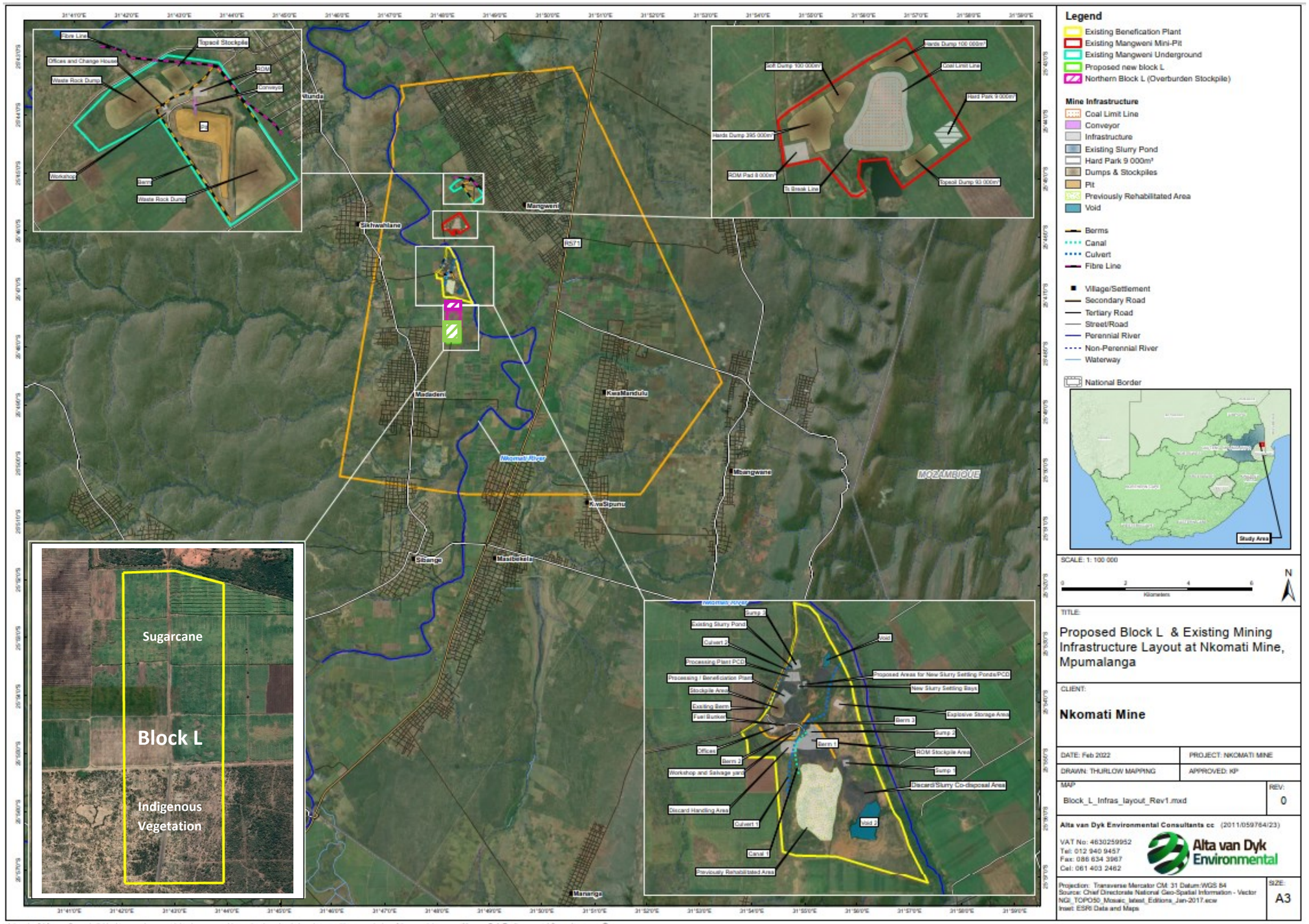

Figure 4-1: N'Komati Anthracite Mine Development Areas

- Processing Plant
    - The processing plant supports not only the Mangweni Operations, but also the Madadeni Operations and the life of the Processing Plant is thus dependant on the life of mining operations;

4.1.1 Mangweni Underground Operations

Underground mining currently takes place at the existing Mangweni Operations through the bord and pillar mining method. Ore is abstracted from underground and transported to the plant for processing. Water that is removed from underground is pumped to the North Void where it is stored and occasionally used as make-up water at the beneficiation plant.

Figure 4-2: Photograph of the Mangweni Operations.

The north void is a previously mined out, opencast section of the mine. The north void is located north-east of the processing plant, on the northern side of the Komati River, southwest of the Mangweni Underground Operations Water from the Mangweni underground workings is pumped to this void, from where it is then used as make-up water for the processing plant. The area is sloped in such a way that contaminated surface water run-off will collect in the void and clean water will disperse into the environment.

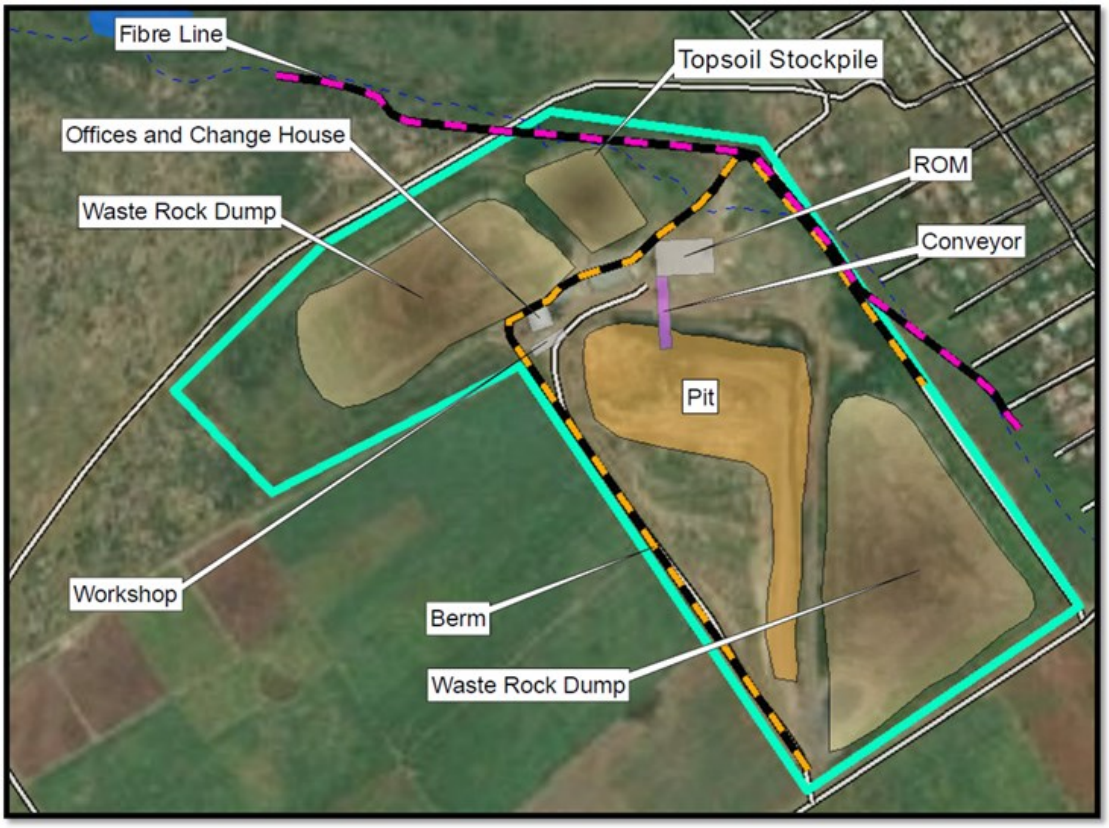

Figure 4-3: Mangweni Underground Section (Thurlow Mapping, 2021)

4.1.1.1 Beneficiation Plant

The processing plant is a dual 120 tons per hour dense medium separation plant with a nameplate output capacity of 90 000 tons per month. Run of Mine (RoM) is transported via trucks on the haul road from Madadeni and Mangweni Operations to the processing plant where it is stockpiled on top of an elevated area. From the elevated area the RoM is fed into the crush and screening plant. Three material streams are produced through the processing plant; namely product, discard, and slurry.

Anthracite is feed via the RoM bin through the primary crusher and screens and into the washing plant. Fines are collected from the de-sliming screen and feed to the spiral plant. The larger size fraction is then pumped to the cyclone plant which separates the product from the discard at a set density.

The product is run through the washing plant where the ore is washed to remove impurities which could lower the value of the anthracite. Magnetite gets recovered and the product is screened into three different sizes and stockpiled separately. The discard material from the first crushing and screening process is washed and screened a second time to ensure that all products have been extracted. The washed anthracite and discard run through the filter press plant where excess water is removed from the product as well as fine materials which could potentially silt up the process water dams. The excess water is pumped into the process water dams to be re-used in processing.

Discard is stockpiled before being used to backfill the voids as per the approved WUL. The fine filtered material (slurry) is removed from the filter with the intent to dry and sell off the slurry for brick making and other industries and community projects. However, currently the offtake does not occur at a quick enough rate which means that slurry is also being used to backfill the voids. Based on water quality monitoring results, the slurry is viewed as inert and doesn't pose a risk of acid mine drainage as anthracite is cleaner than coal and is often used in water filtration, however. The slurry is the same material as discard, which the mine is authorised to backfill with and as such the mine backfills with slurry under the assumption that it is a type of discard, however the approved WUL and EMP require amendment to clearly state this to avoid any confusion and/or ambiguity in interpretation. The

Product is collected by interlink trucks and transported to the clients. A weighbridge is located at the plant to weigh product coal leaving the site.

The plant re-uses its process water and makes use of makeup water from the North Void if required. The mine has recently desilted and relined the two process water dams located at the processing plant. The slurry settling dams are no longer required due to the presence of a filter press and as a result these dams are being emptied to be rehabilitated.

Located to the South of the washing plant are the plant offices, diesel storage/fuelling area; workshops, salvage yard, discard handling area (where discard is stored temporarily before being pushed into the void for backfilling), truck staging area and internal haul road. Block L is proposed to be to further to the South of this area along the haul road.

Figure 4-4: Photograph of Processing Plant

Figure 4-5: Beneficiation Plant (Thurlow Mapping, 2022)

Located to the north-east of the washing plant is an old opencast Void called Void 1. This Void is in the process of being filled as part of the rehabilitation process. The following images show that the Void has been significantly backfilled. The process of continued backfilling and allowing natural vegetation to become established is underway, before determining what (if any) additional measures are required to facilitate the establishment of vegetation. The following images show Void 1 in 2014 versus 2021

Figure 4-6: Void 1

4.1.1.2 Mini Pit

The Mangweni Mini-Pit is an opencast pit located between the North Void and the current Mangweni Underground. It will be operational for a period of between 2 and 3 years commencing in 2020. As with the Mangweni Underground, ore is abstracted and transported to the plant for processing. Water that is removed from the opencast mini pit is pumped to the North Void for storage and occasionally used as make-up water around the plant.

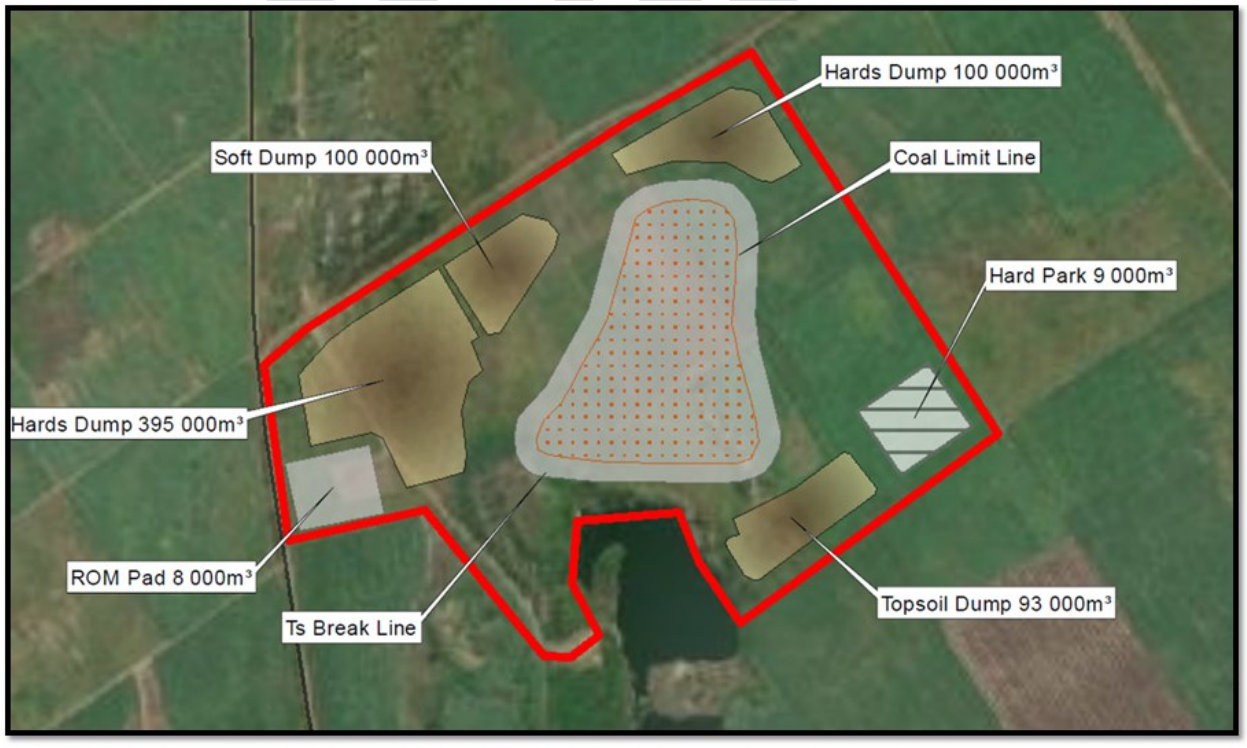

Figure 4-7: Mini Pit Operations (Thurlow Mapping, 2022)

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4.2 Proposed New Mining Activities (This Impact Assessment)

4.2.1 Block L Mining Area

The proposed Block L Opencast Pit is proposed to be established on an area to the south of the existing processing plant along the existing haul road. The proposed Block L Opencast Pit is planned to be operational for a period of 5 years.

As the open pit progresses, a topsoil layer of approx. 300mm will be removed and stockpiled, separate from overburden to facilitate effective rehabilitation. The topsoil stockpile will be minimal as the material will be used in annual rehabilitation.

The coal seam will be removed using drill and blast in combination with mechanised truck and shovel to expose ore. The ore (anthracite) will be hauled to the plant for processing through use of the existing haul road.

The roll over method of mining will be used as far as practically possible to ensure effective use of the area. Due to the location of Block L, it is possible for the area to be extended to the North and South in future should it be desired, however, this will be subject to the necessary approvals. If the pit is extended it will be possible to fully fill the put with overburden, however for only Block L mining, a stockpile outside the open pit will be required. An overburden quantity of approximately 3.3million m^3 will be placed inside the pit to limit the overburden stockpile footprint, whilst approximately 3.7million m^3 of overburden will be stockpiled on the Northern side of Block L on an area current used for sugarcane farming. 35m North and South will be available to allow for future mining development (separate approval process).

4.3 Description of Activities to be Undertaken

Description of the proposed development of the Block L includes the following:

4.3.1.1 Construction Phase:

During the construction phase of the project, the following activities will be undertaken:

- The area for the proposed development of Block L will be earmarked and effectively barricaded as to prevent unlawful entry to the site.
- A security access point will be established at the entrance gate.
- The contractor will undertake site establishment where earth moving equipment will be moved to the proposed site area.
- Stormwater management infrastructure will be constructed as per the Storm Water Management Plan (SWMP) (HEES, 2022)
- Vegetation material as well topsoil will be stripped and stockpiled.
- Overburden will be stripped and stockpiled.

The following infrastructure is expected to be required for the construction and operation of Block L:

- Haul road crossings;
- Stormwater infrastructure (trenches; paddocks);
- Overburden stockpile;
- Pit dewatering infrastructure (pumps, pipes etc.);
- Temporary ablutions.

The following provides a summary the major activities to be undertaken for the proposed Block L opencast pit in terms of Construction Phase.

- Establishment of construction and operational areas;
- Topsoil stripping and handling;
- Overburden management;
- Vehicular movement;
- Human movement;
- Storage and handling of potential pollutants i.e., chemicals, fuels, oils, lubricants, general waste;
- Vegetation clearance;
- Increased disturbance / human activity;
- Operation of machinery and vehicles;
- Placement of infrastructure and lighting;
- Stakeholder management;
- Storm water management;

4.3.1.2 Operational Phase

The following two activities are the main activities that will be undertaken during the Operational Phase of the project.

- Coal will be extracted and transported to approved areas at the existing processing plant;
- Coal will then be processed, stockpiled, and sold.

To mine effectively the following additional activities will be undertaken for the proposed Block L opencast pit supporting the Operational Phase:

- Stockpile management i.e., protection from wind and water erosion;
- Blasting;
- Topsoil handling i.e., protection from water and wind erosion;
- Storm water management;
- Storage and handling of potential pollutants i.e., chemicals, fuels, oils, lubricants, general waste (will be managed at the existing stores located at the beneficiation plant);
- Dewatering i.e., keeping the working face dry;
- Vegetation clearance;
- Increased disturbance / human activity;
- Infrastructure and lighting;
- Expansion of footprint;
- Stakeholder management;
- Concurrent rehabilitation - Backfilling of voids with overburden.

The following maintenance activities will be undertaken during the Operational Phase of the project.

- Maintenance of vehicles and machinery (within the existing workshop located at the beneficiation plant);
- Maintenance to ensure effective barricading;
- Maintenance of storm water infrastructure;
- Maintenance of haul roads.

4.3.1.3 Closure

The following provides a summary the major activities to be undertaken for the proposed Block L opencast pit in terms of Closure Phase.

- Decommissioning and closure of mine and related infrastructure;

- Final Stockpile management;
- Storm water management;
- Storage and handling of potential pollutants i.e. chemicals, fuels, oils, lubricants, general waste;
- Monitoring;
- Disturbance / human activity;
- Remaining infrastructure/lighting;

Table 4-2 Current Services to Nkomati Operations

Process Water	The process water used for the operations at the mine is obtained from the approved process water dams, old mine voids, recycled plant water and water from within the pits. With the focus being on using recycled water, there is no municipal water used in process.
Potable/Domestic Water	Potable water for consumption is brought in from the town whilst water from the licensed boreholes (WUL: 05/X13J/ACGIJ/1864) is used for the change houses and ablutions.
Sanitation	Licensed conservancy tanks have been installed in bunded, fenced off areas located adjacent to the office blocks at the processing plant. These conservancy tanks are used for sewage (toilet) effluent only and are cleaned by an external contractor. Safe disposal certificates are obtained from the contractor. Licensed French drains accommodate the grey water generated at the change houses and from the kitchen areas at both the processing plant and underground workings offices. Chemical toilets are installed at all other parts of the mine i.e., Madadeni Opencast and security areas. These chemical toilets are serviced by an external contractor and cleaned on a regular basis. Safe disposal certificates are obtained from the contractor. Portable chemical toilets will be located at the Block L mining area
Electricity	Electricity is supplied by Eskom. There are several smaller generators around the mine i.e., North Void, Plant Offices and Madadeni opencast which are responsible for providing power on a temporary basis.
Stormwater	Storm water management around the plant has been identified as an area requiring attention and as a result a new storm water management plan was developed by HEES (Pty) Ltd in 2020 and approved on 22/02/2021 (Licence 05/X13J/ACGIJ/1864) in order to work towards rectifying the shortfalls. The proposed mining of Block L will require an update to this stormwater management plan. This has been undertaken by HEES (Pty) Ltd and appended to this report

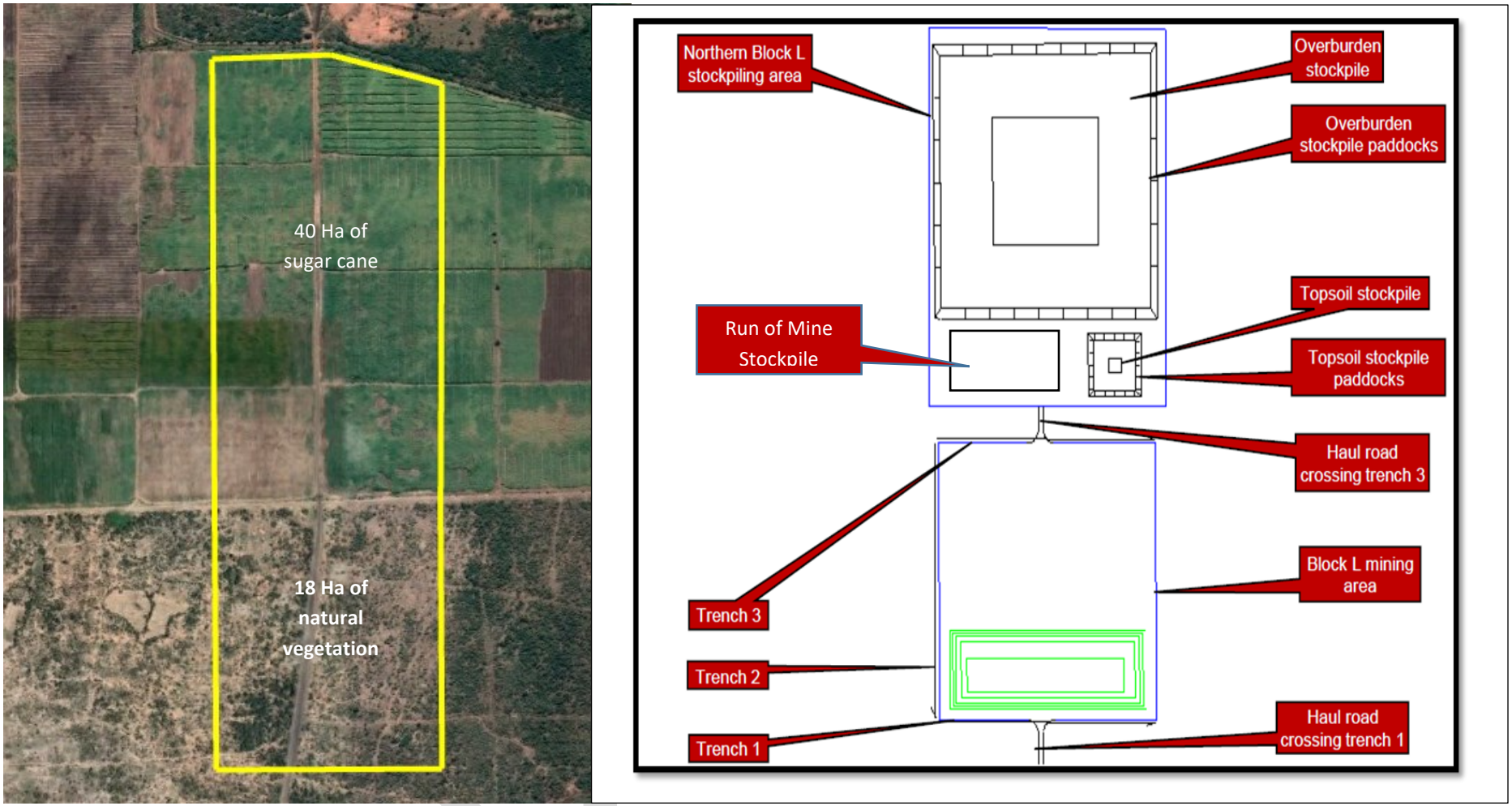

Figure 4-8: Enlarged Block L Section from Figure 3.2.

4.3.1.4 Typical Mine Plan (Pit Area and Stockpile)

The following typical mine plan shows the planned development of Block L, firstly as an overview and then in a year-by-year manner, roughly from year 1 through to year 5.

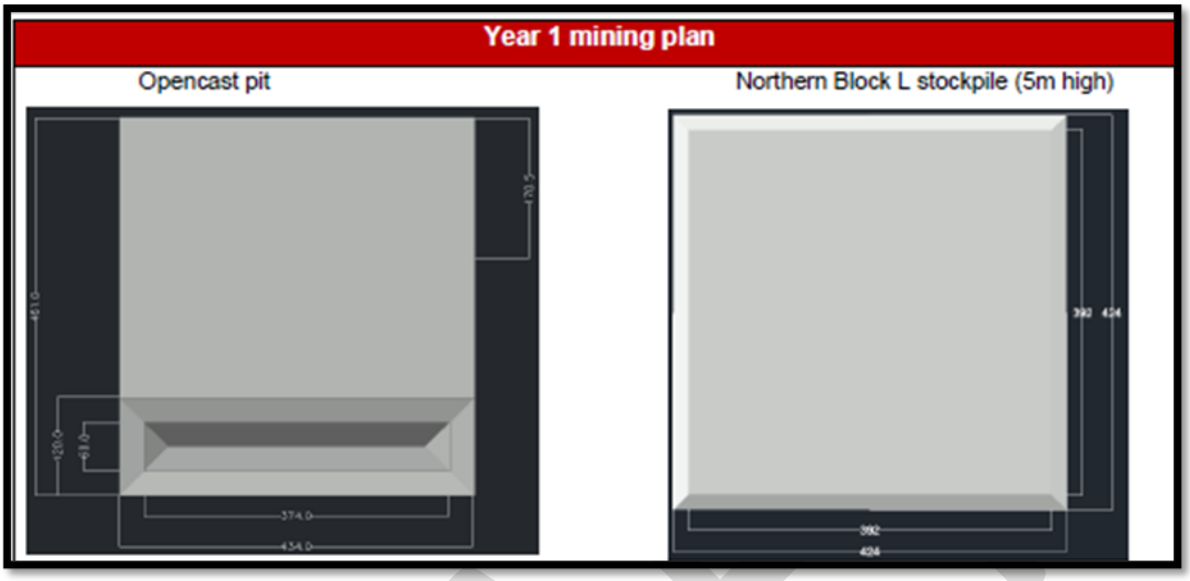

Figure 4-9: Year 1 Mining Plan (HEES, 2022)

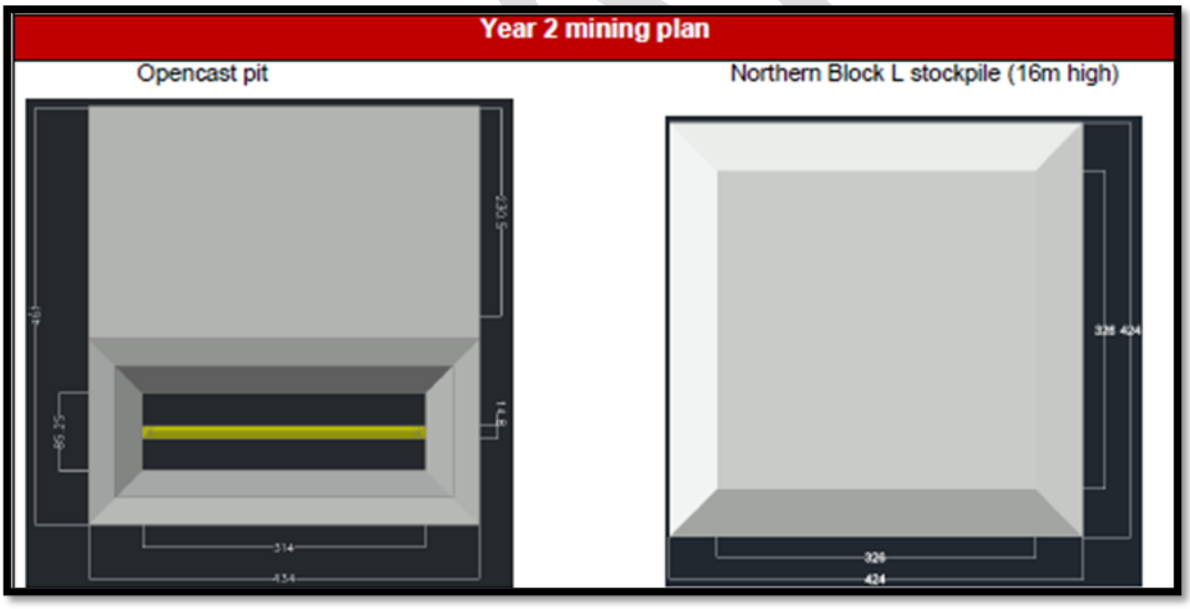

Figure 4-10: Year 2 Mining Plan (HEES, 2022)

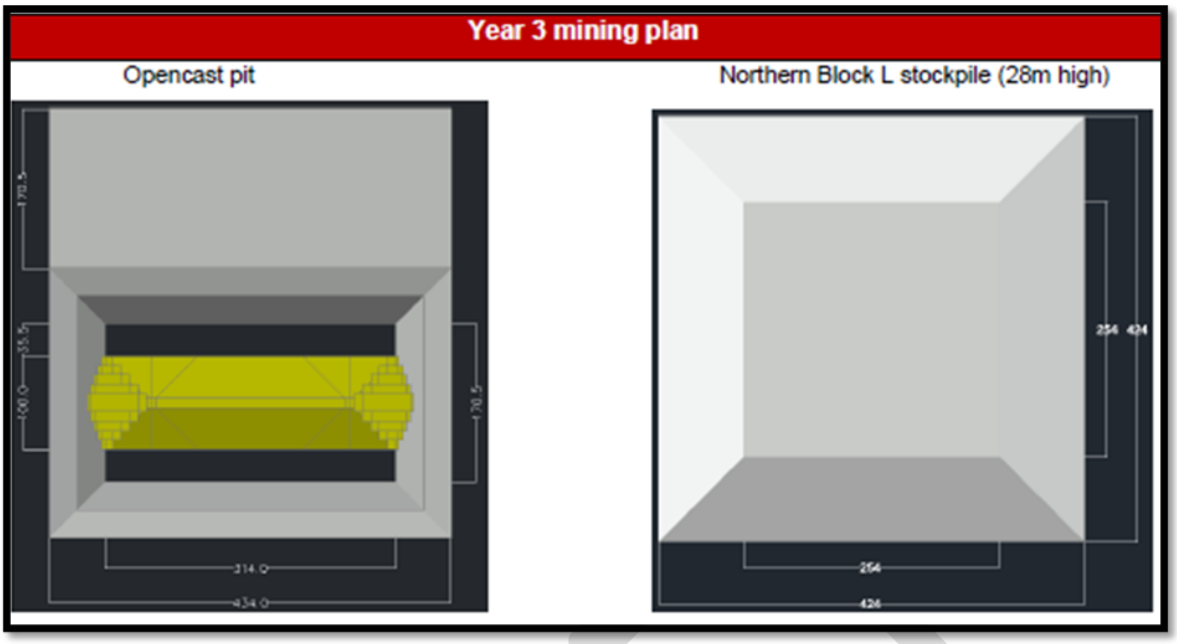

Figure 4-11: Year 3 Mining Plan (HEES, 2022)

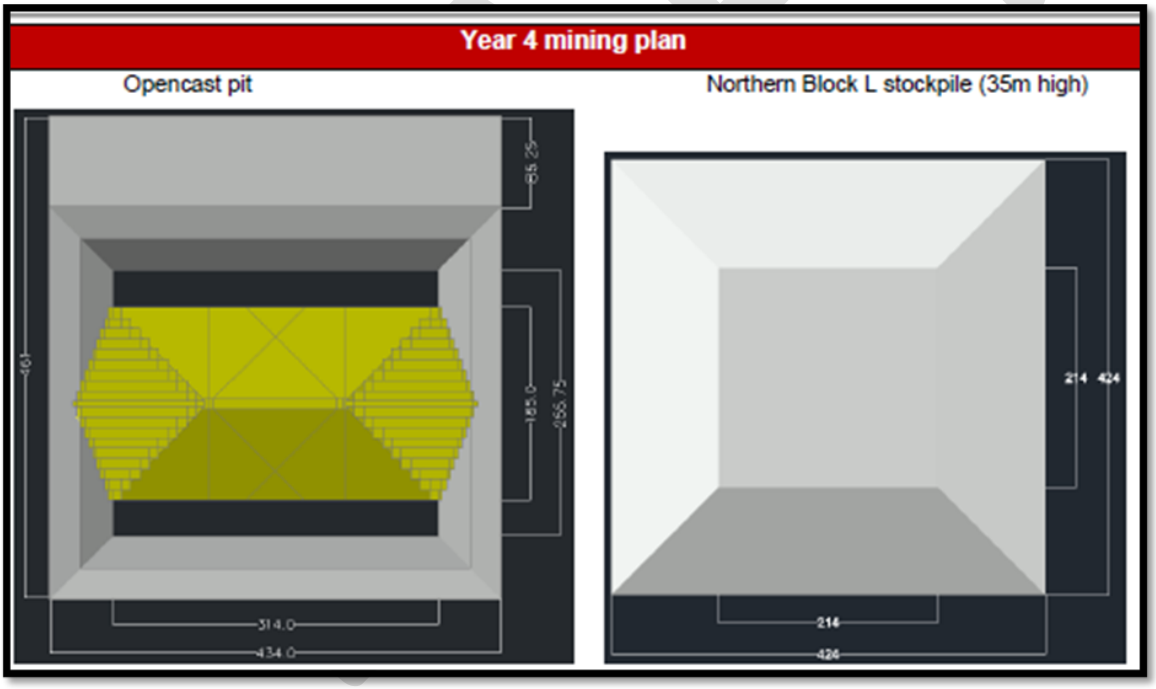

Figure 4-12: Year 4 Mining Plan (HEES, 2022)

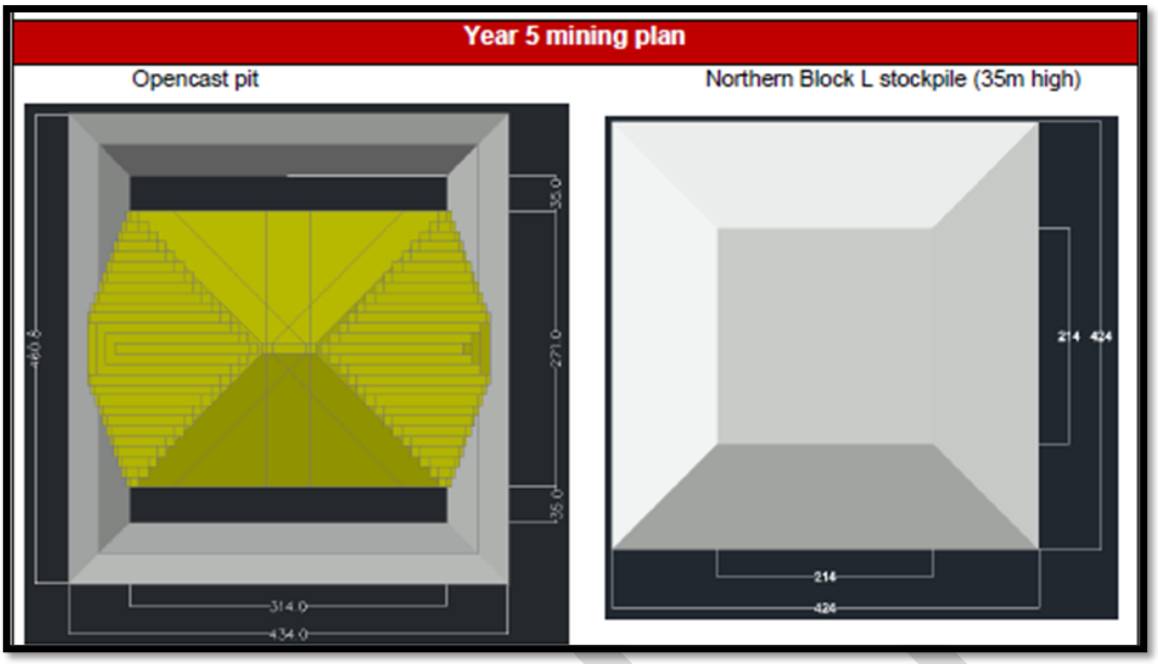

Figure 4-13: Year 5 Mining Plan (HEES, 2022)

5 POLICY AND LEGISLATIVE CONTEXT

5.1 The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)

The Constitution of South Africa compels all to ensure the rights of South African citizens. Section 24 of the constitution provides:

"*Everyone has the right to:*

- *An environment that is not harmful to their health or well-being;*
- *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."*

This right is binding on the state and people, both natural and juristic. Sustainable development is the cornerstone of South Africa's environmental law regime.

In fulfilment of its constitutional mandate to take reasonable legislative measures that give effect to section 24 of the Constitution, the government has promulgated several environmental laws since 1994. These laws provide a legal framework that embodies internationally recognised legal principles. The principal act governing activities that affect the environment is the National Environmental Management Act, No 107 of 1998 (NEMA).

5.2 Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)

The fundamental principles of the Act are:

- Mineral resources are non-renewable;
- Mineral resources belong to the nation and the State is the custodian;
- Protection of the environment for present and future generations to ensure sustainable development of the resources by promoting economic and social development;
- To give effect to section 24 of the Constitution by ensuring that the nation's mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development;
- The need to promote local and rural development of communities affected by mining;
- Reformation of the industry to bring about equitable access to the resources and eradicating discriminatory practices; and
- Guaranteeing security of tenure.

Section 22(4) of the MPRDA states the following:

"If the Regional Manager accepts the application, the Regional Manager must, within 14 days from the date of acceptance, notify the Applicant in writing –

(a) To conduct an Environmental Impact Assessment and submit and Environmental Management Programme for approval in terms of Section 39, and

(b) To notify and consult with Interested and Affected Parties within 180 days from the date of notice."

Section 39 of the MPRDA states the following:

"(1) Every person who has applied for a mining right in terms of Section 22 must conduct an environmental impact assessment and submit an Environmental Management Programme within 180 days of the date on which he/she is notified by the Regional Manager to do so."

Section 102 of the MPRDA provides for the Amendments of rights, permits, programmes, and plans and states the following:

"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."

5.3 The National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)

The National Environmental Management Act (NEMA) gives effect to the rights contained under section 24 of the constitution which states that "*everyone has the right to an environment that is not harmful to their health or well-being" and "to have the environment protected, for the benefit of present and future generations*".

The NEMA provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment. These principles include that development must be socially, environmentally, and economically sustainable.

NEMA sets out:

- The fundamental principles that need to be incorporated in the environmental decision-making process.
- The principles that is necessary to achieve sustainable development.
- Provides for duty of care to prevent, control and rehabilitate the effect of significant pollution and environmental degradation.
- It allows for the prosecution of environmental crimes.

In terms of section 24(5) read with section 44 of the Act, Environmental Impact Assessment Regulations have been published that provide a list of activities that may require either a Basic Assessment (BA) or a full Scoping and Environmental Impact Assessment (EIA) process to be followed and an EA to be obtained prior to their commencement. The Department of Mineral Resources (DMR) will be the competent authority in the application process.

- Government Notice No. 983 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 327 - Listing Notice 1;
- Government Notice No. 984 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 325 – Listing Notice 2; and
- Government Notice No. 985 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 324 – Listing Notice 3.

5.3.1 Listed and Specified Activities

The National Environmental Management Act (NEMA) gives effect to the rights contained under section 24 of the constitution which states that "*everyone has the right to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations*".

NEMA provides for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment. These principles include that development must be socially, environmentally, and economically sustainable. NEMA sets out:

- The fundamental principles that need to be incorporated in the environmental decision making process.
- The principles that is necessary to achieve sustainable development.
- Provides for duty of care to prevent, control, and rehabilitate the effect of significant pollution and environmental degradation.
- It allows for the prosecution of environmental crimes.

In terms of the section 24(5) read with section 44 of the Act, Environmental Impact Assessment Regulations have been published to provide a list of activities that require authorisation before they may be commenced with. The process of obtaining such an authorisation may require either a Basic Assessment (BA) or a full Scoping and Environmental Impact Assessment (EIA) process to be followed. These listed activities are contained within the following:

- Government Notice No. 983 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 327 - Listing Notice 1;
- Government Notice No. 984 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 325 – Listing Notice 2; and
- Government Notice No. 985 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 324 – Listing Notice 3;

The following listed activities are being triggered by the proposed Mangweni Mini-pit and EMP Amendment. Please note that activities contained within Listing Notice 1 require a Basic Assessment Process to be followed.

Table 5-1 List of Activities

Name of Activity	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY Mark with an X where applicable or affected.	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546)
Vegetation clearance to Block L. Please note that whilst the Block L area is approximately 60 Ha, there is a significant portion of the site which consists of the existing haul road that has already been cleared and thus the activity of clearing of indigenous vegetation will only impact 19.5 Ha	18 Ha indigenous vegetation clearance 40 Ha sugarcane	***Activity 27.*** The clearance of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where the clearance of indigenous vegetation is required for – (i) the undertaking of a linear activity, or (ii) maintenance purposes undertaken in accordance with a maintenance management plan. (18ha of Natural vegetation will be impacted, and 40 ha of sugar cane)	Government Notice No. 983 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 327 - Listing Notice 1
The existing haul road passes through the Block L site and will need to be adjusted to facilitate haulage to the processing plant.	1.5ha	***Activity 56 –*** The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometre (i) where the existing reserve is wider than 13.5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres: (existing haul road will be aligned to the west of the proposed Block L open pit as to allow for continual haulage of mining anthracite from the Madadeni operations)	Government Notice No. 983 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 327 - Listing Notice 1.
A Part 2 Section 102 Amendment is being applied for to amend the existing 2020 EMP to include opencast mining in an area to the South of the existing processing plant. Section 31 of GNR 326 of NEMA states that, *"An environmental authorisation may be amended by following the process prescribed in this Part of the amendment will result in a change of scope of a valid environmental authorisation where such change will result in an increased level or change in the nature of impact where such level or change in nature of impact was not (a) assessed and included in the initial application for environmental authorisation."* The establishment of an opencast pit at Block L was not assessed in the original application and will result in different impacts to those arising from the current land use at Block L. The need for a Part 2 Amendment and associated Basic Assessment Process arises out of the need for potential new impacts to be assessed and included into the EMP for their effective management and/or mitigation.			

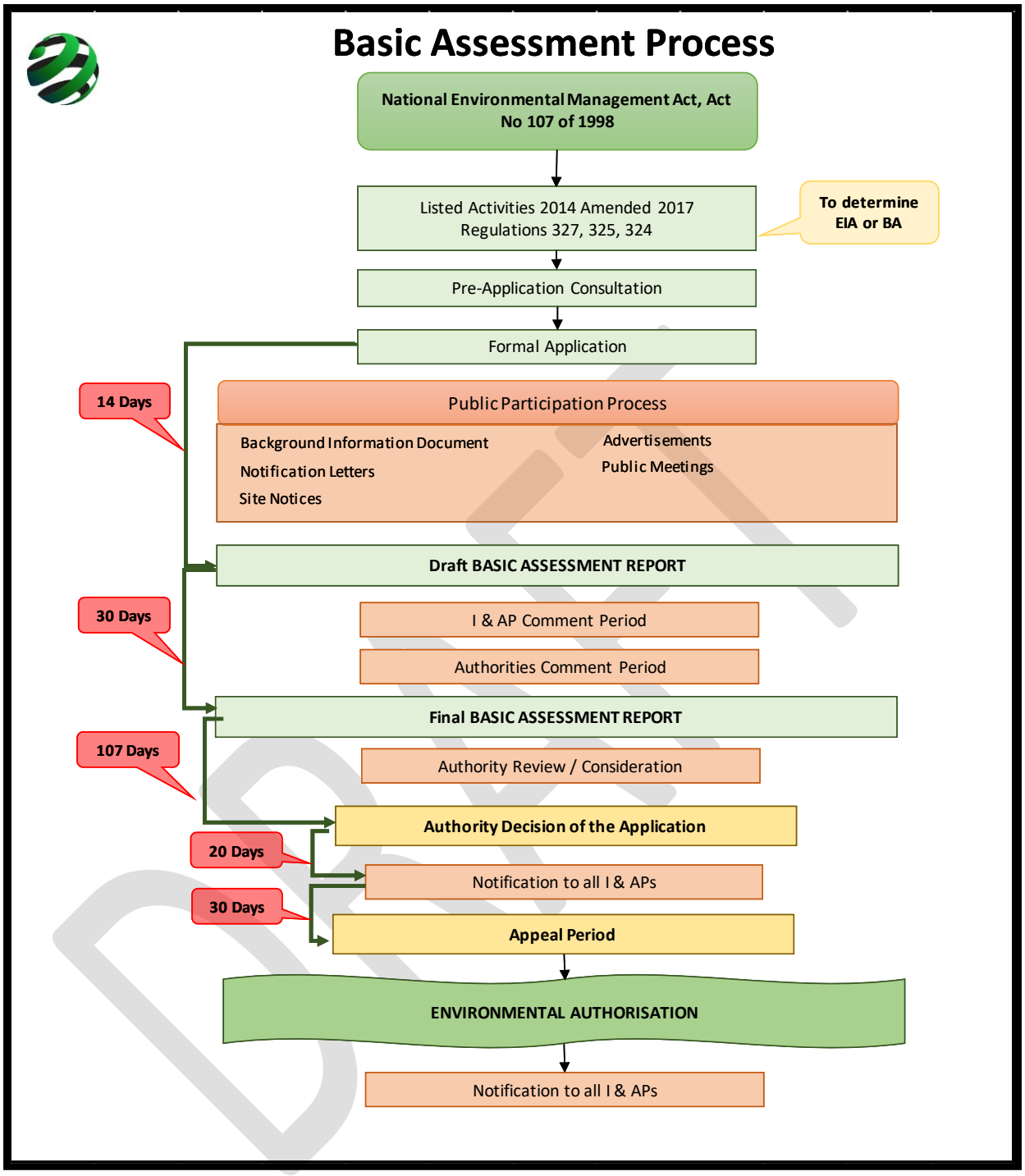

Figure 5-1: Basic Assessment Process

5.4 The National Water Act, 1998 (Act 36 of 1998) (NWA)

The purpose of the National Water Act (Act 36 of 1998) (NWA) is to ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled. Use of water for mining and related activities is also regulated through regulations that were updated after the promulgation of the NWA (Government Notice No. GN704 dated 4 June 1999). Sections 40 and 42 of NWA provides for the responsible authority to request public participation and an assessment of the likely effect of the proposed license the protection, use, development, conservation, management, and control of the water resource.

The following chapters of the NWA are of particular importance:

- Chapter 3, Part 4 states that anyone who owns, occupies, controls, or uses land is deemed responsible for taking measures to prevent pollution of water resources;
- Chapter 4 deals with water use regulation;
- Chapter 12 deals with water management in terms of dam safety;
- Section 19 deals with water management at mines in terms of pollution prevention and control;
- Section 21 defines the water uses requiring authorisation;
- Section 26 (1) provides for the development of regulations requiring monitoring, measurement and recording as well as the effects to be achieved through management practices prior to discharge or disposal.

Section 21 of the NWA defines 11 consumptive and non-consumptive water uses:

- **21(a): Taking water from a water resource;**
    - Pit dewatering and re-use
- 21(b): Storing water;
- **21(c): Impeding or diverting the flow of water in a watercourse;**
    - Mining activities with 100m from a watercourse and within 500m of a delineated wetland area
- 21(d): Engaging in a stream flow reduction activity;
- 21(e): Engaging in a controlled activity;
- 21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit;
- 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource;
- 21(h): Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process;
- **21(i): Altering the bed, banks, course or characteristics of a watercourse;**
    - Mining activities with 100m from a watercourse and within 500m of a delineated wetland area
- **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; and**
    - Pit dewatering and re-use
- 21(k): Using water for recreational purposes.

5.5 The Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (NEMBA) serves to provide a framework for the management and conservation of South African biodiversity, under the auspices of the NEMA. This legislation promotes the sustainable use of natural biological resources, ensuring equitable access and sharing of benefits arising from the use of biological resources. In terms of Section 56(1) of NEMBA a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7. These threatened and protected species have been listed in terms of GNR.151 of 2007: Publication of lists of critically endangered, endangered, vulnerable, and protected species.

Should a project result in the loss of biodiversity identified in terms of GN 151 of 2010, a permit application will need to be submitted to the Provincial Department of Environment and Nature Conservation for approval, before proceeding with the activity.

Table 5-2 Policy and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLIY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.
Minerals and Petroleum Resources Development Act(MPRDA), 2002 (Act 28 of 2002)	A Section 102 Amendment is being undertaken in terms of Section 22(4) and Section 39 of the MPRDA	A Basic Assessment Report (BAR) and an Environmental Management Programme Report (EMPr) Amendment have been undertaken. This is the BAR and EMP. This EMP has been written to supersede the previous 2020 AVDE Mangweni EMP.
National Water Act, 1998 (Act 36 of 1998)	Section 21 activities which require a Water Use Licence have been applied for.	Section 21(a), (c), (i) and (j) – pit dewatering and location in relation to wetlands
The National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) NEMA EIA Regulations 2017	Listing Notice 1: Activity 27 and 56	A Basic Assessment Process is being undertaken to obtain approval to clear vegetation for opencast mining.

6 NEED AND DESIRABILITIY OF THE PROPOSED ACTIVITIES

6.1 Motivation for the Overall Preferred Site, Activities and Technology Alternative

The proposed activities are required to ensure that N'Komati Anthracite Mine can access the required volumes of anthracite and maintain a steady feed to the beneficiation plant to meet current contractual demands.

This will be achieved by accessing the available anthracite resource in Block L to be able to keep the Mine open. The complex geology at the existing Mangweni Operations poses a challenge to extraction volumes and thus the establishment of the Block L opencast pit is required to supplement the RoM from the Mangweni Operations. The proposed activities will ensure that the Mine can abstract the required volumes of anthracite required to remain open and provide continued employment in the area.

6.1.1 Preferred Site

The proposed site has been selected based on an assessment of the social, economic, and environmental impacts. The below table provides the details thereof.

Table 6-1 Motivation for Preferred Site

Environmental	Social	Economic/Mining
Block L Opencast		
To have the least impact and cause the smallest possible disturbance to the environment, the mine has decided to continue with the Mangweni Operations in conjunction with the Block L Opencast. The alternative of closing the Mangweni Underground and switching solely to opencast will mean that the opencast area will need to be considerably larger to meet the required volumes of anthracite.	The mine requires a certain tonnage of anthracite to be mined monthly in order to keep the mine operational. The continued mining operations will ensure the continued employment of existing employees within an area of high unemployment.	The mine requires a certain tonnage of anthracite to be mined monthly in order to remain profitable and open. Continued underground mining at Mangweni in combination with the Mangweni Mini-pit will assist the mine in reaching the required tonnage needed to remain open. The Block L development will allow for the required capital to develop a larger portion of the mine in the future
As per the Mpumalanga Biodiversity Conservation Plan (C-Plan), the area is identified as an area of "least concern". This means that the area is not of conservation concern and does not contain species which are viewed as threatened or near threatened. The land in the mining right area has been transformed by mining, illegal dumping by surrounding communities, extensive grazing, and sugar cane farming. Allowing for the implementation of continual mining through the roll-over method of mining will reduce the potential environmental impacts and allow for closure.	Employees come from (as far as possible) within surrounding communities. These employees are responsible for supporting their families as there is very few other employment opportunities. Block L will mean continued employment opportunities for current employed work force on the mine.	The availability of the anthracite seams in the area have been established and there are enough resources within the proposed area to be able to support the mine financially.

Environmental	Social	Economic/Mining
Block L Opencast		
The proposed location of the Block L Opencast is next to the existing haul road which runs past the proposed Block L Opencast to the existing processing plant. This means that ore extracted from Block L will be trucked to the existing Processing Plant as is current practise with the existing Operations. Planned disturbance for Block L has been planned to reduce overall footprint.	The mine has a SLP and is involved in the upliftment of the surrounding communities. There are several different communities in the area, who are employed at different sections of the mine as the different areas impact different communities.	The proposed location of the Block L Opencast is next to the existing haul road which runs past the proposed Block L Opencast to the existing processing plant. This means that ore extracted from Block L will be trucked to the Processing Plant as is current practise with the existing Operations. Additional disturbances are minimal.

6.1.2 Preferred Layout

The following provides a summary of the advantages and disadvantages of the proposed site/layout and the alternative site/layout.

Advantages

- Within approved mining right area;
- Resource has already been quantified;
- Can ensure on-going mining and keep N'Komati Anthracite Mine operational;
- Minimal environmental impacts as the area have already been disturbed/impacted by both mining and local farming;
- Low faunal and floral diversity as the area is within the mining right area and has already been impacted;
- Will maintain current direct employment.
- With the implementation of the roll-over method of mining, concurrent rehabilitation will be implanted allowing the area to be returned to its natural pre-mining state as far as possible.

Disadvantages

- Hydrogeological study indicates that pit dewatering will be required;
- Life of mine is planned to be in the order of 5 years;
- Increased noise and dust impact that will require management such as dust suppression;
- Potential long term impacts on water quality i.e., post closure;
- Potential impacts on soil i.e., should sound roll-over and rehabilitation not be achieved in accordance to the mine plan;
- Visual impacts i.e., height of overburden stockpiles, night lighting etc).

6.1.3 Preferred Activity and Technology

The Mine has investigated the possibility of continuing the Mangweni Operations in its current guise, however, the complex geology of the area has proven to be an obstacle to this option as the Mine cannot provide the volumes of anthracite required to the plant for the operations to be financially sustainable as it currently is. Due to the complex geology of the area, the current mining yields are not always predictable. To supplement these underground operations, the Mine intends to establish an opencast pit within the mining right area to access additional anthracite.

N'Komati Anthracite Mine requires the continuation of the existing operations in conjunction with the establishment of Block L to ensure that the mine can reach the required volume of anthracite to allow the mine to continue to operate.

The Mine has an existing opencast operation within a different mining area called the Madadeni Operations which are located approximately 7.5km South of the current Mangweni Operations. The Mine thus has the expertise and equipment required to undertake the Block L opencast pit and plan to make use of the available technology in

order to undertake the preferred activity. Should additional machinery and staff be required, the existing recruitment and acquisition procedures will be followed.

6.2 Full Description of the Process Followed to Reach the Proposed Preferred Alternatives within the Site

6.2.1 Details of the Development Footprint Alternatives Considered

6.2.1.1 The property on which or location where it is proposed to undertake the activity

The property for the preferred location has been selected because it is located within the existing mining right area on a portion of un-surveyed state land under the jurisdiction of a Tribal Authority with whom N'Komati Anthracite Mine has an agreement in place regarding occupancy of the land.

The preferred location has also been influenced by the availability of quantified anthracite within the mining area, the shallowness of the anthracite seam as well as the location of the site in relation to the beneficiation plant and existing mining operations. The proposed location will allow the mine to continue with the existing operations in conjunction with the establishment of the Block L Opencast, which is next to the existing haul road allowing for existing trucking and dust suppression routes to continue and be increased if required.

6.2.1.2 The type of activity to be undertaken

The activities to be undertaken will be the establishment of an opencast mine (called the Block L Opencast Pit) for a period 5 years on the mining right area to supplement yield from the existing operations. These operations will make use of the roll over mining method.

Future mining will allow for the development of the mine from the Block L area both in a northern and southern direction. This mine development is currently in a planning phase and will follow a separate environmental approval process.

Due to geological instability, underground mining seems to be proven unsuitable for the area.

6.2.1.3 The design or layout of the activity

The proposed design/layout has been developed considering the least environmental impact as it relates to the clearance of indigenous vegetation. As such only 19,5 Ha of indigenous vegetation will be cleared while the remainder of the activity is planned on current sugarcane cultivated areas.

6.2.1.4 The technology to be used in the activity

The Mine has existing opencast operations at Madadeni to the South and is establishing an opencast mini pit at Mangweni to the North. The new Block L Pit will mine using the same technology and machinery as are used in the existing opencast operations. This is due to the workforce already being equipped with the knowledge and skills required to mine in this manner. Anthracite abstracted from Block L will be trucked along the existing haul road to the existing processing plant where it will be processed in the existing manner before being sold.

The existing operations are currently mined using a standard Drill and Blast operation cleaning with Excavators and Dump Trucks. This way of operating will be carried through into Block L.

A full fleet of diesel driven equipment will be utilised. There is currently no power supply to the site. Equipment planned for use includes the following:

- Excavators;
- 40t Articulated Dump (ADT) Trucks;
- D9 Dozers;
- Water Browser;
- Diesel Browser;

- TLB;
- Grader;
- Primary Drill Rig;
- Secondary Drill Rig;
- LDV;
- Lighting Plant;
- Generator.

Haulage to the processing plant includes the following equipment:

- 34t Truck and Horse Side tipper super link
- Front End Loader (FEL)
- Or alternatively could be done with suitable mining trucks direct from pit.

Road maintenance, dust suppression and grading are undertaken by a water browser and a grader.

The alternative of using different technology was investigated but was not seen as feasible. Using different technology would mean that the workforce available in the area would not have the skills required to perform the task. Due to the 5 year planned life of the pit, there would not be time to train locals in the new technology and then give them employment for a significant enough period of time for it to be worthwhile. This would result in outside labour being used which is not desirable for the surrounding communities or the Mine who aims to create employment opportunities for local people. The preferred option of using current technology that local labour is familiar with is thus seen as the best option.

During operation, the mine will continue to investigate new and emerging technologies for improved safety and efficiency and will train employees in this new technology where applicable.

6.2.1.5 The operational aspects of the activity

N'Komati Anthracite Mine is an operational mine consisting of Madadeni and Mangweni Mining Areas, along with an operational processing plant. The Processing Plant and Mangweni Mining Area are covered by the same EMP. To accommodate the proposed Block L mining area, the existing EMP is being amended (AVDE, 2020).

The application is for an open cast mining process in which: the topsoil is firstly removed and stockpiled for use during rehabilitation. Secondly, as much soft overburden material as possible is removed without the use of blasting techniques. This material is stockpiled separately from the topsoil and hard overburden. Lastly, the hard overburden is drilled, blasted, and excavated, and stockpiled for rolled over, until the top of the anthracite is reached.

Anthracite mined at Block L will then be transported by an existing internal haul road to the existing processing plant. Raw product is processed at the plant, sorted, and sold.

Fissure water and rainwater that collects within the pit will be re-used for dust suppression and at the operations. Excess pit water will be pumped into the Void 2, from where it can be re-used as make-up water as needed.

The above operational description is seen as the most effective way of operating as the existing workforce are familiar with this manner of operation and it makes use of existing infrastructure and facilities to cause the least possible environmental disturbance.

The option of implementing different operational aspects has been investigated, but since the workforce are familiar with the existing operational aspects, a decision was taken to utilise the existing manner of operation as far as possible. This will mean that the existing workforce will remain employed as far as possible, and that mining of the Block L Opencast can commence as soon as authorisation is granted.

6.2.1.6 The option of not implementing the activity

The purpose of implementing the activity is to enable N'Komati Anthracite Mine to access the remaining anthracite within the existing mining right area to supplement the existing Mangweni and Madadeni Operations through the establishment of the Block L Opencast Pit. By not implementing the activity, the Mine will not be able to reach the required amount of anthracite required to keep the mine open.

The Mine currently has supply agreements in place and is required to achieve these volumes for the agreements to remain valid. Without the ability to honour the existing agreements in terms of production volumes, the Mine will not be able to remain operational. The no-go option will require a re-evaluation of the business structure and may result in closure of the Mine.

7 PUBLIC PARTICIPATION PROCESS

An extensive public participation process will be undertaken in support of this application, inclusive of site notices, newspaper advertisement, background information document, notification letter, public meeting(s) and the placement of draft documents in the public domain for review and comment.

A summary of the process to be followed is listed below and will be documented for submission with the Final Basic Assessment Report:

Table 7-1 Public Participation Process

Site Notices	• Site notices will be placed at clearly visible areas along the main road, mine access road, mine notice board and prominent places within surrounding towns. Proof of placement will be included in the Stakeholder Engagement Report as an Annexure to the Final Basic Assessment Report • The site notices provide information on the project, locality and layout maps, and details on how to register as an Interested and Affected Party.
Newspaper Advertisement	• A newspaper advertisement will be placed in a suitable local newspaper. • The newspaper advertisement contains a brief introduction to the project, the locality of documents in the public domain, details of public participation process and a request to register as an Interested and Affected Party.
Background Information Document	• A Background Information Document (BID) will be provided to Interested and Affected Parties and Stakeholders. • The BID includes an introduction to the project, information on the proposed activities, details of the process to be followed, details of the public participation process and an invitation to register as an Interested and Affected Party. • The BID will be provided to the Nkomati Mining Forum (who are responsible for distribution within the community); Registered Interested and Affected Parties and individuals/organisations on the existing Stakeholder Database.
Notification Letter	• Notification letters will be provided to Interested and Affected Parties and Stakeholders. • The notification letter will include a brief introduction to the project, details of the public participation process and an invitation to register as an Interested and Affected Party.
Public Meeting	• The following Public Meetings have been scheduled: o Meeting 1 – Tribal Authority o Meeting 2 – Headman o Meeting 3 – Sugarcane Farmers o Heading 4 – Bordering Communities
Placement of Draft Documents	• The Draft Basic Assessment will be placed in the public domain for 30 calendar days. • The draft documentation will be placed at the following locations: o N'Komati Anthracite Mine Security Office, Mpumalanga; o Offices of Alta van Dyk Environmental Consultants, 4 Garcia Peak, Midlands Estate, Centurion, Gauteng; o Malelane Public Library, Park Street, Malelane, Mpumalanga; o Website: www.altavandykenvironmental.co.za

Any issues, comments or concerns raised by Interested and Affected Parties during the consultation period will be recorded in the below table and submitted to the Department of Mineral Resources.

Table 7-2 Summary of Issued Raised by I&APs

Interested and Affected Parties	Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES				
Landowner/s				
Lawful occupier/s of the land	To be completed and submitted with Final Basic Assessment Report.			
Surrounding communities, landowners or lawful occupiers on adjacent properties				
Tribal Authorities		To be completed and submitted with Final Basic Assessment Report.		
Municipal councillor	To be completed and submitted with Final Basic Assessment Report.			
Municipality				
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA e				
Department of Water and Sanitation (DWS), Nelspruit		To be completed and submitted with Final Basic Assessment Report.		
Inkomati-Usuthu Catchment Management Agency (IUCMA)				
Department of Economic Development, Environment and Tourism (DEDET)				
Communities				
Nkomati Mining Forum		To be completed and submitted with Final Basic Assessment Report.		
Dept. Land Affairs	To be completed and submitted with Final Basic Assessment Report.			
OTHER AFFECTED PARTIES	To be completed and submitted with Final Basic Assessment Report.			

8 ENVIRONMENTAL ATTRIBUTES / ENVIRONMENTAL STATUS QUO

8.1 Topography

The general landscape in the proposed mining area is relatively flat. The Block L development lies slightly to the east of a southwest / northeast striking topographical high and as such the topography at Block L slopes gently towards the Komati River. Elevation on site is highest west of Block L at around 265 mamsl and lowest along the Komati River at around 240 mamsl. There is an elevation difference of 25 m between the highest and lowest topographic points over the site. The average topographical gradient is calculated to range between 1:45 to 1:55.

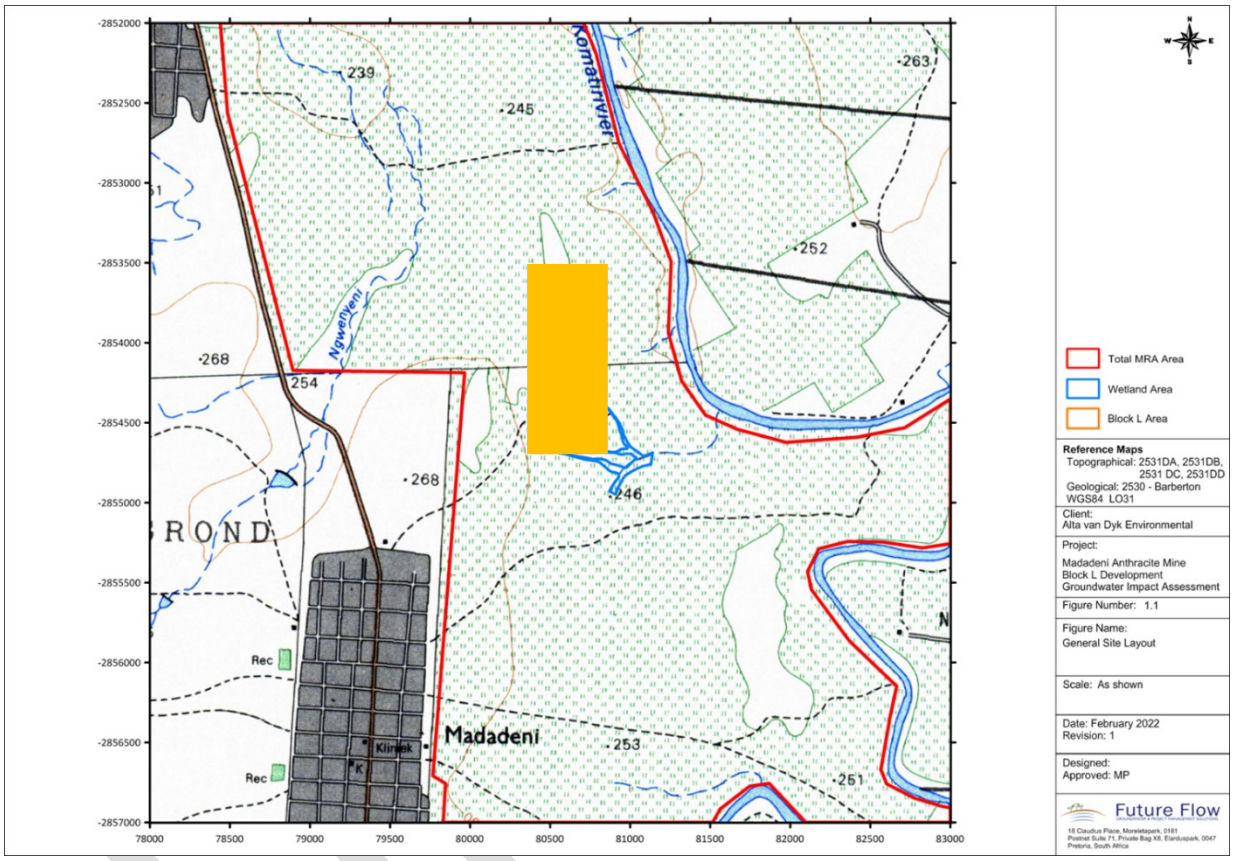

Figure 8-1: Block L Topomap (FFGPMS, 2022) Add additional area

8.2 Climatology

N'Komati Anthracite Mine falls within the summer rainfall region of South Africa, with 80% of the annual rainfall occurring during the months of October to March; 85% of the rainfall falls during summer with a significant number of thunderstorms. They occur as conventional thunderstorms and are usually scattered and of short duration and high intensity. The rainfall events are highly localised and can vary markedly over short distances.

Temperatures in this climate zone are generally moderate to high in summer, although low minimum temperatures can be experienced during the winter months due to clear night skies. Temperature can vary between 39°C (maximum) to 4°C (minimum) in summer and 36°C (maximum) to -2°C (minimum) in winter.

The gross annual "A" pan evaporation for the region, measured at Barberton, is 1635 mm. During the seven summer months from September to March the mean monthly evaporation is 157 mm. This equates to 67% of the total mean annual evaporation. Evaporation is lowest between the months of May to July when the average monthly evaporation of 90 mm occurs. Fog occurs throughout the year, although the highest tendency occurs during November to December. The annual prevailing wind direction, during the day, summer and winter months, is north-easterly. (GCS, 2012).

8.3 Surface Water and Wetlands

8.3.1 Surface Water

8.3.1.1 Description of Surface Water

N'Komati Anthracite Mine falls within the Komati River catchment which covers an area of 11 209km2, stretching from the Transvaal Plateau west of Carolina to the Lebombo Mountain Range at Komatipoort in the east. N'Komati Anthracite Mine falls within the downstream catchment of the Komati River. The Komati River catchment is divided into three sub-catchments, namely the upstream catchment, Swaziland and the downstream catchment. The Mine falls within the downstream sub-catchment of the greater river catchment (Geovicon, 2005).

The Komati River system has a desktop PES in a "D Category" reflecting a Largely Modified state. The NFEPA (National Freshwater Ecosystem Priority Areas) data also listed in a "D category" in 2011 inferring that the river condition is in a Largely Modified state. (GCS, 2012). The proposed area falls within the X13J Quaternary Catchment and lies within the jurisdiction of the Inkomati Usuthu Catchment Management Agency (IUCMA).

The proposed Block L Opencast Pit lies approximately 600m to the West of the Komati River. The general drainage pattern of the area in which the mine is situated in is flowing towards the north which is the flow direction of the Komati River.

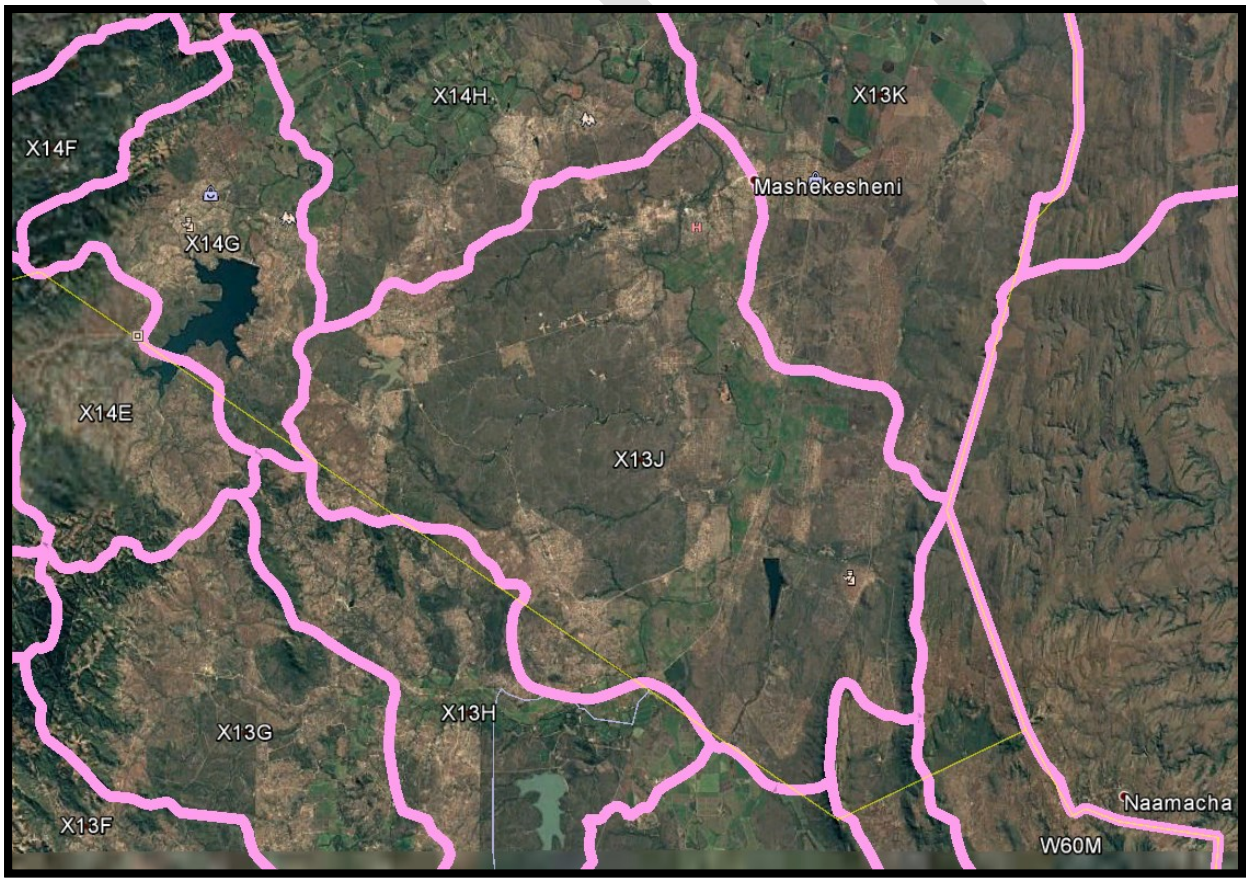

Figure 8-2: X13J Quaternary Catchment (site area marked with a red x)

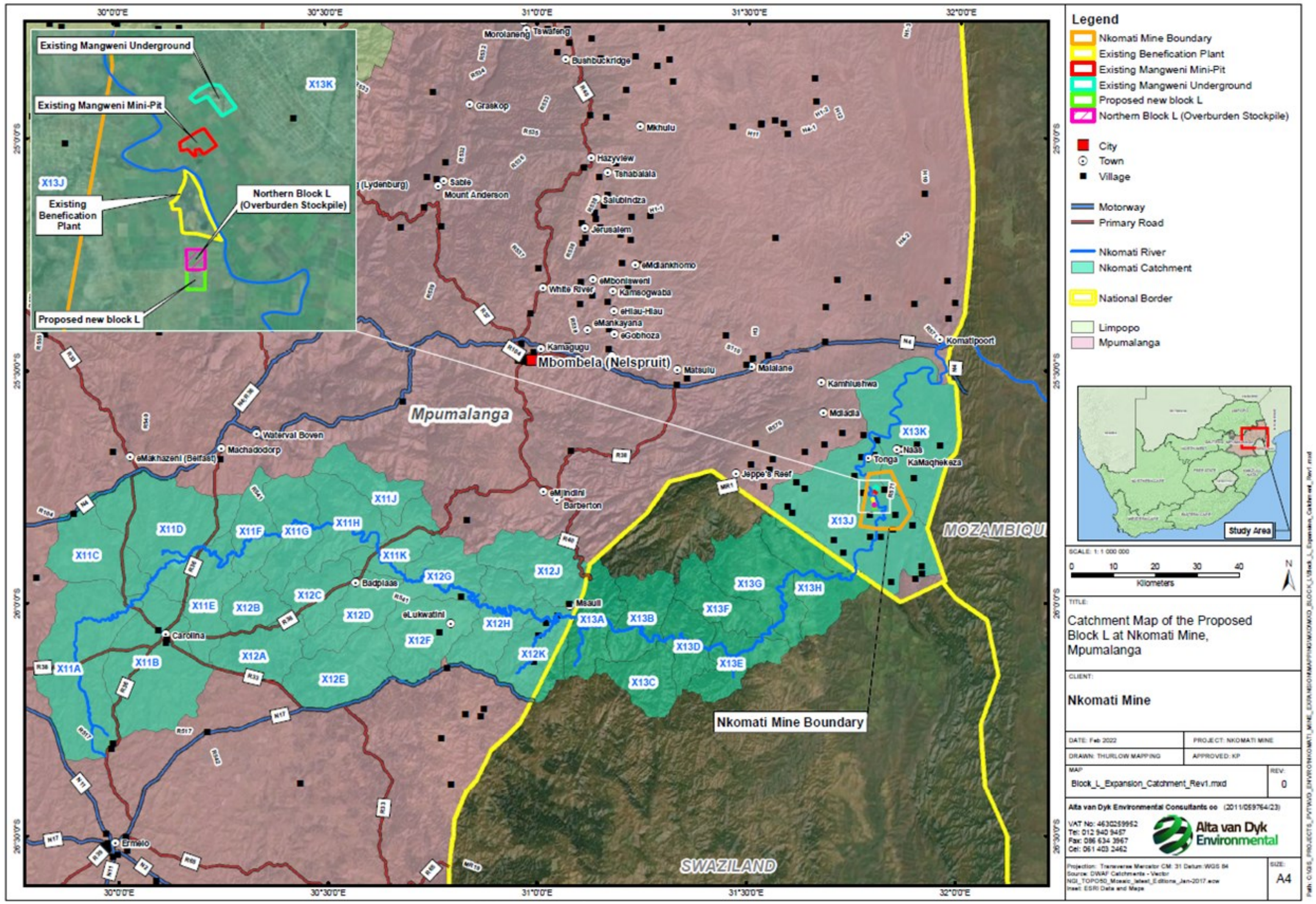

Figure 8-3: Catchment Map (Thurlow Mapping, 2022)

The study site is characterised by the occurrence of extensive riparian habitats along the Komati River, as well as along the Ngwenyeni and Nhlenga tributaries of the Komati River to the north of the mine lease area. While key riparian indicator species were used as the basis of the delineation, these were not always dominant, including due to removal of such species in cultivated areas and seemingly in preparation for further clearance of land for cultivation. Riparian habitats cover approximately 67.5 % of the watercourses mapped, making them the most extensive watercourse type on site.

All riparian systems typically have three identifying characteristics, namely:

- Distinct topography, including alluvial bars, terraces, and a macro-channel. This was most developed along the Komati River, but less apparent in the smaller tributaries.
- Vegetation that is distinct from the surrounding terrestrial vegetation; and
- Signs of alluvial deposition or erosion within the channel.

The riparian zone is characterised by woody vegetation, the most obvious of which are the trees. Typical riparian species observed include Celtis Africana, Diospyros mespiliformis, Ficus sycomorus, Gymnosporia senegalensis, Peltophorum africanum, Philenoptera violacea, Schotia brachipetala, S. capitata,Sclerocarya birrea, Seersia pyroides, Trichilia emetica and Vachellia tortilis

8.3.1.2 Surface Water Monitoring

The Mine carries out surface water monitoring in accordance with their approved Water Use License (05/X13J/ACGIJ/1864). The WUL requires monthly surface water quality monitoring to be carried out. Monthly results and quarterly monitoring reports are submitted to the Department of Human Settlements, Water and Sanitation (previously the Department of Water and Sanitation). Surface water monitoring are carried out by Aquatico Scientific (Pty) Ltd who are a SANS Accredited Testing Laboratory (No T0685). The following tables and image detail the locations of the existing surface water monitoring points.

Table 8-1 Surface Water Monitoring Points

Ref	Description	Coordinates	Status
Process Water			
SW05	Nkomati Make Up Dam 2 (Process Water Dam 2)	S25.77484 / E31.80180	Active
SW06	Nkomati Make Up Dam 1 (Process Water Dam 1)	S25.77484 / E31.80180	Active
SW09	Nkomati Slurry Dam	S25.77504 / E3180184	Active
SW10	Nkomati Opencast Void	S28.78303 / E31.80499	Active
SW11	Opencast Pit	S25.82893 / E31.79976	Active
SW7P	Inflow from U/G to pit SW7, N of U/G	S25.75386 / E31.80900	Active
SW7V	Void with water from U/G	S25.76695 / E31.80419	Active
River Localities			
SRW01	Komati River Furthest Upstream	S25.87948 / E31.79382	Active
SRW03	Komati River Furthest Downstream	S25.73668 / E31.78637	Active
Surface Water			
MD01	Komati River downstream of Madadeni O/C and Upstream of Plant	S25.81902 / E31.82926	Active
MD02	Komati River upstream of Madadeni O/C	S25.83422 / E31.80796	Active
MWetland	Wetland close to Madadeni O/C	S25.83074 / E31.79188	Active
SRW02	Komati River downstream of O/C, at bridge	S25.76965 / E31.80102	Active

Table 8-2 Surface Water Monitoring Variables

Variable	Unit
pH @ 25ºC	pH
Electrical conductivity @ 25ºC	mS/m
Total dissolved solids (TDS)	mg/l
Total hardness	mg $CaCO_3$/l
Calcium (Ca)	mg/l
Magnesium (Mg)	mg/l

Variable	Unit
Sodium (Na)	mg/l
Potassium (K)	mg/l
Total alkalinity	mg $CaCO_3$/l
Chloride (Cl)	mg/l
Sulphate (SO4)	mg/l
Fluoride (F)	mg/l
Nitrate (NO_3) as N	mg/l
Nitrate as NO_3	mg/l
Aluminium (Al)	mg/l
Iron (Fe)	mg/l
Manganese (Mn)	mg/l
Zinc (Zn)	Mg/l
Total suspended solids (TSS)	Mg/l

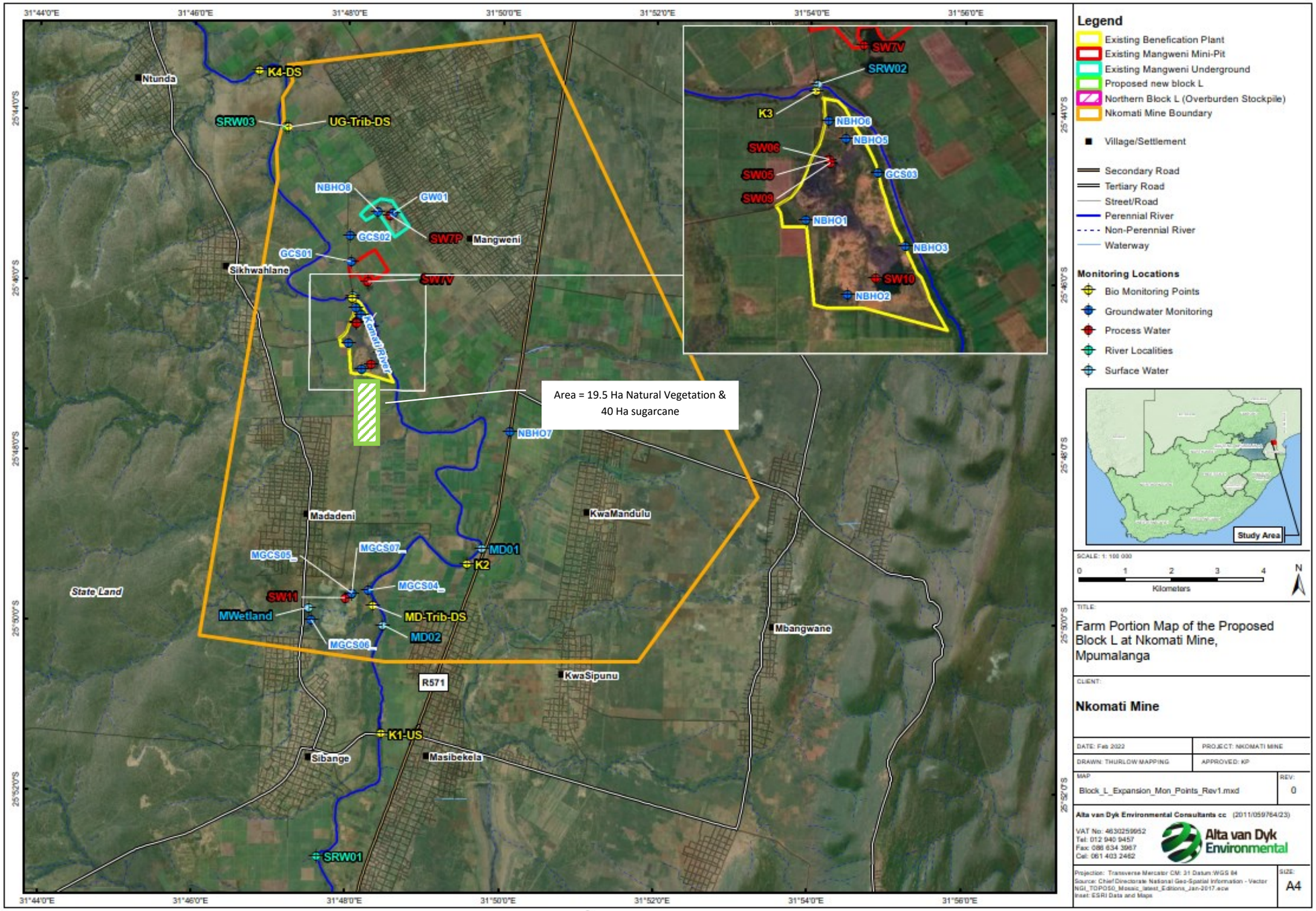

Figure 8-4: Surface water monitoring points (Aquatico, 2019)

8.3.2 Wetlands

The aim of the study was to identify and delineate all wetlands and watercourses within the N'komati Anthracite mining lease area, with specific focus on wetlands likely to be affected by the proposed Block L Project, to assess affected wetlands in terms of their Present Ecological State (PES) and Importance and Sensitivity (IS), to identify and assess likely impacts resulting from the construction and operation of the proposed opencast mining operation and related infrastructures, and to provide detailed recommendations on the mitigation and management measures within the framework of the mitigation hierarchy to ensure minimisation of the impact to wetlands.

The national Wetland Map 5 dataset (CSIR, 2018) indicates limited wetland areas within the study area, mostly associated with the tributaries to the Komati River. The NFEPA (Nel et al, 2011) wetland data indicates the Komati River as a wetland FEPA. In terms of broad vegetation types, the study area falls within the Zululand Lowveld vegetation type, which is not listed as a threatened ecosystem. The Mpumalanga Biodiversity Sector Plan shows the bulk of the mine lease area as "Modified" or "Modified – Old lands". Only a very small area of CBA Optimal extends into the extreme north of the mine lease area.

Field surveys to inform this study was undertaken over several days in November and December 2021. Extensive wetland and watercourse habitats were identified and delineated on site. In total, the wetlands, riparian habitats and watercourses cover 441.7 hectares of the mine lease area and associated 500m buffer, and makeup 16.4 % of the land surface. Within the mine lease area, specifically those areas planted with sugar cane, the identification and delineation of wetland habitat was found to be very challenging and a number of constraints to the accurate delineation of wetlands were encountered, which are further detailed in the report below.

The results of the PES assessment clearly indicate the effect existing land uses have had on the integrity of wetland habitats. The majority of watercourses fall within the Critically Modified (F) category, with 55 % of watercourses characterised as such. None of the watercourses on site are still considered to be Natural (A) or Largely Natural (B) category.

It was found that the wetlands on site are mostly of Low/Marginal importance and sensitivity, though the riparian habitats are considered of Moderate importance and sensitivity (tributaries) and High importance and sensitivity (Komati River).

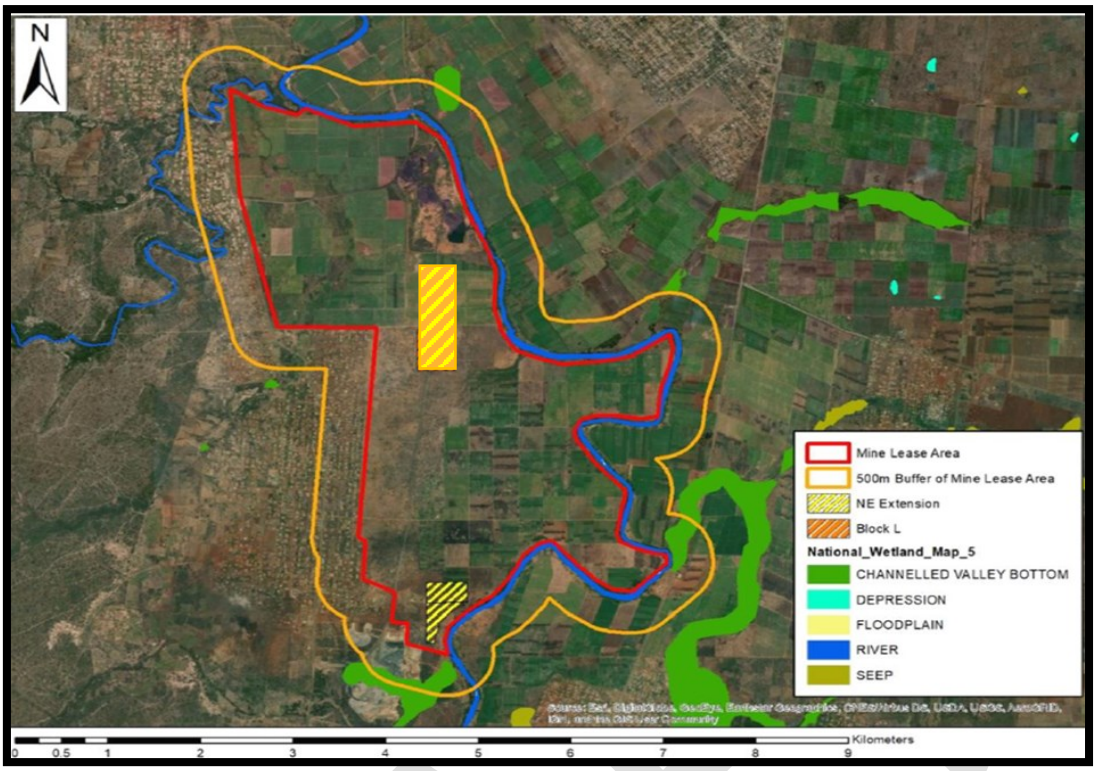

Figure 8-5: National Wetland Map for project area and surrounds (WCS Scientific, 2022)

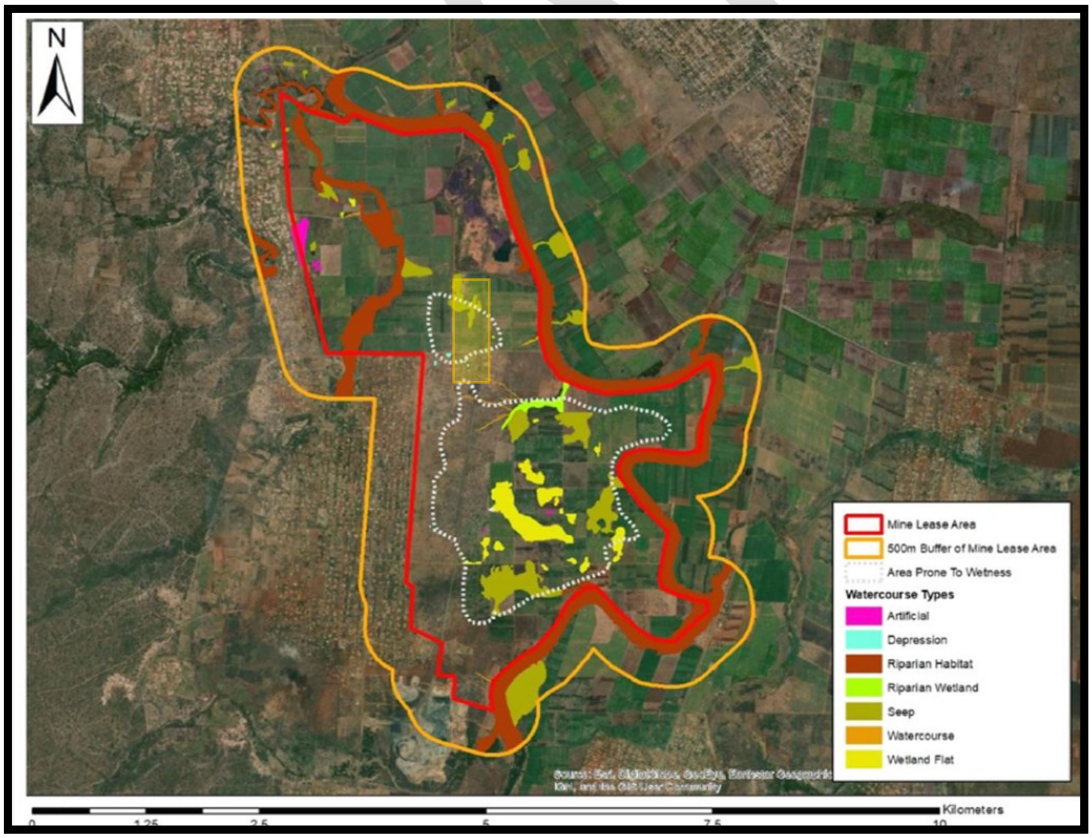

Figure 8-6: Map of Study Area showing delineated water courses (WCS Scientific, 2022)

8.3.2.1 Artificial Wetlands

Artificial wetlands amount to 1.4 % of the total extent of watercourses delineated and are located within the sugarcane fields and are presumably as a result of return flows from irrigation onto a flat surface with poor drainage. Due to the prolonged wetness in these areas, sugar cane tends not to do well, and these areas are characterised by stunted growth and prevalence of decaying patches of sugar cane within the fields. There are few hydrophytes present, though soil profiles indicate signs of wetness. The figure which follows shows typical habitat associated with these artificial wetlands and shows wetness signatures observed in the soil profile of these wetlands.

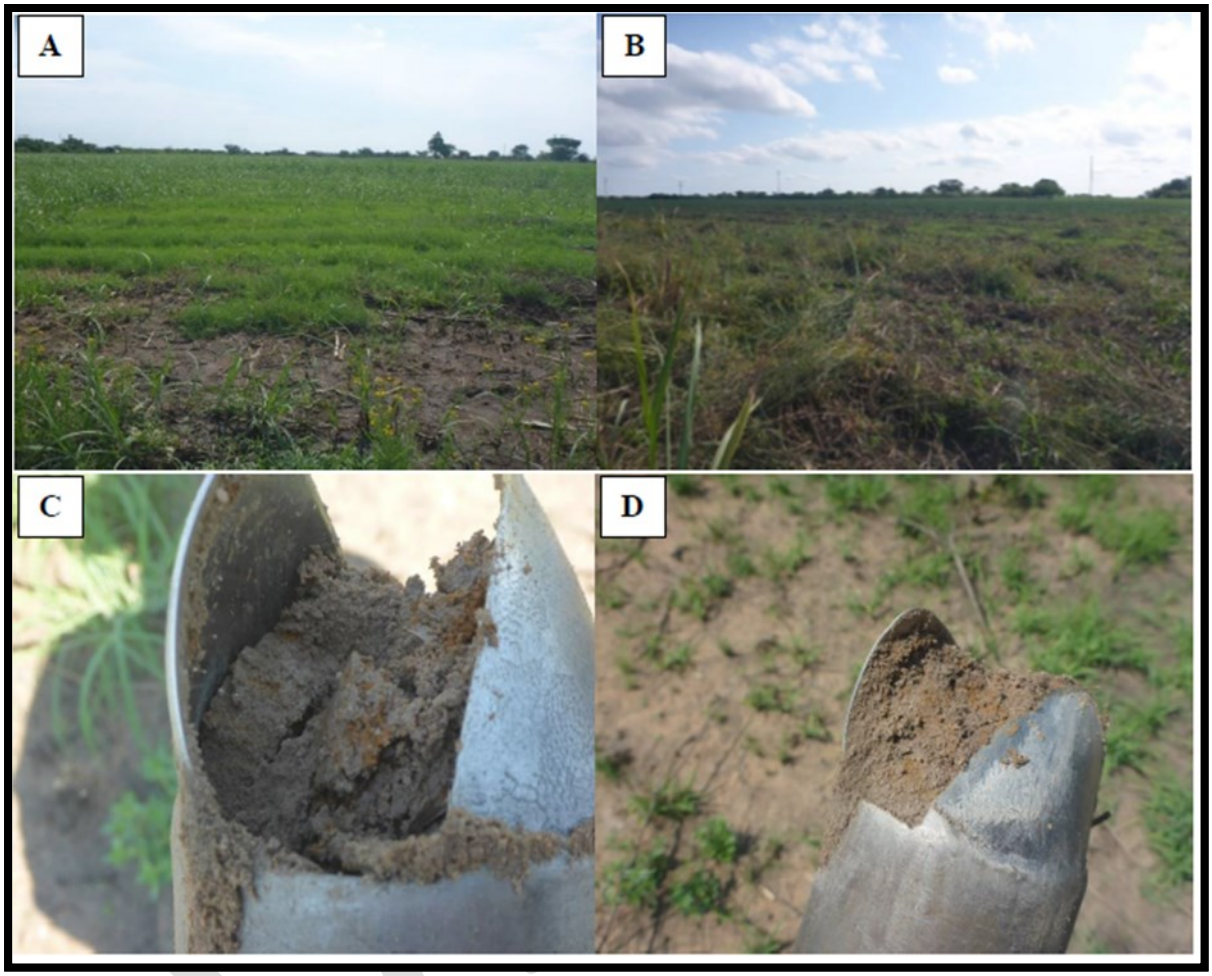

Figure 8-7: Photographs indicating A and B (artificial wetland areas) and C and D (wetness signatures within the artificial wetland areas) (WCS Scientific, 2022)

8.3.2.2 Depression Wetlands

Several small depression wetlands occur in the middle of the mine lease area and to the south along the western boundary of the mine lease area. These are typically very small and highly ephemeral depressions. During the first site visit in November 2021 these depressions were dry, though during the second site visit (December 2021), some of these were fully inundated. These depressions represent small endorheic features in the landscape that support shallow standing water for short periods during the summer rainfall season. They have a distinct basin-shaped, inwardly draining topography with no clear hydrological linkages to the drainage system and no clear inlet or outlet, though they are likely to overflow during periods of extreme high rainfall. On site they are characterised by dense, dark, heavy clay topsoil that expands and becomes largely impermeable when wet, retaining water on surface.

These depression wetlands are heavily utilised by livestock for grazing and watering during the summer season. D1b, the largest depression identified on site is traversed by a road on its northern edge adjacent to the sugarcane fields. The following figures indicate some of the depressions mapped onsite and photographs of some of the depressions.

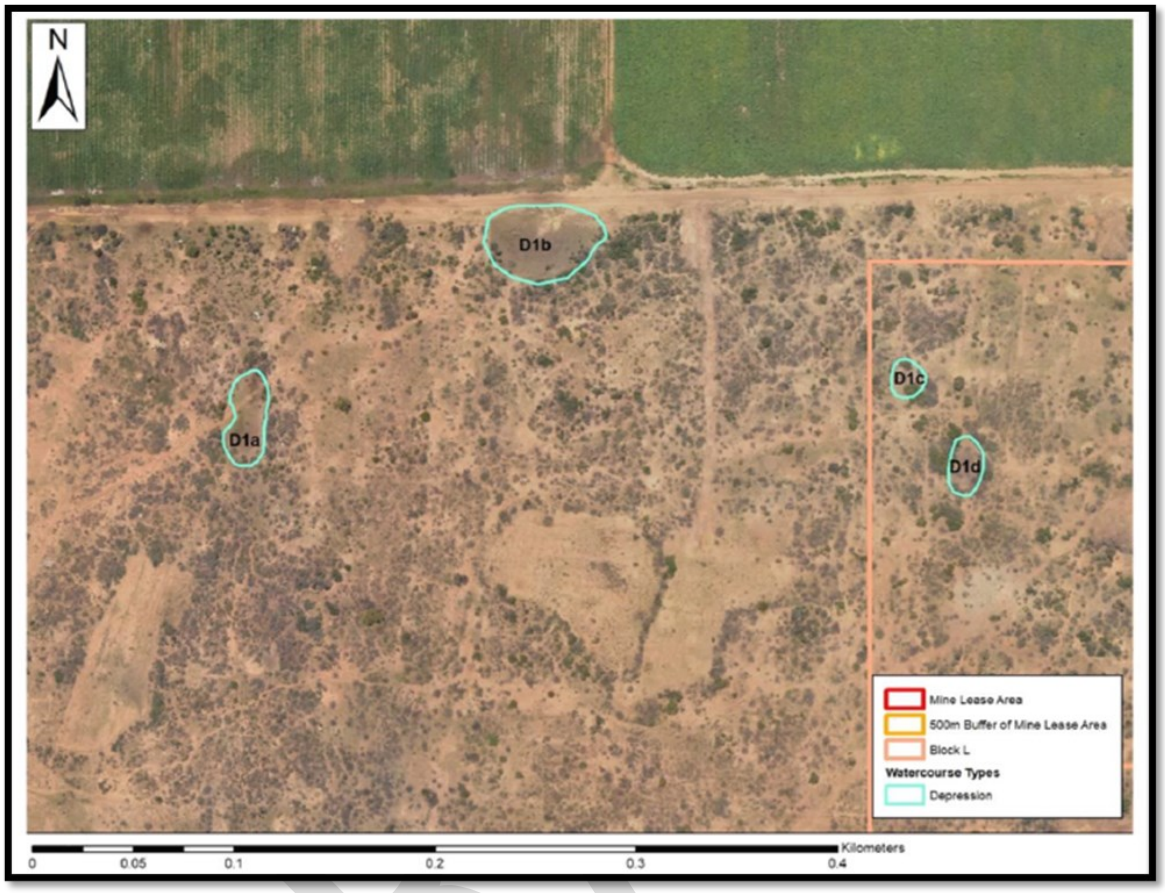

Figure 8-8: Depression Wetland Map (WCS Scientific, 2022)

Figure 8-9: Depression Wetland Photographs (WCS Scientific, 2022)

8.3.2.3 Riparian Wetlands

A single unchanneled valley bottom wetland with well-developed riparian fringe was identified and delineated on site – due to the combination of wetland and riparian features displayed by this wetland system it has been labelled a Riparian wetland. The riparian wetland covers approximately 1.3% of the mapped watercourses on site. The vegetation within this wetland consists of mixed riparian tree species along the margins and a diverse mix of grass and sedge species along the central flow path of the wetland. No clear channel is present, though intermittent, weakly-developed channel sections can be observed channel. The wetland is characterised by a fluctuating water table and the wetland is likely in seasonal contact with shallow groundwater of the weathered zone. Two large Seep wetlands to the south of the wetland also drain into this wetland and likely contribute both surface and sub-surface flow to the wetland. Surface flow within the wetland was observed within the lower section of the wetland near the confluence to the Komati River. At the time of the field surveys no surface flow was observed in the upper section of the wetland, though several pools of standing water occur.

Several sediment fans were observed associated with outlets of smaller intermittent flow paths (watercourses) discharging into this system. Evidence of intensive livestock grazing, and trampling was observed within the wetland.

8.3.2.4 Seep Wetlands

Seep wetlands are scattered across the study area and, together with the Wetland Flats, form a mosaic of fragmented wetland features within the extensive sugar cane fields. Within the project study area Seep wetlands are the second most extensive watercourse type identified, making up 21 % of the area mapped.

As is typical of most Seep wetlands, the Seep wetlands on site are characterised by more sandy soils with increased permeability, but with impeded vertical drainage due to the presence of typically a soft-plinthic layer within the soil profile which encourages lateral movement of water and formation of interflow.

The Seep wetlands on site consist of a mosaic of temporarily, seasonally, and permanently saturated wetland habitat, with most saturation experienced during the summer rainfall season and into the early dry season. At the time of the site visits in November and December 2021, the Seep wetlands were very wet and in some cases pools of surface water and saturated soils were observed within these wetlands. These wet conditions were as the result of good summer rains but were exacerbated by ongoing irrigation within the sugar cane despite the good rainfall and saturated conditions. This makes it difficult to estimate the importance of irrigation inputs in maintaining the wetland habitats on site.

All the Seep wetlands have been severely impacted by cultivation (mostly sugar cane fields). Seeps S6, S7 and S8 have active drains to dry out these systems and to improve the production of sugar cane (Figure 18). All of the Seep wetlands are impacted directly by sugarcane cultivation which has replaced virtually all natural vegetation within these wetlands. Seep S9 is an exception, with a portion of the wetland characterised by indigenous, though secondary vegetation. Subsistence cultivation was also observed and impacts particularly on S6. The dominant vegetation in most of the seep wetlands is sugar cane, but in places includes the obligate wetland species Phragmites australis, Typha capensis, several Cyperus spp. and patches of Imperata cylindrica. In addition to drains and sugarcane fields, road crossings are concentrating the flows and accelerating passage of flow within some of the wetlands, with this being observed in wetlands S1, S6, S7, S8 and S9.

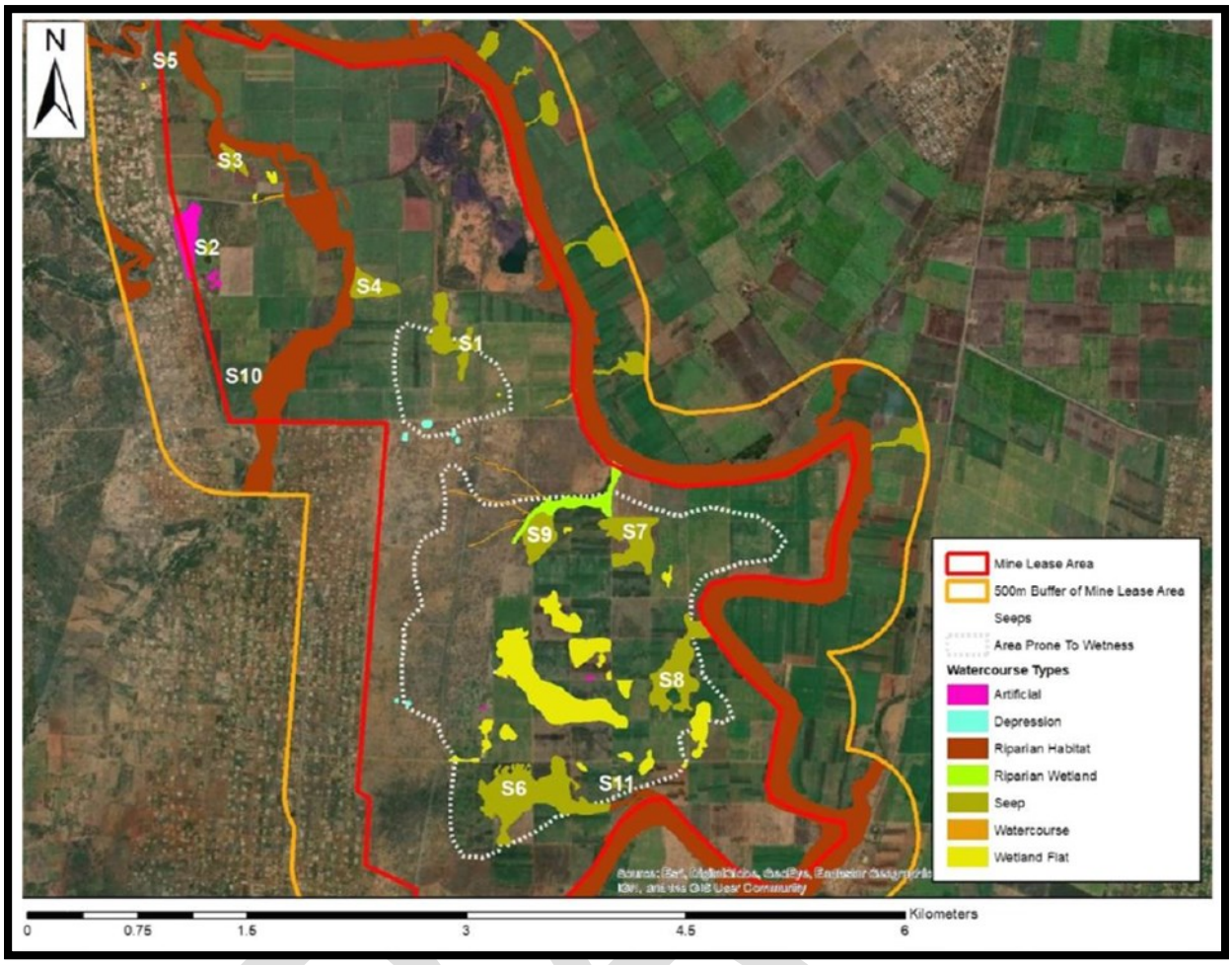

Figure 8-10: Map Indicating Seep Wetlands (WCS Scientific, 2022)

8.3.2.5 Wetland Flats

These wetlands covered approximately 8.3% of the watercourses onsite and they consist of mosaic irregularly shaped wetland areas that are not linked to a stream and at the same level areas where waterlogging occurs. It is believed that the areas prone to wetness as a result of this process are larger than the delineated flat wetlands. Wetlands are recognised by either hydric soil indicators or hydrophytes/aquatic plants or both. These systems occur within the sugarcane fields and are largely notifiable with patches of decaying patches of sugarcane and exposed water in some cases. These systems are presumably formed by prolonged irrigation, return flows and poor drainage area, resulting in continuous accumulation of water in a certain section of the cultivated fields.

Where vegetation is the primary indicator, patches/stands of *Imperata cylindrica* or *Phragmites australis* or *Typha capensis* and/or *Cyperaceae ssp.* occurs. In other cases, prolonged damming of water in the surface created anaerobic conditions and thus the formation of hydric soil indicators. The two conditions explain are conditions were favourable for wetland flat onsite.

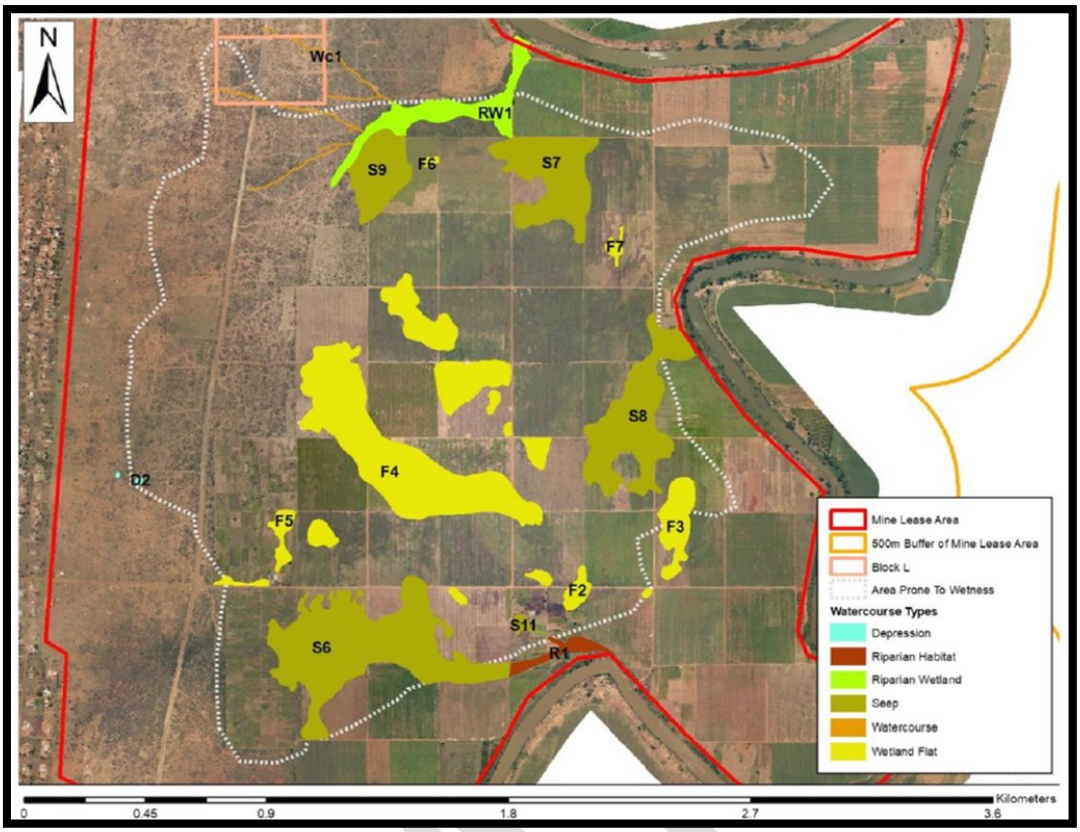

Figure 8-11: Map Indicating Wetland Flats (WCS Scientific, 2022)

Figure 8-12: Photographs of Wetland Flats (WCS Scientific, 2022)

8.3.2.6 Present Ecological State (PES) Assessment

The watercourses on site exist within a landscape currently dominated by agricultural (planting of sugar cane, as well as subsistence agriculture) activities and these land uses have had a significant influence on the current extent and condition of the majority of the watercourses. Many of the watercourses (13 out of 28 assessment units) have been entirely converted to sugar cane with no natural vegetation remaining, while many of their catchments are also extensively cultivated (13 out of 28 assessment units are more than 75% sugar cane and subsistence agriculture). These disturbances have had a significant influence on the vegetation composition, geomorphology, and hydrology of the wetlands.

Some of the impacts encountered within the wetlands and their catchments during the site visits included:

- Cultivation (sugarcane and subsistence agriculture) resulting in total loss of the wetland vegetation, disturbance of the upper soil profile and increased surface runoff;
- Excessive irrigation, resulting in waterlogging and increased wetness within the soil profiles;
- Application of fertilizers and pesticides to sugarcane established within wetland areas;
- Trenches used in an attempt to drain wetlands;
- Numerous farm road and tracks crossing wetlands and watercourses, many acting as preferential flow paths or leading to localised impoundment of flows;
- Alien vegetation, especially species such as *Lantana camara* and *Chromolaena odorata*;
- Ongoing clearing of riparian vegetation and felling of large riparian trees;
- Hardening of catchments through urban areas and infrastructure, resulting in increased surface runoff;
- Littering and waste disposal within watercourses;
- Livestock grazing and trampling.

The results clearly indicate the effect existing land uses have had on the integrity of wetland habitats. Most watercourses fall within the Critically Modified (F) category, 55 % of watercourses characterised as such. None of the watercourses on site are still considered to be Natural (A) or Largely Natural (B) category.

8.3.2.7 Wetland Importance and Sensitivity

An Importance and Sensitivity (IS) assessment was conducted on every watercourse unit identified within the study area. Considerations that informed the IS assessment included:

- The Extensively transformed nature of the study area and watercourses on site, with more than 55% of the watercourses identified being considered Critically Modified (PES category F);
- The location of some of the study area within a vegetation type (Mananga-Lebombo Thornveld) considered extensively transformed and threatened, having been classed as Endangered.
- According to the national wetland map (Van Deventer et al., 2019), generated as part of the latest National Biodiversity Assessment (NBA, 2018) the relevant wetland ecosystem types present within the study area, and their threat status and protection levels are as follows:
- Lowveld Bioregion (Valley-bottom): Critically Endangered and Poorly Protected;
- Lowveld Bioregion (Floodplain): Critically Endangered and Poorly Protected;
- Lowveld Bioregion (Seep): Endangered and Not Protected; and
- Lowveld Bioregion (Depression): Vulnerable and Well Protected.
- The designation of virtually the entire study area as “Modified” or “Modified – Old Lands” with limited natural habitat remaining according to the Mpumalanga Biodiversity Sector Plan.
- The Komati River classified as a wetland Freshwater Ecosystem Priority Areas (FEPA).
- It is these considerations that have informed the scoring of the watercourses in terms of their importance and sensitivity, and it was found that the wetlands on site are mostly of Low/Marginal importance and sensitivity, though the riparian habitats are considered of Moderate importance and sensitivity (tributaries) and High importance and sensitivity (Komati River).

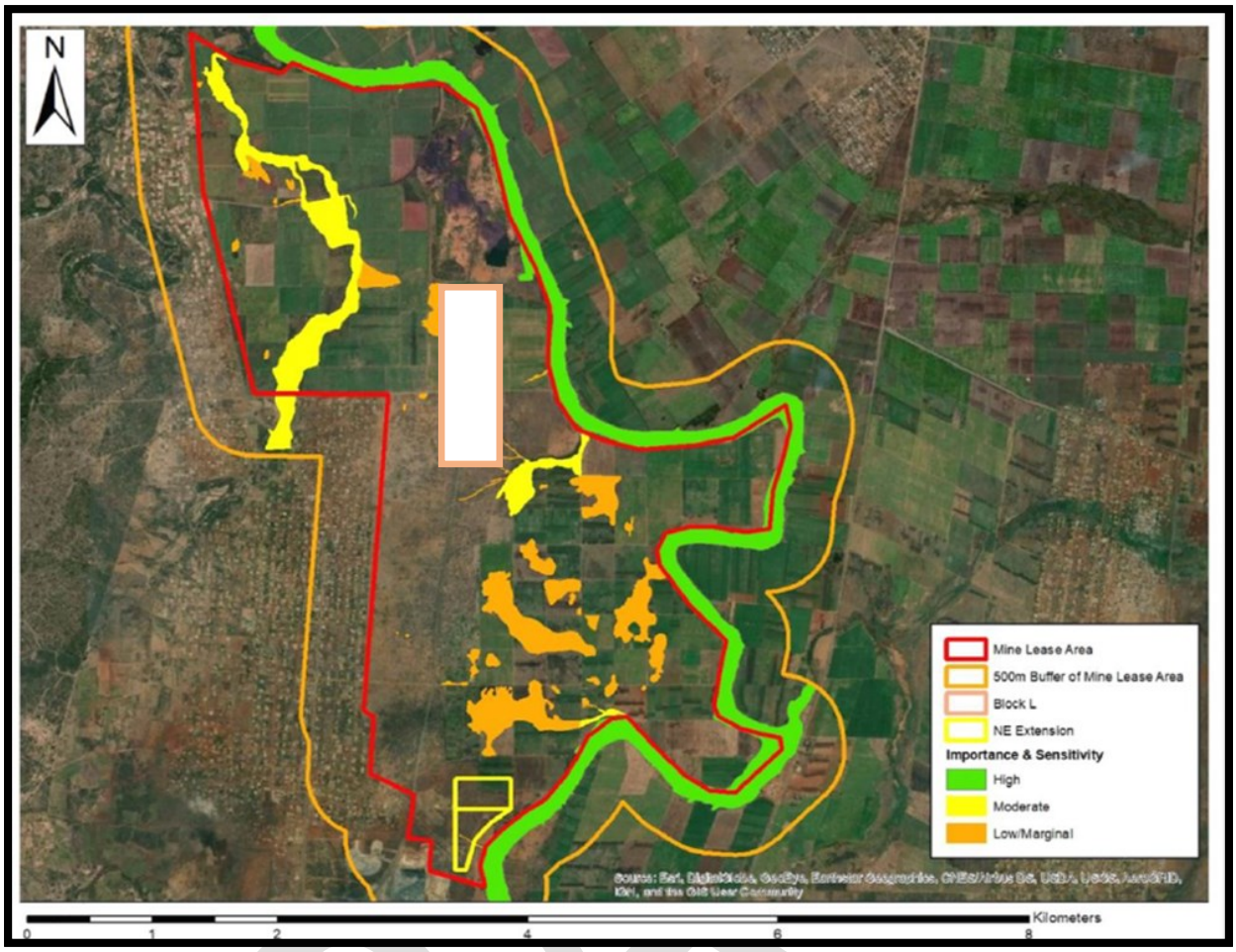

Figure 8-13: Importance and Sensitivity Map (WCS Scientific, 2022)

8.3.2.8 Wetlands Within Block L Area

The proposed Block L mining area is located roughly in the centre of the greater mining lease area in an area characterised by indigenous savanna vegetation, though the vegetation is considered secondary due to historical disturbances (indicated as historical cultivation in the National Landcover 2018 dataset). Currently the area is used for livestock grazing, though it appears the adjacent urban area is also expanding towards the Block L area.

The Block L mining area is roughly 60ha in size and consists of an approximately 40 ha area earmarked for opencast mining and an adjacent 20 ha area earmarked for stockpiles. Existing roads traverse the area and will be used for access.

A number of small watercourses and two small depressions have been identified within the Block L area. The watercourses drain in a roughly easterly direction towards a riparian wetland draining into the Komati River. The watercourses in question represent highly ephemeral preferential flow paths in the landscape that are expected to support surface flow only in the immediate aftermath of large rainfall events that generate surface runoff. In some instances, the watercourses appear to have formed as erosion features along footpaths or livestock paths. The lower reaches of these watercourses towards the east show more clearly defined flow paths, with active erosion evident on site. The ephemeral nature of these features precludes the establishment of wetland or riparian habitat along the watercourses, and the vegetation within the watercourses does not differ significantly from the surrounding terrestrial vegetation. Typical tree species observed include *Dichrostachys cinerea*, *Spirostachys Africana*, *Vachellia karroo*, *V. nigrescens* and *Ziziphus mucronata*.

Two small depression wetlands also fall within the proposed Block L opencast pit footprint, with a further two depressions just to the west. These are again highly ephemeral features of the landscape, holding water for brief periods following large rainfall events or periods of regular rainfall. At the time of the site visits in November and

December 2021 some of these depressions held shallow water. The two depressions falling within the mining area cover are very small in size, measuring 19m x 17m and 30m x 17m respectively. They occur as small patches of grass/sedge vegetation within the surrounding terrestrial savanna. They appear extensively used by livestock for watering and grazing.

8.4 Ecology (Fauna and Flora)

The proposed Block L mining area is located roughly in the centre of the greater mining lease area in an area characterised by indigenous savanna vegetation, though the vegetation is considered secondary due to historical disturbances (indicated as historical cultivation in the National Landcover 2018 dataset). Currently the area is used for livestock grazing, though it appears the adjacent urban area is also expanding towards the Block L area.

N'Komati Anthracite Mine is situated in the Savanna Biome (Rutherford, 1988). Mucina and Rutherford (2006) classify the area within the Zululand Lowveld vegetation unit (SVI 23) of the Lowveld Bioregion in the Savanna Biome. Characteristically it consists of grassy ground layer and distinct upper layer of woody plants. Where the upper layer exists near the ground the vegetation is referred to as shrubveld. The intermediate stages as well as where it is as dense as a woodland, are known as Bushveld. (Vegetation of South Africa, Lesotho and Swaziland (1998)).

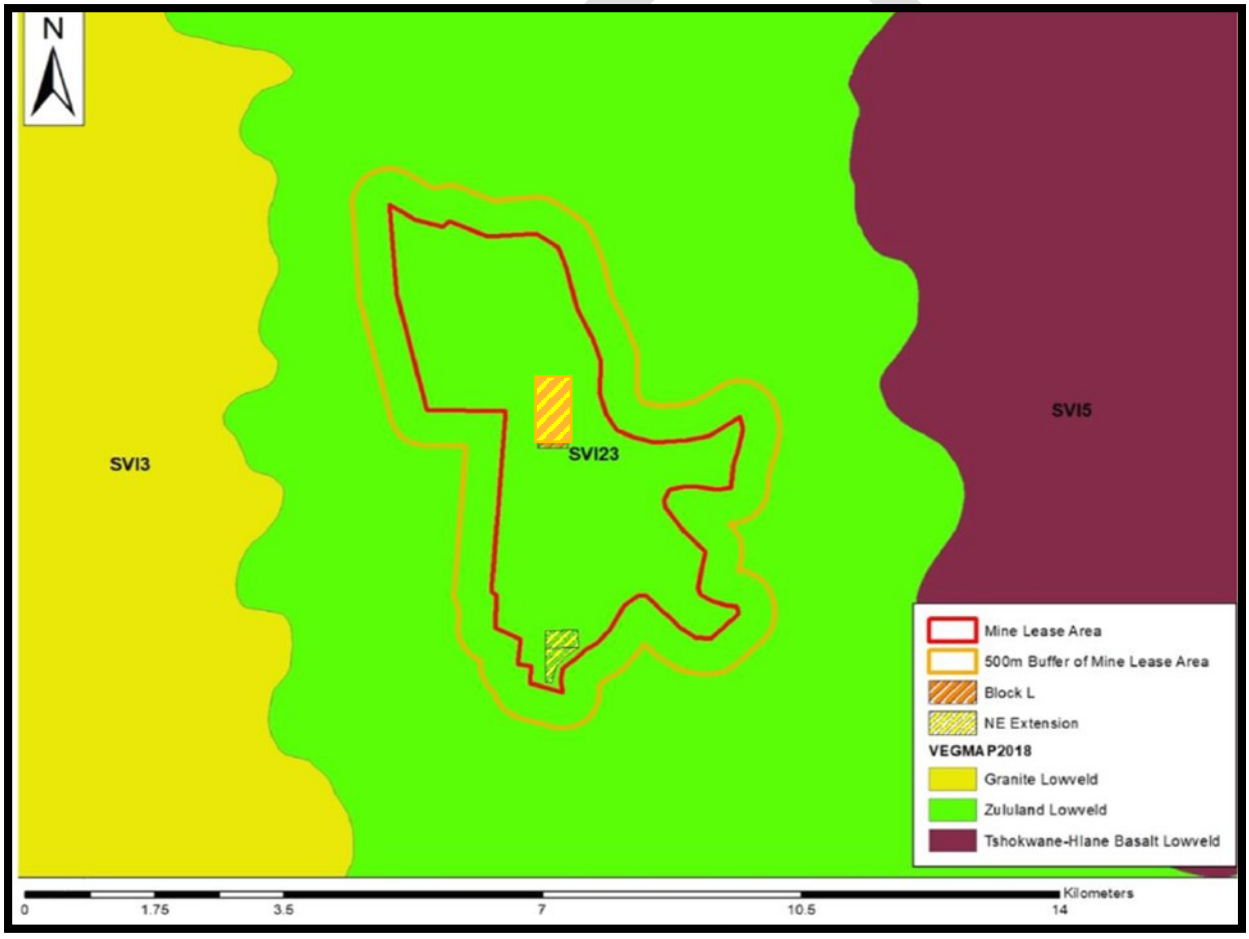

Figure 8-14: IS Vegetation Types (VEGMAP, 2018)

An extract of the Mpumalanga Biodiversity Sector Plan 2013 terrestrial biodiversity assessment is illustrated in the below figure.

- The bulk of the mine lease area is classified predominantly as "Modified" or "Modified – Old lands".
- Only small, fragmented areas of "Other Natural Areas" remain on site, most significantly associated with the Komati River.

- A critical Biodiversity Area (CBA) Optimal occurs within the 500m buffer to the northwest of the mine lease area and marginally extends into the mine lease area.
- Block L is classified predominantly classified as “Modified – Old lands”, with only a very small area classed as “Other Natural Habitat”.

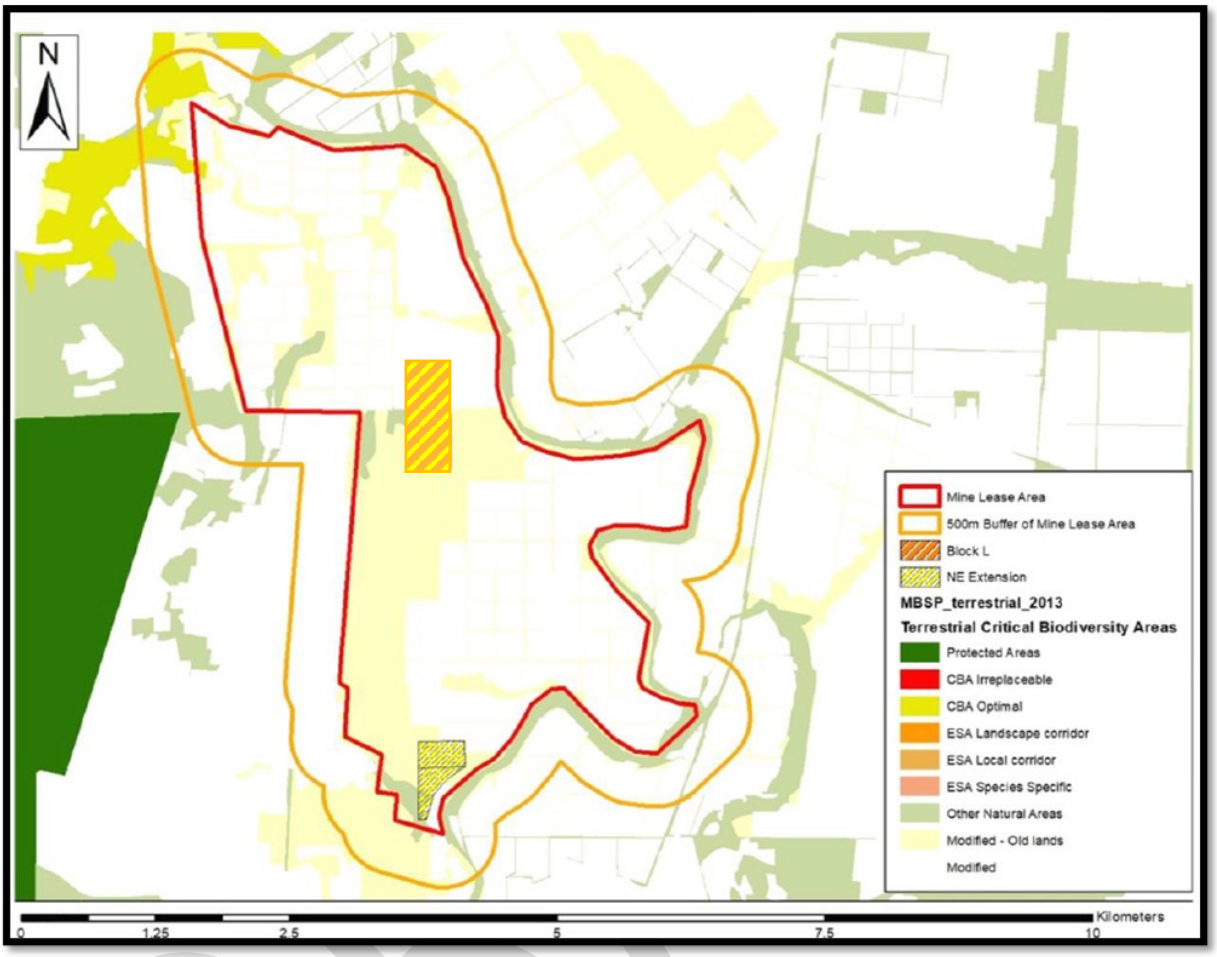

Figure 8-15: IS Extract from Mpumalanga Biodiversity Sector Plan 2013 Terrestrial Biodiversity Assessment

During field studies undertaken by WCS Scientific (Pty) Ltd in November and December of 2021, a list of dominant and obvious plant species recorded in the riparian zone was compiled and is provided below. No threatened species or any protected plants in terms of the Mpumalanga Conservation Ordinance were recorded within the study area.

Table 8-3: Dominant and Common Plant Species Found in Riparian Habitats

Species Name	Species Name
Brachiaria brizantha	*Philenoptera violacea*
Bridelia micrantha	*Phragmites australis*
Celtis africana	*Phragmites mauritianus*
Commelina africana	*Psidium guajava**
Cynodon dactylon	*Ranunculus meyeri*
Cyperus fastigiatus	*Saccharum officinarum**
Cyperus sexangularis	*Schoenoplectus spp*
Dichrostachys cinerea	*Schotia brachypetala*
Diospyros mespiliformis	*Schotia capitata*
Ficus sycamorus	*Sclerocarya birrea*
Gomphocarpus fruticosus	*Seersia pyroides*
Gymnosporia senegalensis	*Senegalia nigrescens*

Species Name	Species Name
Imperata cylindrica	*Setaria incrassata*
*Lantana camara**	*Solanum mauritianum**
Leersia hexandra	*Spirostachys africana*
*Mangifera indica**	*Sporobolus spp*
*Melia azederach**	*Trichilia emetica*
*Mimosa pigra**	*Typha capensis*
Nymphaea spp.	*Vachellia sieberiana*
Paspalum spp	*Vachellia tortilis*
Peltophorum africanum	*Vachellia karroo*
Persicaria spp	*Ziziphus mucronata*

The following plant life can be found within the general region.

Table 8-4: Dominant and Common Plant Species Found in The Region

Species Name	Species Name
TREE LAYER-UPLANDS	
Red bushwillow	*Combretum apiculatum*
Largefruit bushwillow	*Combretum Zeyheri*
Silver clusterleaf	*Terminalia sericea*
Black monkey orab\nge	*Strychnos madagascariensis*
Maroela	*Sclerocarya birrea*
False maroela	*Lannea stuhlmannii*
Weeoing wattle	*Peltophoram africanum*
TREE LAYER -BOTTOMLANDS	
Knobthorn	*Senegalia nigrescens*
Scented thorn	*Vachellia nilotica*
Common falsethorn	*Albizzia harveyi*
Magic guarri	*Euclea divinorum*
SHRUB LAYER	
Hairy corkwood	*Commiphora Africana*
Wild grape	*Cissus cornifolia*
Sickle bush	*Dichrostachys cinereal*
Flaky thorn	*Vachellia exuvialis*
Zebrawood	*Dalbergia melanxylon*
Round leaf teak	*Pterocarpus rotundifolia*
GRASS LAYER	
Herringbone grass	*Pogonarthria sqarrosa*
Blueseed grass	*Tricholaena monachane*
Culyleaf lovegrass	*Eragrostis rigidior*
Natal red top	*Melinus repens*
Black-footed signal grass	*Brachiaria nigropedata*
Guinea grass	*Panicum maximum*
Finger grass	*Digitara eriantha*
Spear grass	*Heteropogon contottus*
OTHER GRASSES	
Kalahari sand quick	*Schmidtia pappophoroides*
Spreading bristle grass	*Aristida congesta*
Bushvels signal grass	*Urocloa mosambicensis*
Nine-awned grass	*Enneapogon cenchroides*

The following animal life can be found within the general region.

Table 8-5: Dominant and Common Animal Species Found in the Region

Common Name	Scientific Name	Habitat
Laughing dove	*Streptopelia snegalenis*	Terrestrial
Namaqua dove	*Oena capensis*	Terrestrial
Cape turtle dove	*Streptopelia capensis*	Terrestrial
Rock pigeon	*Columba guinea*	Terrestrial
Helmeted quineafowl	*Numida Meleagris*	Terrestrial
Blacksmith plover	*Vanellus armatus*	Water
House sparrow	*Passer domesticus*	Terrestrial
Habeda ibis	*Bostychia hagedash*	Terrestrial
Swainson's Framcolin	*Francolinus swainsonsil*	Terrestrial
Common waxbill	*Estrilda astrild*	Water/ terrestrial
Masked weaver	*Ploceus velatus*	Water/ terrestrial
Blackshouldered kite	*Elanus caeruleus*	Terrestrial
Grey heron	*Ardea cinerea*	Water

As per the Mpumalanga Biodiversity Conservation Plan (C-Plan) which can be seen in the below figure, the site itself is identified as an area of "no natural habitat remaining", which means that the area has very little biodiversity value. The area has been transformed by farming, mining, and livestock grazing. No threatened species or protected plants in terms of the Mpumalanga Conservation Ordinance were recorded within the study area.

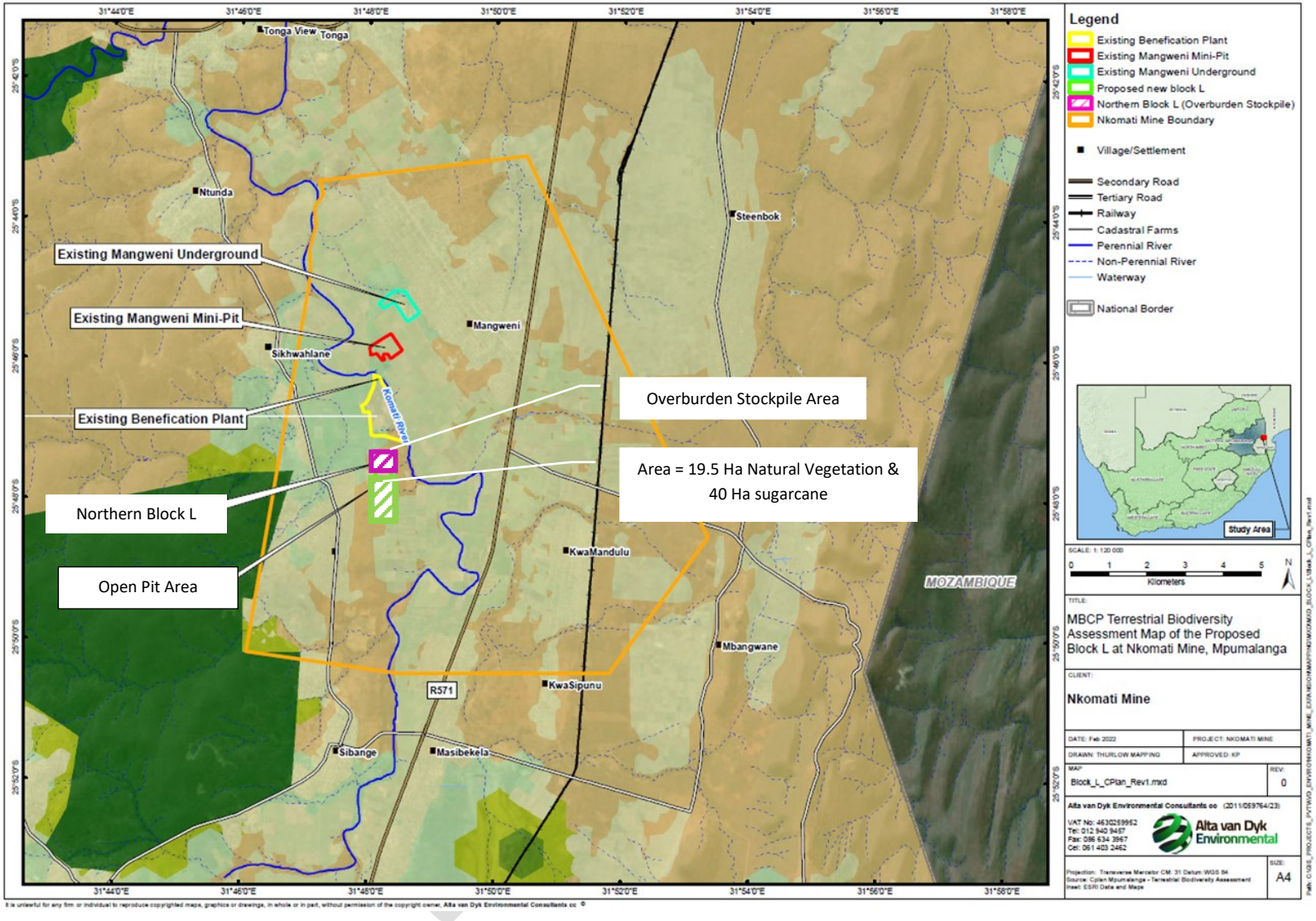

Figure 8-16: Mpumalanga C-Plan (Thurlow Mapping, 2022)

8.5 Soils, Land Use and Land Capability

8.5.1 Soil Characterisation

There are four dominant soil groupings that characterise the area of study. These groupings include a number of dominant and sub dominant forms. The dominant soil forms are closely associated with the lithologies (geology) from which the soils are derived (in-situ formation), the general geomorphology of the site, the effects of slope and attitude of the landforms (topography). These factors combined contribute to and affect the soil pedogenisis and ultimately the soil forms classified and mapped.

The flat to undulating topography has resulted in the in-situ formation of all but the alluvial derived materials found associated with the N'Komati River flood plains. The climate also has an influence on the soil forming processes and outcomes, with the negative hydrological balance for the area (evaporation > rainfall) resulting in the development of evaporites within the soil profile, the accumulation of carbonate, iron and magnesium precipitates resulting in the development of nodules of ferrous oxide and calcium carbonate that become cemented over time into layers or "banks" of calcrete and laterite (hard plinthite, ouklip/hard pan ferricrete). These inhibiting layers form barriers to the vertical infiltration of water down the profile and the accumulation of clay and fine materials which in turn results in further accumulations of relic ferric oxide and carbonate over time. These restrictions in combination with the high clay contents contributes to the lateral flow and poor infiltration and the development of wet based soils. These waters contribute to the "base-flow" of the rivers and are an important contributor to the wetlands and more sensitive and important ecological and biodiversity balance of the area.

The dominant soils classified are described in terms of their physical and chemical similarities and to some extent their topographic landform position, their spatial distribution being of importance to the formulation of the soil utilisation plan and management recommendations.

8.5.2 Soil Classification

The soils mapped range from shallow sub-outcrop and outcrop of parent materials to moderately deep sandy loams, sandy clay loams and structured clay loams, all of which are associated with either a thin saprolitic layer, a hard rock or plinthite as the underlying "C" horizon.

The clay content and clay morphology are significant to the soil structure and texture, the difference in parent lithologies (sediments versus volcanic) noted as the primary contributor to the difference in these aspects. The soils associated with the granite terrain are significantly much lower in clay, returned medium to coarse textured sandy loams with 1:1 swelling (non-expansive) clays generally below 15%, with better than average soil drainage and lower than average water holding capabilities. In contrast, the sediment derived soils and those associated with the igneous intrusives (Karoo sandstones, shales and mudstones, and the intrusive dolerite dykes and sills) returned soils with a fine to medium texture, significantly much higher clays (generally non-swelling, topsoil of between 18% and 25% and subsoil clays from 35% to greater than 65%), with much stronger soil structures, better water holding capabilities but poor drainage.

Where present, the ferricrete (hard plinthite) are confined almost exclusively to the lower lying riverine and flood plain environments or as relic landforms in lower midslope and midslope positions. The degree to which the plinthite layer has been cemented (friability of the ferricrete) will determine the effectiveness of the layer as a barrier to infiltration, while the depth of overlying soil dictate how easily or difficult it is for the soil water to be accessed by the fauna and flora. The friability or relative hardness of the ferricrete will have an effect on its water storage capability and its effectiveness as a shallow reservoir or aquiclude, the clay mineralisation and its character influencing the water holding characteristics of the soil.

Where present, the carbonate mineralisation is found associated with the soil structure and are a function of the parent materials from which the soils are derived. These soils are prone to chemical weathering, and acid conditions will result in preferential weathering and erosion. These conditions are of concern where dirty water might come into contact with the soil. As with any natural system, the transition from one system to another is often complex with multiple facets and variations that change over relatively small/short distances.

The dominant soil groupings include:

- Moderate to deep sandy loam and sandy clay loams. These are considered of the better potential materials and are distinguished by the better than average depth (>500mm) of relatively free draining soil. This group is recognisable by the red-to-red brown and yellow colours, the lack of signs of wetness within the top 500mm and are free of chemical or physical barriers within the profile. These soils range in texture from fine to medium grained with apedal or single grained to weak or moderate blocky in the more structured forms, returned good intake rates (> 12mm/hr), coupled with moderate to low T.A.M. (ranging from 35mm/m on the shallower sandy soils to over 140mm/m on the heavier deeper soils), moderate to good internal drainage and moderate to high compactability. The permeability/drainage of these materials is rated as moderate to good, with the infiltration test work (hydropedological test work) returning values of between 9.54E-03cm/s and 1.66E-03cm/s, while the more sandy texture renders them more easily worked, and of a lower sensitivity. These soils are generally lower in clay than the more structured materials, are better drained (better permeability) and have a lower water retention coefficient. The land capability is rated as moderate intensity grazing and/or arable (where >750mm of depth) depending on the production potential of the soils in the area.
- In contrast, the moderately shallower to shallow and more strongly structured materials are considered to be more sensitive and will require greater management if disturbed. This group of structured soils (<750mm) are associated almost exclusively with the sub outcropping of the horizontally bedded sandstone and sedimentary layers of the Karoo sequence, and returned moderate to high clay percentages, fine to medium textures and weak to moderate blocky pedocutanic structure. These soils are widespread over the mining right area, returning effective rooting depths of between 20cm and 60cm with 20cm to 40cm more common on the mid and upper midslopes. The clay percentages range from 18% to 28% in the topsoil, and between 35% and 70% in the subsoils. These soils returned moderate to good water holding capabilities due to the high clay contents, Total Available Moisture (TAM) levels of between 35mm/m to 60mm/m. These soils returned moderate to poor drainage characteristics and are moderately susceptible to salinity problems if water is not managed correctly. Drainage and surface water management are essential for good economic return of agriculture on these soils. The land capability rating is at best poor-quality grazing or wilderness status. These soils form a significant proportion of the mining block being considered for development.
- Of similar pedogenisis, but with more extreme limitations and sensitivity are the shallow wet based soils. As with the shallow structured materials described above, these materials are derived from the in-situ development from the underlying Karoo sediments and their associated intrusive dolerite. The flat bedded sandstone combined with the flat to undulating topography (slow drainage) and semi-arid climate (negative hydrological water balance – evaporation > rainfall) result in the accumulation of clays and metal precipitates on the restrictive sedimentary (sandstone) layers. The result is the formation of laterite/plinthite of varying hardness and thickness at the soil rock interface and the accumulation of soil water within the profile where the vertical drainage is impeded. These soils returned moderate to shallow (200mm to 400mm) rooting depths, soil texture with a fine to medium grain size, apedal to strong blocky pedocutanic structure, good water holding characteristics and moderate to poor soil permeability. Growth is compromised by the low availability of soil water to the plants. This group of soils constitute a relatively small but significant area of the proposed mining block.

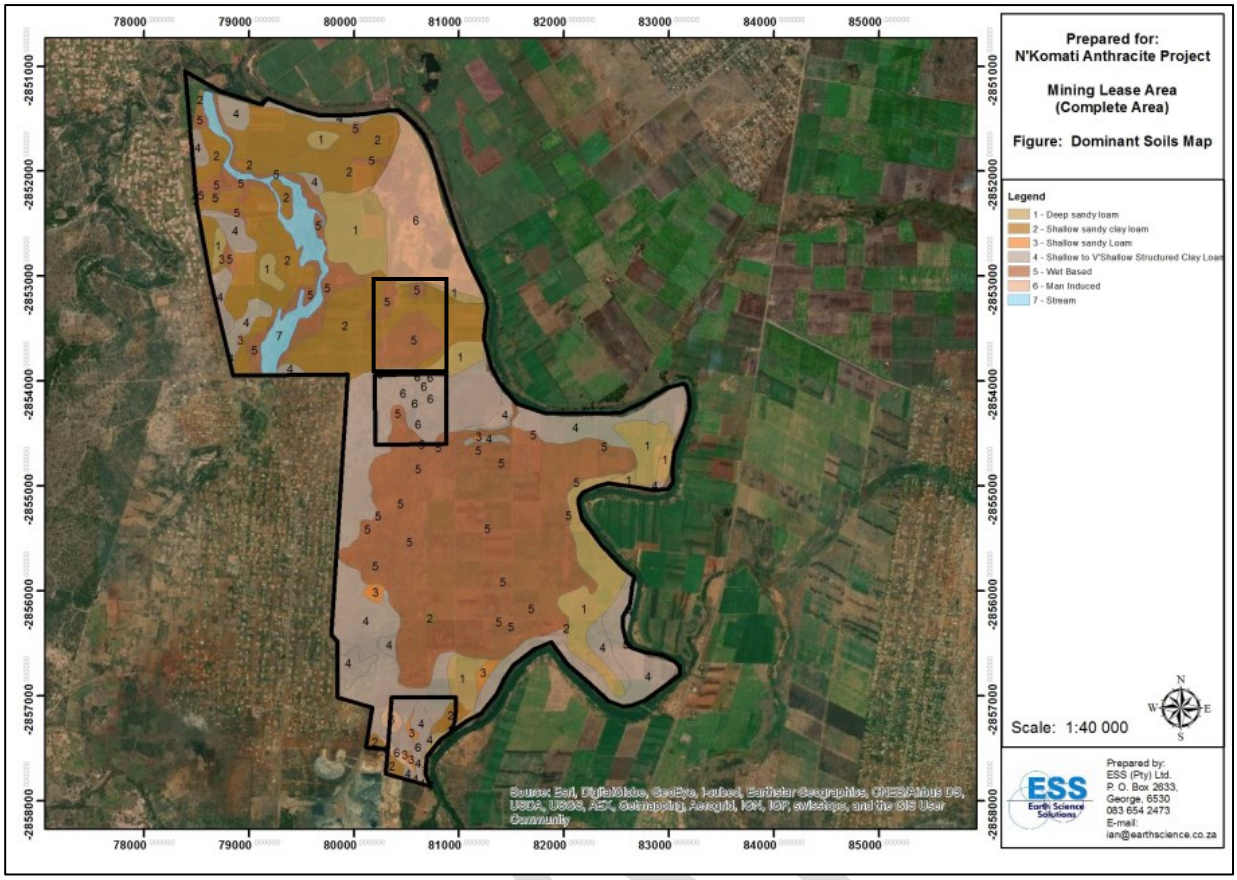

Figure 8-17: Dominant Soils Map (ESS, 2021)

8.5.3 Soil Sensitivity

When considering the sensitivity of a site, factors including the landform slope, ground roughness, geology, depth of soil and the depth to an inhibiting layer (<500mm), evidence of redoximorphic characteristics, soil structure and clay mineralogy are all important in deciding on the degree to which a site might be affected by development, and how these factors might contribute to the degradation of the ecology of the site. These conditions and associated sensitivities are considered and noted in terms of the overall bio-diversity balance of the sustainability equation and have been used to better understand and manage the development plan. These factors all contribute to the inputs to the mitigation proposed.

8.5.4 Land Use Capability

The area to be disturbed by the proposed new developments will definitely impact the surface environment, with the footprint of impact being planned over a range of land capability classes. These include for the most part significant areas of low potential grazing land and wilderness rated sites, with a significant area of moderate potential arable land.

Arable Land

There are very limited areas that classify or rate as arable lands, the deep red coloured fine to medium grained sandy loams and moderate to deep weakly structured sandy clay loams returning variables that rate as having a moderate potential.

Grazing Land

The classification of grazing land covers the more shallow and transitional zone soils, and although not always free draining to a depth of 750mm, they are capable of sustaining palatable plant species. A significant portion of the study area classifies in this category as moderate or poor intensity grazing land.

Wilderness / Conservation Land

The shallow to very shallow and rocky areas are characteristically poorly rooted and support at best low intensity grazing, or more realistically are of a wilderness character and rating.

Wetland (Areas with wetland status soils)

The wetlands have been mapped and classified as part of the wetland study.

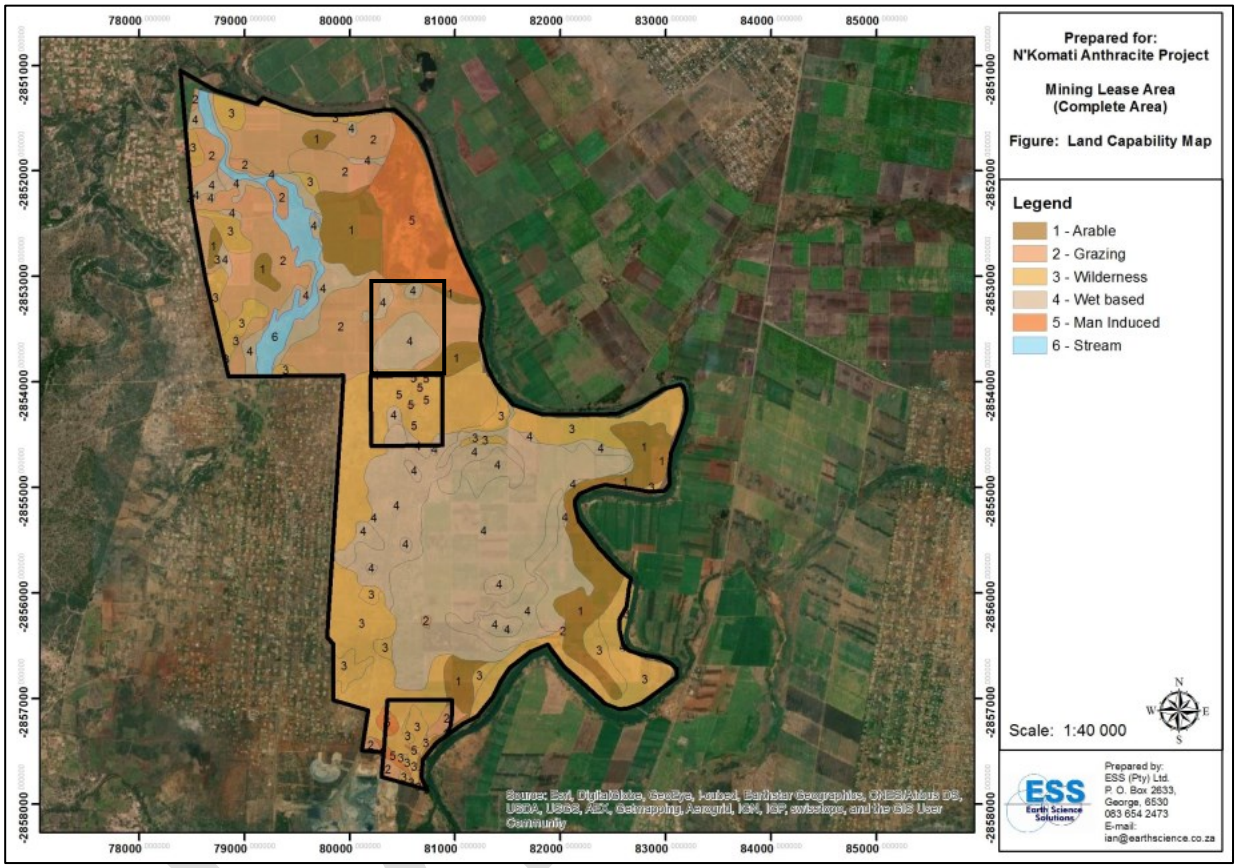

Figure 8-18: Land Use and Land Capability Map (ESS, 2021)

8.6 Air Quality

There are no significant sources of air pollution in the area surrounding the three Nkomati Anthracite Mine sites. There is no industrial activity in the municipality and the area might be described as being relatively rural and predominantly under agriculture besides the towns of Ntunda and Tsonga to the north, eMangweni immediately to the east of the underground works, Sibange and Madadeni to the west and south of the Madadeni Opencast Mine.

The dependence on wood and coal as an energy source has reduced significantly and is illustrated by the increased use of electricity for lighting from 47.6% in 2001 to 83.3% in 2011 (http://www.statssa.gov.za/?page_id=993&id=nkomazi-municipality). In 2011 65.4% of all homes used electricity for cooking and 50.6% for heating . Wood is still used in 28.3% of homes for cooking and 10.6% for heating. The use of coal is limited. Wood is a relatively dirty fuel and results in emissions of mostly particulates and carbon monoxide and smaller amounts of oxides of nitrogen (NOX) and sulphur dioxide (SO2). Emissions of these

pollutants from domestic wood burning will influence local ambient air quality. It is not possible to quantify the effect without any ambient monitoring in the area.

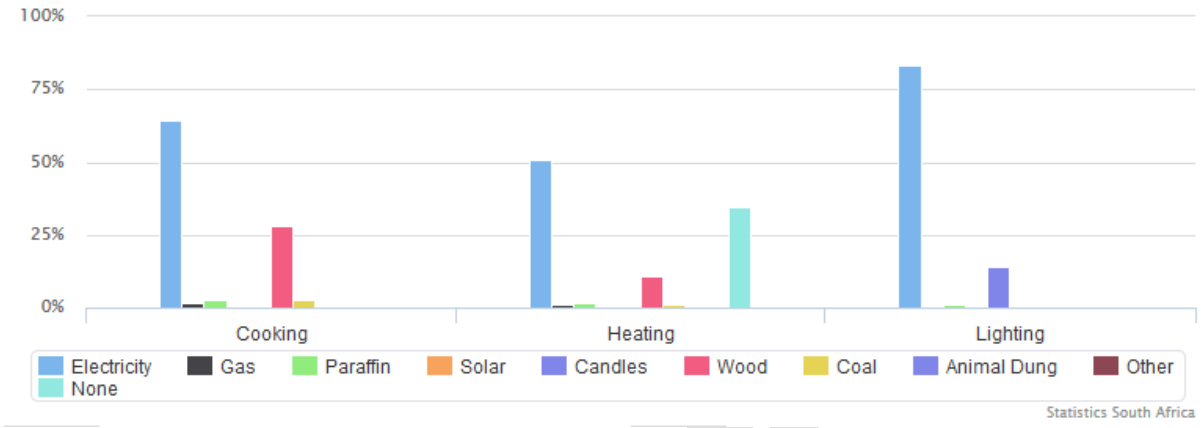

Figure 8-19: Energy Use Statistics for Nkomazi Municipality for Cooking, Heating and Lighting (http://www.statssa.gov.za/?page_id=993&id=nkomazi-municipality, 2011)

Nkomati Anthracite Mine measures dust fallout at a number of sites. Dust fallout monitoring is done according to the SANS 1929:2005 and ASTM Standard, D1739-98: Standard Test Method for the Collection and Measurement of Dust fall (Settleable Particulate Matter). Dust fallout gauges are exposed for a month at a time, and the collected samples are weighed in the gravimetric laboratory and then converted to dust fallout in g/m2/day. Dust fallout (DFO) monitoring started at Nkomati Anthracite Mine in February 2018. A network of 12 DFO monitoring sites was established in the underground mining area, at the processing plant and at one site in the north opencast area. In 2019 an additional site was added at the north opencast area. The highest DFO in 2018 and 2019 was recorded at two sites in the plant area (10S and 11S) and in the north opencast pit area (14N) where the limit value of the National Dust Standard of 1 200 mg/m2/month for non-residential areas was exceeded. The Standard provides for two exceedances of the limit value per year, implying that the standard was exceeded at these three monitoring points.

In 2020 the DFO monitoring was reduced to seven monitoring sites and no exceedances of the National Dust Standard were reported. In 2021 it was expanded to 13 monitoring points with sites around the Mangweni Mini Pit. The National Dust Standard was not exceeded in 2021, but some exceedances of the limit value were recorded at the Mini Pit.

Table 8-6: Number of Monthly Exceedances of the National Dust Standard for Non-Residential Areas (uMoya-Nilu, 2022)

Site name	Site area	2018	2019	2020	2021
01E	East Underground Area	0	0	0	0
02N	North Underground Area	0	0	0	0
03W	West Underground Area	0	0	0	0
04S	South Underground Area	0	0	0	0
05NW	North-West Underground Area	0	0	0	0
06N	North Underground Area	0	0	0	0
08E	Surface/Plant Area	0	0	0	0
09W	Surface/Plant Area	0	0	0	0
10S	Surface/Plant Area	**3**	**7**	0	2
11S	Surface/Plant Area	1	**3**	0	2
12E	Surface/Plant Area	0	0	0	0
13E	East O/C Pit Area	0	0	0	1
13E	Opencast Pit East	0	0	0	1

14N	North O/C Pit Area	**5**	**7**	0	0
15N	Opencast Pit North	0	0	0	0
16W	Opencast Pit West	0	0	0	0
DB 1	Mini Pit Main Gate	0	0	0	2
DB 2	Mini Pit View Point	0	0	0	1
DB 3	Mini Pit Underground	0	0	0	0
DB 4	Mini Pit Community	0	0	0	0

In summary, it appears that ambient air quality in the vicinity of the Nkomati Anthracite Mine operations is relatively good. The influence of the mining activities is localised and complies with the dust standards at most of the monitoring sites. The influence of wood burning is likely to be localised.

Emissions of TSP, PM_{10} and $PM_{2.5}$ for the Current Baseline, Future Mining at Block L and the Current Baseline + Future Mining at Block L Emission Scenarios are shown in the following table. Points to note when reading the following table are:

- Emissions for the Current Baseline include the Madadeni Opencast Mine, Underground Workings, the Processing Plant and current haul road activity. Emissions from the Processing Plant are relatively small as are the emissions from the Madadeni Opencast Mine and Underground Workings. More than 92% of particulate emissions are attributed to the current haul road activity;
- Emissions from the Future Mining at Block L Emission Scenario include the Block L Opencast Mine and haul road activity associated with the introduction of mining at Block L. Total emissions as a result of future mining at Block L are higher than emissions from the Current Baseline Emission Scenario. More than 94% of the particulate emissions are attributed to haul road activity.
- Emissions for the Current Baseline + Future Mining at Block L Emission Scenario include emissions from the Current Baseline and Future Mining at Block L. Total emissions increase almost 2.5 times of the Current Baseline. In this scenario, emissions from the Madadeni Opencast Mine, Underground Workings and Process Plant remain the same. The increase in emission is attributed mainly to an increase from the haul road activity, accounting for more than 93% of the total emission.

Table 8-7: Particulate Emissions in tonnes per annum for the Current Baseline, Future Mining at Block L and Current Baseline + Future Mining at Block L Operational Scenarios (uMoya-Nilu, 2022)

	Operational Emission Scenarios								
Activity	**Current Baseline**			**Future Mining at Block L**			**Current Baseline + Future Mining at Block L**		
	TSP	**PM_{10}**	**$PM_{2.5}$**	**TSP**	**PM_{10}**	**$PM_{2.5}$**	**TSP**	**PM_{10}**	**$PM_{2.5}$**
	tpa	tpa	tpa	tpa	tpa	tpa	tpa	tpa	tpa
Madadeni Open Cast Mine									
Overburden Removal	14.07	2.72	1.48				14.07	2.72	1.48
Blast Hole Drilling	0.96	0.50	0.50				0.96	0.50	0.50
Blasting	1.26	0.65	0.04				1.26	0.65	0.04
ROM	0.10	0.05	0.01				0.10	0.05	0.01
Sub-total	**16.39**	**3.92**	**2.03**				**16.39**	**3.92**	**2.03**
Underground Mine									
ROM	0.06	0.03	0.01				0.06	0.03	0.01
Conveyor Transfer Pts	0.02	0.01	0.00				0.02	0.01	0.00
Sub-total	**0.07**	**0.03**	**0.01**				**0.07**	**0.03**	**0.01**
Processing Plant									

Primary Crushing	0.18	0.08	0.01				0.18	0.08	0.01
Secondary Crushing	0.14	0.06	0.01				0.14	0.06	0.01
Screening	0.75	0.37	0.01				0.75	0.37	0.01
Conveyor Transfer Pts	0.02	0.01	0.00				0.02	0.01	0.00
ROM	0.19	0.09	0.02				0.19	0.09	0.02
Stockpiles	0.39	0.18	0.03				0.39	0.18	0.03
Sub-total	**1.67**	**0.80**	**0.08**				**1.67**	**0.80**	**0.08**
Current Haul Road Activity									
Road Dust	220.24	62.78	6.28				220.24	62.78	6.28
Grading	2.67	1.32	0.08				2.67	1.32	0.08
Sub-total	**222.91**	**64.10**	**6.36**				**222.91**	**64.10**	**6.36**
Block L Open Cast Mine									
Overburden Removal				14.07	2.72	1.48	14.07	2.72	1.48
Blast Hole Drilling				3.25	1.71	1.71	3.25	1.71	1.71
Blasting				1.28	0.67	0.04	1.28	0.67	0.04
Overburden & Topsoil Stockpiles				2.51	1.22	0.33	2.51	1.22	0.33
Sub-total				**21.11**	**6.30**	**3.55**	**21.11**	**6.30**	**3.55**
Haul Road Activity associated with Block L									
Road Dust				333.20	94.98	9.50	333.20	94.98	9.50
Grading				1.14	0.57	0.04	1.14	0.57	0.04
Sub-total				**334.34**	**95.54**	**9.53**	**334.34**	**95.54**	**9.53**
TOTAL	**241.04**	**68.85**	**8.48**	**355.45**	**101.85**	**13.08**	**596.49**	**170.69**	**21.56**

8.7 Geology

The geological map of the study area is shown below. The geology in general comprise of green, fine-grained mafic lava of the Letaba Formation of the Lebombo group of the Karoo Sequence. It also includes the Tshipise member cream-coloured, fine grained, massive sandstones of the Clarens Formation of the Lebombo Group of the Karoo Sequence. There are undifferentiated Karoo Sequence sandstones below the above mentioned Letaba sandstones which make up a large portion of the project area. Further away and not directly related to the project area potassic gneiss and migmatite of the Nelspruit Suite can be found (none of this lithology was found in the borehole logs from the newly drilled boreholes).

Faulting occurs generally in a north – south direction with displacements up to and exceeding 50 metres. In addition dykes intruded in the fault panes and sills displaced and burnt the anthracite seams. The Middle Ecca Formation thins from the south to the north on strike as shown by the sandstone partings between the different anthracite seams. In the southern area, the Upper and Middle Seams are separated by 50 metres of sediments, while the Middle and Lower are separated by 20 metres of sediments. In the northern area this decreases to 8.5 and 0.7 metres respectively. From west to east, however, the succession thickens.

The anthracite seams have a tendency to thicken from south to north on a regional scale while a thinning is normally encountered from west to east in the area of the KaNgwane Coalfield and may consist of up to five benches of different appearance and quality. Seam 4 varies in thickness between 2.5 m and 6.5 m; the coal is predominantly dull. Seam 5 consists of predominantly bright coal and has an average thickness of about 1.8 m.

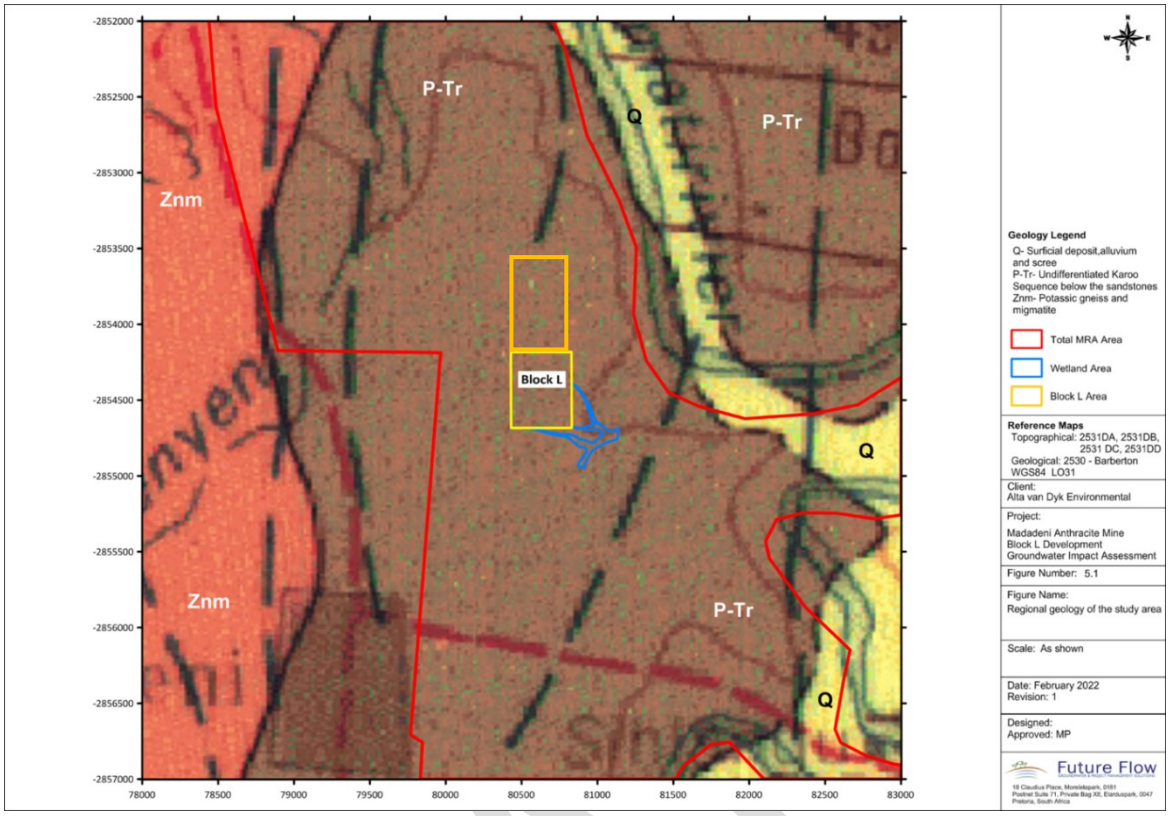

Figure 8-20: Geology of Mining Right Area (FFGPMS, 2022)

8.8 Hydrogeology

8.8.1 Groundwater Aquifers

Four aquifers occur in the area. These four aquifers are associated with a) the weathered material, b) the underlying shallow slightly weathered fractured rock material, c) the deeper more competent less weathered fractured rock, and d) the alluvial sands along the Komati River. The anthracite horizon will also act as a fractured aquifer within the deeper fractured rock environment, however little hydraulic information on this layer exists. The following is a description of the natural aquifer systems in the area.

Upper weathered material aquifer

The upper aquifer forms due to the vertical infiltration of recharging rainfall through the weathered material being retarded by the lower permeability of the notable clay content in the weathered material. Groundwater collecting above the weathered / clayey material contact migrates down gradient along the contact to lower lying areas. In places where the contact is near surface the groundwater can daylight on surface as springs. The topsoil and weathered material in the west, away from the Komati River have an average thickness of approximately 7 to 9 m. Close to the Komati River, in the flood plain the depth ranges up to 25 to 32 m. Reference to the Groundwater Resource Assessment report (Department: Water Affairs and Forestry, 2006) shows that recharge from rainfall into the X13J quaternary catchment is 5.58 %. Aquifer transmissivities are in the order of 0.3 to 1.1 m^2/day.

Upper fractured rock aquifer

Although the lower permeability of the competent rock material will retard vertical infiltration of groundwater some of the water in the upper aquifer will recharge the lower aquifer. The geological map does indicate major faults or fractures in the area, which will also help recharge the lower aquifers. The average aquifer thickness is around 30 to 40 m.

Groundwater flows in the upper fractured rock aquifer are associated with the secondary fracturing in the competent rock that was formed by the major north / south striking faulting seen from the geological maps. As such groundwater flows and contaminant transport will be along discrete pathways associated with the fractures. The general transmissivity of the competent rock material is around 0.1 m^2/day (Grobbelaar, Usher, Cruywagen, de Necker, & Hodgson, 2004).

Lower fractured rock aquifer

The lower fractured rock aquifer is associated with the more competent fractured rock below 50 m where there is little indication of weathering. Recharge is from the upper fractured rock aquifer through discrete fractures and faults. Transmissivities could range between 0.01 to 0.4 m^2/day. The average extinction depth of this layer is expected to be approximately 80 m below surface where the weight of the overlying rocks will close the fractures.

Alluvial aquifer

The aquifer is associated with the alluvial sands along the Komati River. The sands are expected to have a relatively high storage capacity (around 20 %), as well as a high transmissivity. Due to the high storage and constant recharge from the Komati River this aquifer can hold a significant volume of water. However, because the sands are confined to the vicinity of the Komati River it does not play a major role in the regional groundwater flows.

Aquifer transmissivity

The aquifer hydraulic conductivity of the upper weathered material aquifer and the upper and lower fractured rock aquifers was determined through a literature review (upper weathered material aquifer) and aquifer testing done on the 4 newly drilled groundwater monitoring boreholes (upper and lower fractured rock aquifer). A literature survey of previous groundwater studies done in the area show that the upper weathered aquifer has a transmissivity ranging between 0.3 to 1.1 m^2/day and low storage.

The aquifer tests that were formed assessed the upper and lower fractured rock aquifers. Due to the low transmissivity of the lower fractured rock aquifer, it is assumed that the calculated transmissivities mostly reflect the upper fractured rock aquifer. Please refer to the below table for the aquifer test results. Analysis of the aquifer test data for the boreholes was done using AquiferWin32, which is an internationally developed and used software package. Three different methods were used to calculate the transmissivity. The transmissivity around borehole NKBH1 is calculated to be in the order of 0.49 m^2/day. It can be seen that the transmissivity in boreholes NKBH2, NKBH3 and NKBH4 ranges around 0.04 to 0.1 m^2/day for the pumping phase data, while recovery phase data indicate transmissivities of 0.16 m^2/day for both NKBH2 and NKBH3, while NKBH4 show a transmissivity of 7.42 m^2/day. It should be taken into account that the groundwater level recovery in these boreholes was very poor, especially in borehole NKBH4 where the groundwater level recovered only 5 %, and therefore, the transmissivities obtained from the recovery phase data is less reliable than that of the pumping phase data.

Table 8-8 Aquifer Test Results (FFGPMS, 2022)

Borehole	Units	NKBH1	NKBH2	NKBH3	NKBH4
Static Water Level	mbgl	4.04	4.81	8.73	34.02
Test - pump phase duration	min	480	80 (pump inlet)	40 (pump inlet)	7 (pump inlet)
Abstraction Rate	L/s	0.30	0.25	0.25	0.20
Drawdown achieved	m	17.57	49.10	18.37	19.34
Recovery achieved	%	74	86	74	5
Transmissivity (Theis)	m^2/day	0.56	0.04	0.07	0.12
Transmissivity (Cooper-Jacob)	m^2/day	0.41	0.06	0.08	0.10
Transmissivity (Recovery)	m^2/day	0.49	0.16	0.16	7.42
Transmissivity (Average)	m^2/day	0.49	0.08	0.10	0.11

8.8.2 Groundwater Levels

The hydrocensus of the 2019 study (Future Flow GPMS cc, November 2019) was updated. The hydrocensus covered the area in a 2 km radius around the proposed mining activities. The aim of this hydrocensus was to collect information on privately owned groundwater boreholes around the mine. During this process privately owned boreholes in the area were identified, the groundwater levels measured, and the groundwater use (type and volume) recorded. Most of the properties in the area obtain water from the Komati River; therefore, there is a sparsity of boreholes that are used for water supply. Only 1 privately owned groundwater point was identified in the field due to landowners obtaining water from the Komati River. In addition to the hydrocensus data existing boreholes at Nkomati mine as well as the newly drilled groundwater monitoring boreholes are also taken into account.

Results from the 2019 study (Future Flow GPMS cc, November 2019) showed that there is a separation between the groundwater levels associated with the weathered material aquifer and those of the fractured rock aquifer. At the time the measured groundwater levels showed that the depth to groundwater level in the weathered material aquifer ranged between 2 and 4 m while the depth to groundwater level in the fractured rock aquifer ranged between 7 and 14 m. This separation between the two aquifers was attributed to the presence of a clay layer. The clay layer acts as an aquitard that reduces groundwater flow between the two aquifers. Results from the current hydrocensus do not show such a clear distinction in the groundwater levels, although a number of the boreholes are the same boreholes that were visited during 2019. During this hydrocensus the depth to groundwater level ranged between 3.78 and 10.77 m.

Looking at the following figures, it can be seen that there is no clear grouping for different aquifers in the measured groundwater levels. Taking into consideration that the clay layer is still present regionally, and that many of the boreholes are located close to existing mining areas, it is concluded that removal of the clay layer as part of the existing opencast mining operations created a better hydraulic connection between the two aquifers.

Borehole NKBH4 shows a depth to groundwater level of 34.02 m. The borehole was newly drilled and the aquifer test results show a very low transmissivity and only 5 % recovery of the groundwater level after completion of the pumping phase. Based on this, it is concluded that the anomalously deep groundwater level is due to the low permeability around the borehole and the associated slow rate of rise of the groundwater level within the borehole after drilling was completed. It is expected that the groundwater level will eventually stabilise between 4 and 10 m below surface. In areas where there are no large scale external impacts on the groundwater environment, such as the lowering of groundwater level through dewatering, and where the geology and aquifer interactions are not excessively complex it is expected that the groundwater level contours will reflect topographical contours, although at a moderated gradient. The depth to groundwater level in the two aquifers against topography shows a 96.25 % correlation. Based on this it is concluded that groundwater levels in the study area mimic topography.

Bayesian interpolation is used to interpolate the regional groundwater levels throughout the study area for the weathered material aquifer. Regionally, groundwater flow from the west towards the Komati River in the east. Close to the existing opencast and underground mine areas the groundwater levels in the weathered material aquifer is expected to remain near surface. It is possible that the groundwater level in the fractured rock aquifer underneath the clay layer will be drawn down locally around the mining areas due to mine dewatering, although that is not seen in the groundwater levels in the existing monitoring boreholes. The impact on the groundwater levels in the fractured rock aquifer is potentially mitigated by seepage from the weathered material aquifer due to the dividing clay layer between the weathered material aquifer and the underlying fractured rock aquifer being disturbed by the mining excavations.

Table 8-9 Hydrocensus Results (FFGPMS, 2022)

BH	Owner	East	North	Elevation	Water level		Use type
		WGS84, LO31	WGS84, LO31	mamsl	mbgl	mamsl	
BH1	Nkomati Mine	79 403	-2 857 900	258.02	6.36	251.66	Monitoring borehole
BH3	Private owner	78 117	-2 856 313	275.04	3.87	271.17	Private use
GCS01	Nkomati Mine	80 323	-2 850 824	252.88	3.78	249.10	Monitoring borehole
GCS03	Nkomati Mine	80 761	-2 852 569	247.79	10.77	237.02	Monitoring borehole

NBH01	Nkomati Mine	80 267	-2 852 590	249.32	4.98	244.34	Monitoring borehole
NBH03	Nkomati Mine	80 953	-2 852 803	242.56	9.10	233.46	Monitoring borehole
NBH05	Nkomati Mine	80 546	-2 851 975	243.78	6.44	237.34	Monitoring borehole
NBH06	Nkomati Mine	80 416	-2 851 832	245.46	Dry/blocked		Monitoring borehole
NBH08	Nkomati Mine	80 897	-2 849 733	253.74	5.84	247.90	Monitoring borehole
NBH02	Nkomati Mine	80 550	-2 853 169	248.00	7.40	240.60	Monitoring borehole
NKBH1	Nkomati Mine	78 778	-2 851 391	239.92	4.04	235.88	Monitoring borehole
NKBH2	Nkomati Mine	79 491	-2 854 193	261.71	4.80	256.91	Monitoring borehole
NKBH3	Nkomati Mine	82 123	-2 854 859	250.56	8.73	241.83	Monitoring borehole
NKBH4	Nkomati Mine	80 673	-2 857 786	251.50	34.02	217.48	Monitoring borehole

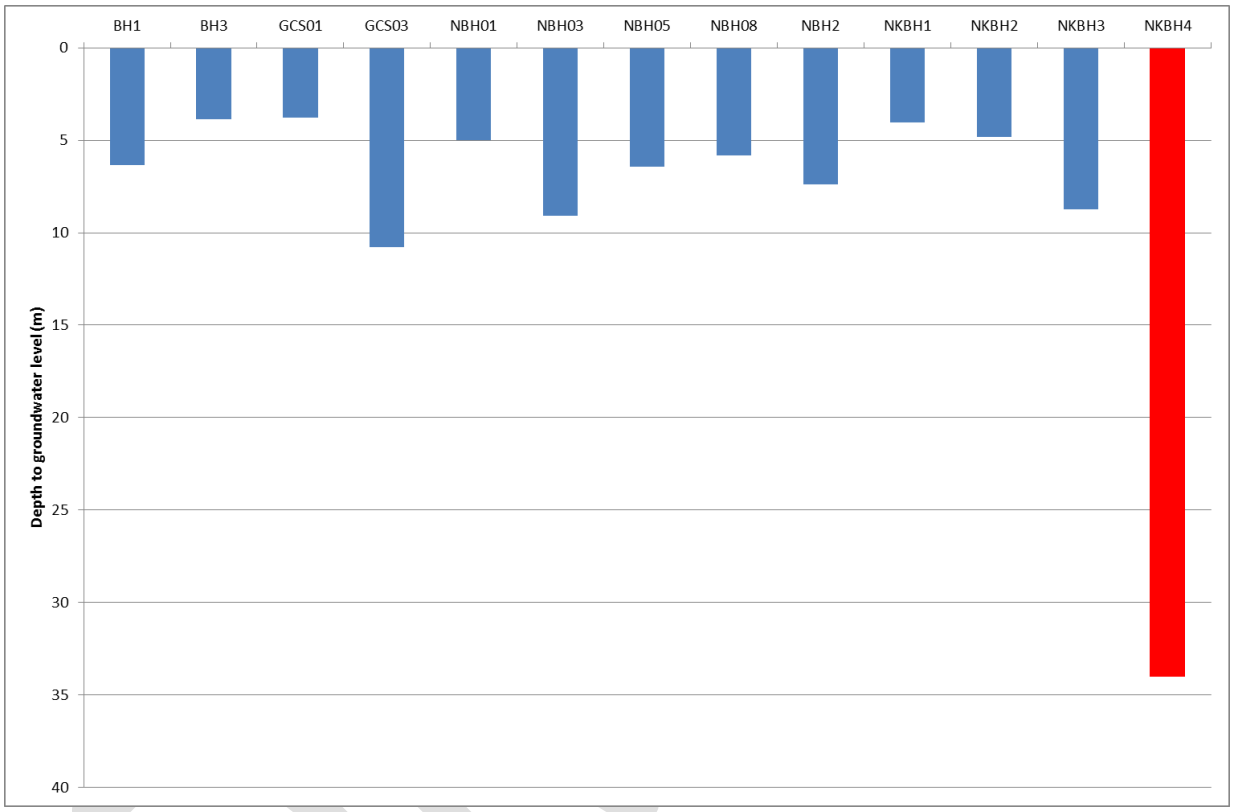

Figure 8-21: Depth to Groundwater Levels (FFGPMS, 2022)

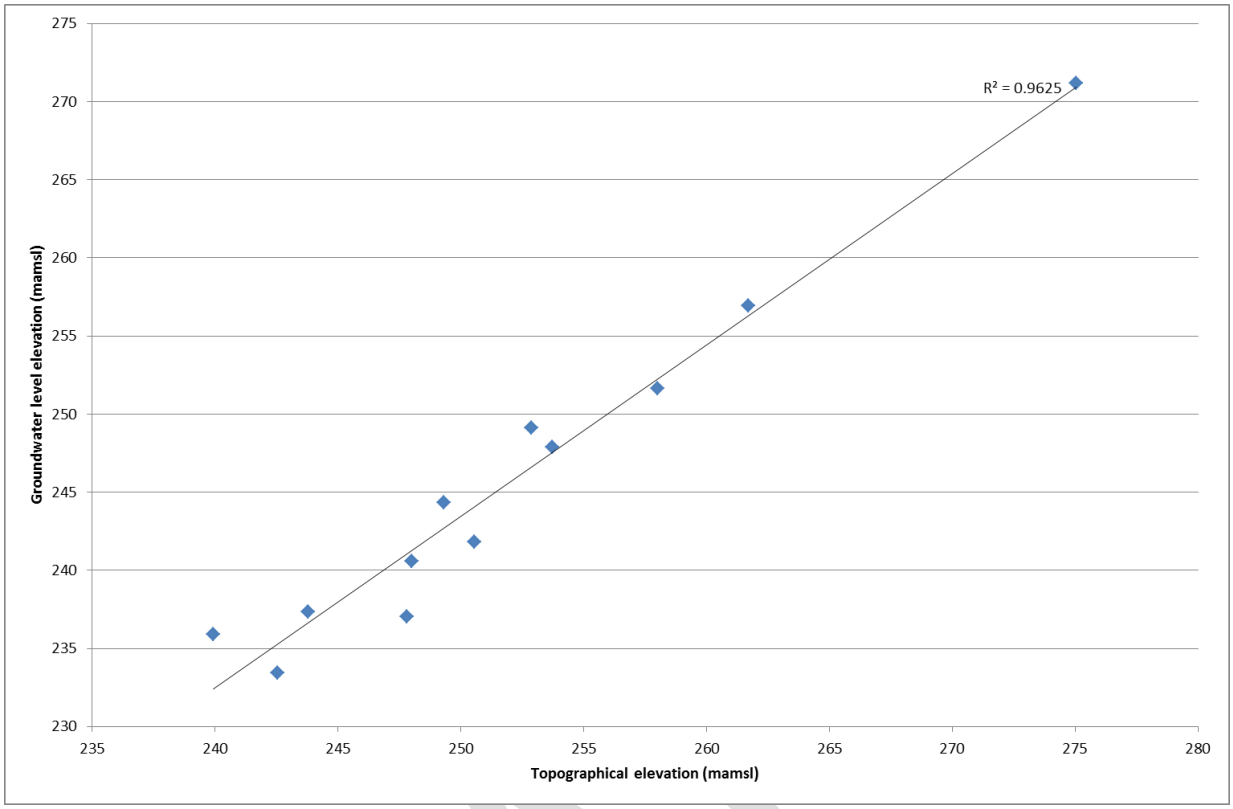

Figure 8-22: Groundwater Elevation vs Topographical Elevation (FFGPMS, 2022)

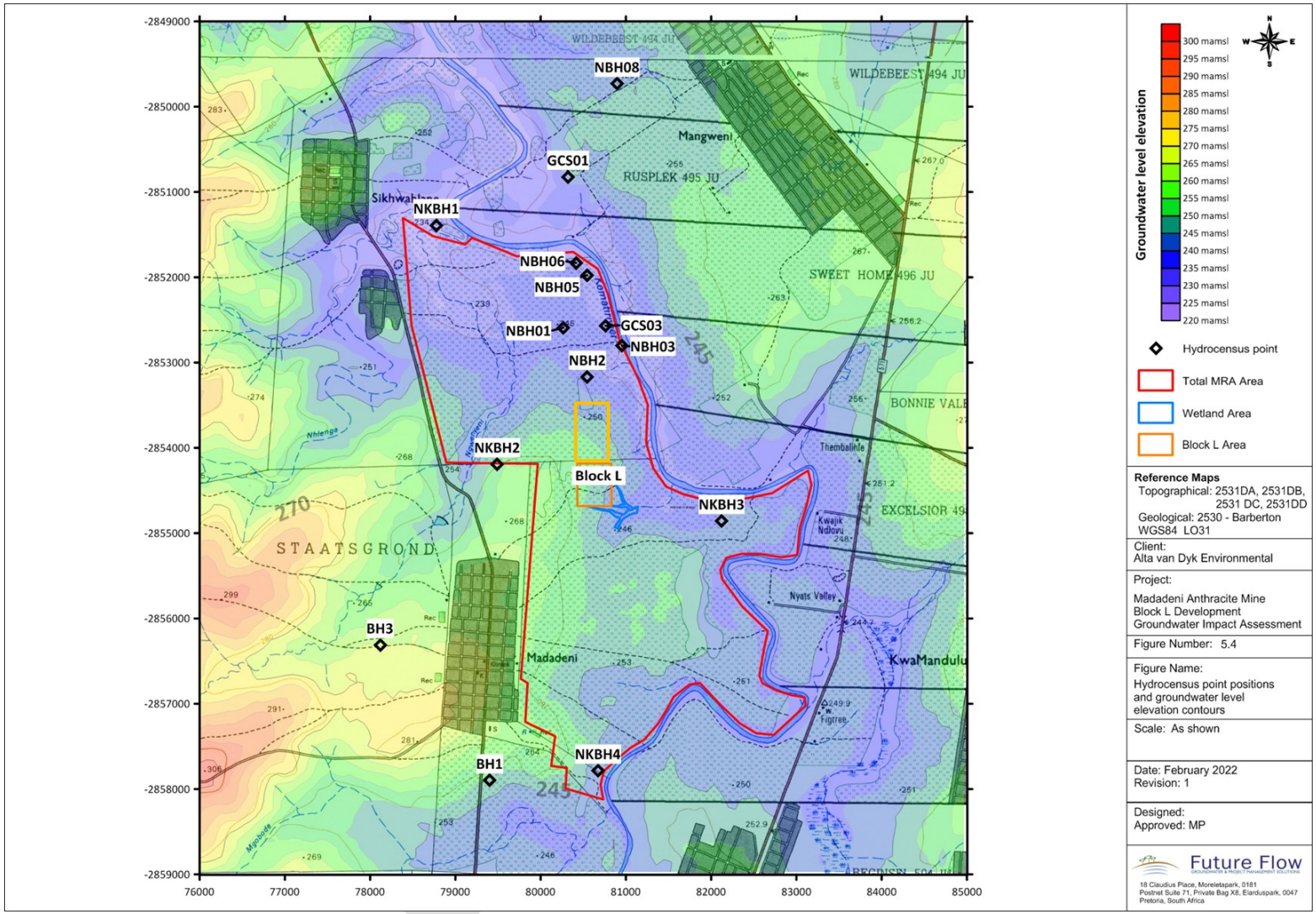

Figure 8-23: N'Komati Ground Water Level Elevations (FFGPMS, 2022)

8.8.3 Groundwater Quality

The Block L excavation area and waste rock stockpile area act as potential sources of contamination to the aquifers. Leach testing results can be used to determine the potential source concentrations. Leach test results show that all elements are expected to comply with LCT0 guideline values. In addition, the acid-base-accounting testing show that none of the material handled on site is expected to be AMD forming. A total of 4 groundwater samples were collected for chemical analysis during the hydrocensus. In addition, groundwater samples were collected from the 4 newly drilled monitoring boreholes. The samples were submitted to an ISO17025 / SANAS accredited laboratory for chemical analysis.

The chemical analysis results of the groundwater samples taken from the study area were compared to the SANS 241:2015 drinking water standards. The standard represents a numerical limit of the listed element concentrations that will protect the health of the consumer over a lifetime of consumption. All elements that exceed the guidelines are highlighted and their aesthetic and health impacts discussed below at the hand of the information contained in the South African Water Quality Guidelines for domestic use as published by the Department of Water Affairs in 1996. There are some individual elements showing concentrations that exceed the applicable SANS241:2015 drinking water guidelines.

Chloride: The chloride concentration in 4 of the 8 boreholes exceeds the SANS241:2015 guideline value of 300 mg/L. The chloride concentration in boreholes NBH08, GCS01, NKBH2 and NKBH3 range between 615 and 815 mg/L. At concentrations above 200 mg/L water has a distinctly salty taste but no health effects are expected. At concentrations above 600 mg/L the water will not slake thirst.

Nitrate: The nitrate concentration in borehole NBH2 (26.6 mg/L) exceeds the guideline value of 11 mg/L. At concentrations between 10 and 20 mg/L methaemoglobinaemia may occur in infants, no effect in adults are expected. At concentrations above 20 mg/L methaemoglobinaemia occurs in infants and mucous membrane irritation in adults occurs.

Sodium: The sodium concentrations in boreholes NBH08, GCS01, NKBH2 and NKBH3 exceed the SANS241:2015 guideline value of 200 mg/L. The sodium concentrations range between 213 and 547 mg/L. At concentrations above 200 mg/L the water will have a salty taste and is undesirable for persons on a sodium restricted diet. At concentrations above 400 mg/L the salty taste intensifies. No health effects are expected in healthy adults with short term use. The water is undesirable for infants.

Aluminium: The aluminium concentration in borehole NKBH1 measured 0.861 mg/L. The SANS241:2015 guideline value for aluminium is 0.3 mg/L. At concentrations above 0.5 mg/L no acute health effects are expected. However, there may be long-term neurotoxic effects. This relationship has not been conclusively demonstrated. Severe aesthetic effects (discoloration) occur in e presence of iron or manganese.

Manganese: the manganese concentrations in NBH08 (0.495 mg/L) and GCS01 (3.40 mg/L) exceed the guideline value of 0.4 mg/L. At concentrations between 0.15 and 1.0 mg/L increasingly severe staining and taste problems, but no health effects, can be expected. At concentrations between 2.0 and 5.0 mg/L extreme staining occurs which is likely to be aesthetically unacceptable to a large proportion of users. No health effects are expected.

8.8.3.1 Chemical Character

The groundwater character is shown at the hand of a Piper diagram. The Piper diagram was created using the AQQA program. The Piper diagram, introduced by Arthur Piper in 1944, is one of the most commonly used techniques to interpret groundwater chemistry data. This method proposed the plotting of cations and anions on adjacent tri-linear fields with these points then being extrapolated to a central diamond field. Here the chemical character of water, in relation to its environment, could be observed and changes in the quality interpreted. The cation and anion plotting points are derived by computing the percentage equivalents per million for the main diagnostic cations of calcium, magnesium and sodium, and anions chloride, sulphate and bi-carbonate.

Different waters from different environments always plot in diagnostic areas. The upper half of the diamond normally contains water of static and dis-ordinate regimes, while the middle area normally indicates an area of dissolution and mixing. The lower triangle of this diamond shape indicates an area of dynamic and co-ordinated

regimes. Sodium chloride brines normally plot on the right hand corner of the diamond shape while recently recharged water plots on the left-hand corner of the diamond plot. The top corner normally indicates water contaminated with gypsum.

In general the top half of the diamond contains static waters and other unusual waters high in magnesium/calcium chloride and calcium/magnesium sulphate. The lower half contains those waters normally found in a dynamic basin environment. Mixtures of any two waters in any proportion plot along a line joining their respective points in each of these diagrams. Water therefore being invaded by an industrial effluent will plot as a vector towards the analysis of the invading fluid.

The piper diagram which follows shows that the water mainly plot in the centre, and upper portion, of the diamond which indicates some ion exchange having taken place since recharge. None of the borehole show high levels of contamination. Five of the eight samples show a sodium and chloride dominant character. For the remaining three samples bi-carbonate is the dominant anion while calcium and magnesium is also a dominant cation in one sample each.

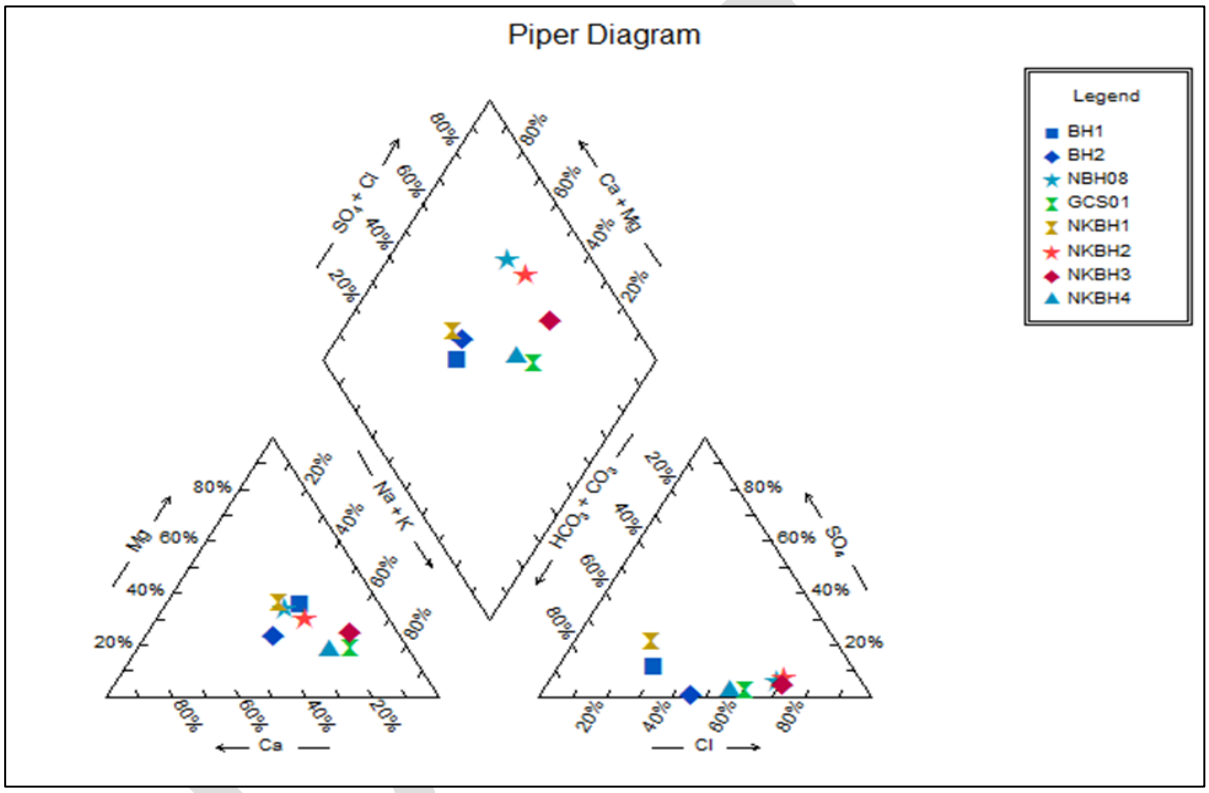

Figure 8-24: Piper Diagram (FFGPMS, 2022)

Table 8-10 Groundwater Chemical Analysis Results

Analysis	Units	SANS 241:2015 guideline value	BH1	BH2	NBH08	GCS01	NKBH1	NKBH2	NKBH3	NKBH4
pH		≥5 - ≤9.7	7.71	7.91	7.34	8.08	8.33	7.78	7.59	7.52
Electrical Conductivity (EC)	mS/m	≤170	109	27.9	245	368	19	316	301	110
Total Dissolved Solids (TDS)	mg/L	≤1 200	678	162	1406	2159	99	1953	1706	589
Alkalinity	mg/L $CaCO_3$	N/G	401	91.3	421	858	55.8	454	459	262
Chloride (Cl)	mg/L	≤300	109	43.6	615	813	13.6	815	750	199

Sulphate (SO_4)	mg/L	≤500 (health)	57.6	0.489	64.7	38.7	16.6	112	60.5	9.71
Nitrate (NO_3)	mg/L	≤11	10.2	<0.194	<0.194	<0.194	0.343	26.6	3.38	0.324
Ammonium (NH_4)	mg/L	N/G	0.023	0.388	0.065	4.64	0.076	0.089	0.136	0.414
Orthophosphate (PO_4)	mg/L	N/G	<0.005	0.009	<0.005	2.06	0.02	0.037	0.014	0.201
Fluoride (F)	mg/L	≤1.5	0.402	<0.263	<0.263	0.623	0.276	0.701	0.627	<0.263
Calcium (Ca)	mg/L	N/G	56.9	22.3	149	128	10.6	167	86	49.8
Magnesium (Mg)	mg/L	N/G	51.8	8.34	104	83.8	7.81	118	87.8	22.3
Sodium (Na)	mg/L	≤200	112	19.2	213	547	13	343	402	134
Potassium (K)	mg/L	N/G	0.997	11.6	3.25	18.2	1.87	3.34	24.4	11.6
Aluminium (Al)	mg/L	≤0.3	<0.002	0.002	0.01	0.035	0.861	<0.002	<0.002	<0.002
Iron (Fe)	mg/L	≤2 (health)	<0.004	<0.004	<0.004	0.004	0.41	<0.004	<0.004	<0.004
Manganese (Mn)	mg/L	≤0.4 (health)	0.143	0.393	0.495	3.4	<0.001	0.061	0.366	0.109
Chromium (Cr)	mg/L	≤0.05	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper (Cu)	mg/L	≤2	0.762	<0.002	<0.002	<0.002	0.07	<0.002	<0.002	<0.002
Nickel (Ni)	mg/L	≤0.07	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc (Zn)	mg/L	≤5	0.031	0.127	0.085	0.009	0.009	0.002	0.007	0.002
Cobalt (Co)	mg/L	N/G	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.003	<0.003
Cadmium (Cd)	mg/L	≤0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Lead (Pb)	mg/L	≤0.01	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Total Hardness	mg/L $CaCO_3$	N/G	355	90	798	665	59	904	576	216
Bicarbonate	mg/L $CaCO_3$	N/G	399	90.6	420	848	54.6	451	457	262

8.8.4 Groundwater Flows

The baseline data is analysed and compiled into a conceptual model which is summarised below.

There are four aquifers present in the area, associated with a) the upper weathered material, b) the upper, weathered fractured competent rock, c) the lower unweathered fractured rock material, and d) the alluvial sands along the Komati River channel. The upper weathered material aquifer is present throughout the whole of the study area and is heavily dependent on rainfall and therefore yields from the aquifer vary seasonally. During the dry season sections of the aquifer will be dry due too little to no recharge from rainfall occurring. In low lying areas, close to streams, the aquifer can be expected to contribute to stream flow volumes through baseflow contribution during the rainy season. It is possible that during the dry season the flow direction can change at perennial streams and the river will then recharge the underlying and surrounding weathered material aquifer. The transmissivity of the aquifer is between 0.3 and 1.1 m^2/day.

The underlying upper and lower fractured rock aquifers are associated with secondary fracturing that occurred during formation of the numerous north / south striking structures in the area. The majority of the groundwater flows in the aquifer are along discrete fractures. In the upper fractured rock aquifer zone flows can be expected to be more widespread due to a higher fracture density and fracture interconnection while groundwater flows in the lower fractured rock aquifer will be more discrete. The upper weathered fractured aquifer has an average thickness of between 30 and 40 m. The lower unweathered fractured rock is expected to have an extinction depth of around 80 mbgl. The general transmissivity of the competent rock material is around 0.1 m^2/day. The transmissivity of the lower fractured rock aquifer ranges between 0.01 to 0.4 m^2/day.

The alluvial aquifer is associated with the sands along the Komati River channel and are expected to have a relatively high storage capacity (around 20 %), as well as a high transmissivity. Due to the high storage and constant recharge from the Komati River this aquifer can hold a significant volume of water. However, because the sands are confined to the vicinity of the Komati River it does not play a major role in the regional groundwater flows.

The depth to groundwater level ranges between 3.78 and 10.77 m. There is no clear grouping for different aquifers in the groundwater levels. With the clay layer present regionally, and with many of the boreholes located close to

existing mining areas, it is concluded that removal of the clay layer as part of the existing opencast mining operations created a better hydraulic connection between the weathered material and fractured rock aquifers.

Regionally, groundwater flow from the west towards the Komati River in the east. Close to the existing opencast and underground mine areas the groundwater levels in the weathered material aquifer is expected to remain near surface. It is possible that the groundwater level in the fractured rock aquifer underneath the clay layer will be drawn down locally around the mining areas due to mine dewatering, although that is not seen in the groundwater levels in the existing monitoring boreholes. The impact on the groundwater levels in the fractured rock aquifer is potentially mitigated by seepage from the weathered material aquifer due to the dividing clay layer between the weathered material aquifer and the underlying fractured rock aquifer being disturbed by the mining excavations.

Rainfall recharges into the aquifers. Long term rainfall data show an average rainfall figure of 673 mm/a. The Groundwater Resource Assessment report shows that recharge from rainfall into the X13J quaternary catchment is 5.58 %.

Factors that could impact on groundwater flows in the catchment include:

- Drawdown of groundwater levels within and around the proposed mining developments;
- Recovery of groundwater levels when mining and the associated dewatering stop; and
- Seepage from the overburden and topsoil stockpiles, as well as ROM and product stockpiles where rainfall accumulates and artificially increases recharge to the underlying aquifers. Research shows that recharge from such areas can be as high as 20% of the annual rainfall in comparison to 1 to 3 % for general areas (Hodgson & Krantz, 1995).

Groundwater inflow volumes into Block L are anticipated to increase from 40m^3/day in year 1, to 50m^3/day, 100m^3/day, 120m^3/day up to a maximum of 140m^3/day in years two, three, four and five respectively. No acid mine drainage conditions are expected and none of the materials on site will cause leach qualities where any elements exceed Regulation 635 Leach Concentration Thresholds (LCTD). As a result, no significant contamination of surrounding aquifers are expected.

8.8.5 Ground Water Monitoring

A water monitoring program with focus on the possible sources of impact is in place at Nkomati Mine. The sources of impacts include the existing and historic opencast and underground mining areas as well as surface stockpile areas. The monitoring program follows a quarterly interval with parameters and elements monitored summarised in the following tables and figure. These quarterly reports are submitted to the relevant departments and this practise will be continued.

Table 8-11 Ground Water Monitoring Points

Ref	Description	Coordinates	Status
GCS01	Nkomati washing plant, U/G operations	S25.76304 E31.80068	Active
GCS02	Nkomati U/G workings	S25.75778 E31.80043	Active
GCS03	Nkomati U/G workings	S25.77572 E31.80515	Active
GW01	Nkomati groundwater seepage at U/G entrance	S25.75370 E31.80959	Active
MGCS04	Down gradient of Madadeni Opencast area, close to Komati	S25.8282 E31.8063	Active
MGCS05	Down gradients of Madadeni Opencast area	S25.8283 E31.8018	Active
MGCS06	Up gradient of Madadeni O/C	S25.83340 E31.79252	Active
NBH01	Nkomati production B/H in wash plant area, West of O/C	S25.77895 E31.80022	Active
NBH02	Nkomati South West of O/C void	S25.78414 E31.80307	Active
NBH03	Nkomati North East of O/C void, between void and Komati River	S25.78078 E31.80711	Active
NBH05	Nkomati down gradient of make-up water and slurry dams	S25.77336 E31.80296	Active
NBH06	Nkomati North of make-up water and slurry dams	S25.77213 E31.80174	Active
NBH08	North of Nkomati U/G operations	S25.75318 E31.80631	Active

Table 8-12 Ground Water Monitoring Variables

Variable	Unit
pH @ 25ºC	pH

Variable	Unit
Electrical conductivity @ 25ºC	mS/m
Total dissolved solids (TDS)	mg/l
Calcium (Ca)	mg/l
Magnesium (Mg)	mg/l
Sodium (Na)	mg/l
Potassium (K)	mg/l
Total alkalinity	mg $CaCO_3$/l
Chloride (Cl)	mg/l
Sulphate (SO_4)	mg/l
Fluoride (F)	mg/l
Nitrate (NO_3) as N	mg/l
Nitrate as NO_3	mg/l
Copper (Cu)	mg/l
Iron (Fe)	mg/l
Manganese (Mn)	mg/l
Silicon (Si)	mg/l
Zinc (Zn)	mg/l
Oil and grease (SOG)	mg/l

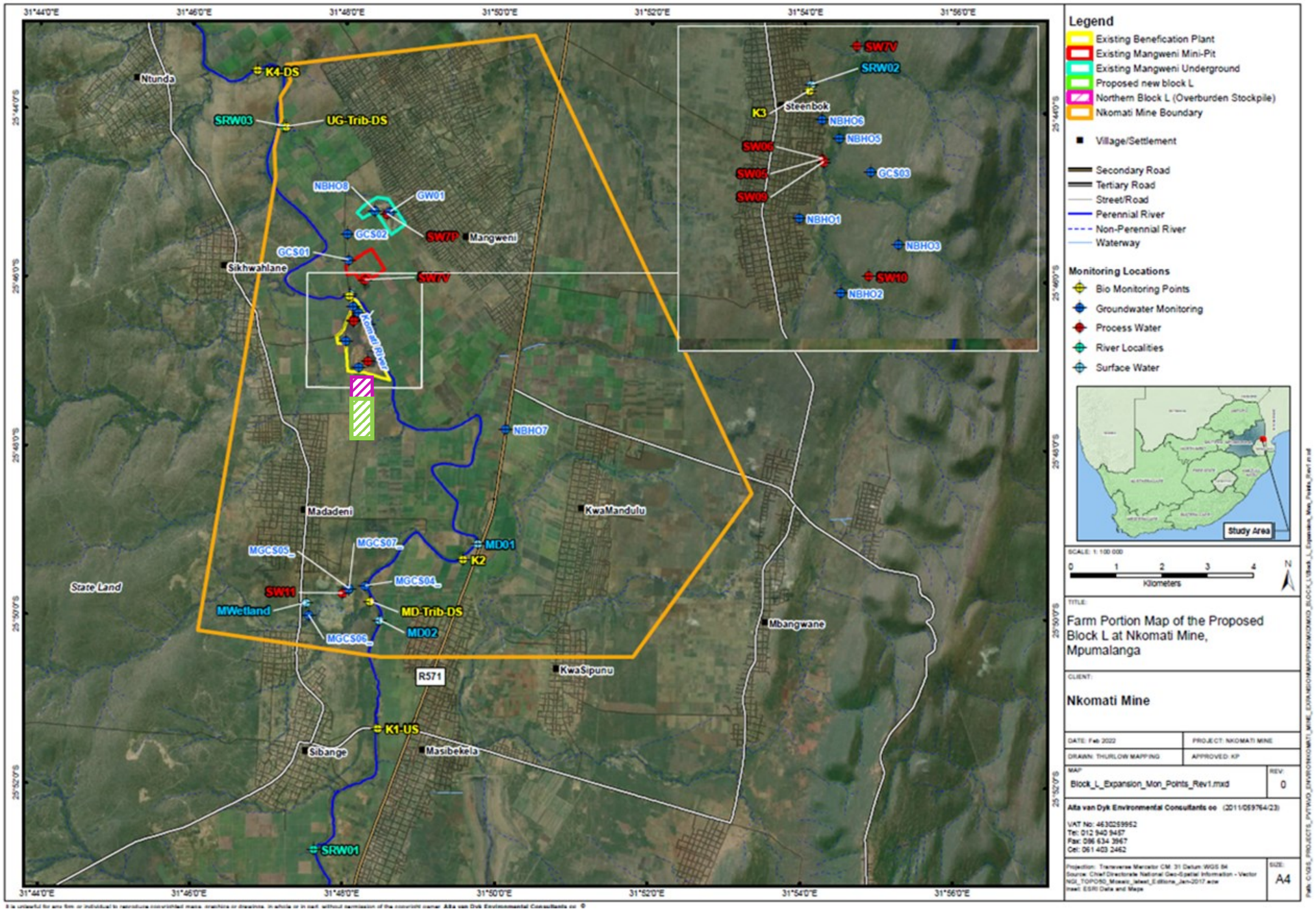

Figure 8-25: Summary of Monitoring Points including biomonitoring, surface, and groundwater points (Thurlow Mapping, 2022)

8.9 Noise & Vibration

dBAcoustics was appointed to assess the current environmental noise sources as well as assess potential environmental noise impact during the Nkomati Expansion Project The main noise sources within and beyond the boundaries of the proposed mining right area (MRA) are:

- Traffic noise along the feeder roads east of the mining right area (MRA);
- Intermittent traffic noise along the gravel roads;
- Haulage along existing haul roads;
- Existing Nkomati mine activity noises
- Agricultural type noises during the different seasons;
- Farmhouses/residential properties in the vicinity of the proposed MRA;
- Animal and bird noises; and
- Wind noise.

The following findings were made with respect to potential noise impacts:

- The noise intrusion levels from the proposed mining activities will be below 2.0dBA; T
- The noise calculations revealed that the noise level at the abutting noise receptors will be insignificant;
- The threshold value of 7.0dBA will not be exceeded during the day and/or night- time periods.
- There will be a shift in the prevailing ambient noise level in the immediate vicinity of the mining activities but at a distance exceeding 500m from the mining activities, the intrusion level will be minimal and in line with the Noise Control Regulations.

Blast Management & Consulting (BMC) was contracted as part of Environmental Impact Assessment (EIA) to perform an initial review of possible impacts with regards to blasting operations in the proposed opencast mining operation. The evaluation of effects yielded by blasting operations was evaluated over an area as wide as 3500m from the mining area. The range of structures observed is typical roads (tar and gravel), low-cost houses, corrugated iron structures, brick and mortar houses, communication towers.

The location of structures around the Pit areas is such that the charge evaluated showed possible influences due to ground vibration. The closest structures observed are the Houses. Ground vibrations predicted for the pit areas ranged between low and very high. The expected levels of ground vibration for some of these structures are higher than suggested limits and will require specific mitigations in the way of adjusting charge mass per delay to reduce the levels of ground vibration. Ground vibration at structures and installations other than the identified problematic structures is well below any specific concern for inducing damage.

Air blast predicted also showed some concerns for opencast blasting. The current accepted limit on air blast is 134 dBL. Prediction shows that air blast will be greater than 134 dB at distance of 540 m and closer to pit boundary. Infrastructure at the pit areas such as roads, power lines/pylons are present, but air blast does not have any influence on these installations. If stemming control is not exercised this effect could be greater with greater range of complaints or damage. The pits are located such that “free blasting” – meaning no controls on blast preparation – will not be possible.

Fly rock remains a concern for blasting operations. Based on the drilling and blasting parameters values for a possible fly rock range with a safety factor of 2 was calculated to be 224 m. The absolute minimum unsafe zone is then the 224 m. This calculation is a guideline and any distance cleared should not be less. The occurrence of fly rock can however never be 100% excluded. Best practices should be implemented at all times. The occurrence of fly rock can be mitigated but the possibility of the occurrence thereof can never be eliminated.

Specific actions will be required for the pit area such as Mine Health and Safety Act requirements when blasting is done within 500 m from structures and mining with 100 m for structures. The Houses, Crop Fields and River falls within the 500 m range from the pit areas.

The pit areas are located such that specific concerns were identified and addressed in the report. There are graves and an informal settlement located very close to the pit boundaries. Specific mitigation will be required for these concerns.

8.10 Visual

The Block L Opencast Pit will be situated on an area within the current mining right area. The proposed site has no infrastructure present and is in a semi-natural state as it has been modified by the haul road, livestock grazing and human traffic. The proposed location is surrounded by mining infrastructure and associated features (i.e., void, stockpiles, haul road etc.). The current mining area is not visible from the Mzinti-Madadeni tar road or from the neighbouring towns.

Due to the surrounding land use and associated mining infrastructure (Madadeni opencast, Mangweni Underground and Opencast, voids, haul roads and Processing Plant) having been in existence for a significant time period, the establishment of the Block L Opencast Pit will not have additional significant visual impact on the landscape. Further to this, the closest dwellings are more than 750m from Block L.

8.11 Heritage

Four (4) sites (NKM/21/13, NKM/21/17, NKM/21/22, NKM/21/26) consist of low-density pottery and lithic scatters that are not conservation worthy. The impact significance before mitigation on these archaeological sites will be MEDIUM negative. The impact of the proposed development will be site-specific in extent. The possibility of the impact occurring is highly probable. The expected duration of the impact is assessed as Long-term. Implementation of the recommended mitigation measures will reduce this impact rating to an acceptable LOW negative impact.

One (1) site (NKM/21/15) consist of only archaeological midden deposit and were rates as IIIA and of High Heritage significance. The impact significance before mitigation on these archaeological sites will be MEDIUM-HIGH negative. The impact of the proposed development will be regional/provincial in extent. The possibility of the impact occurring is highly probable. The expected duration of the impact is assessed as permanent. Implementation of the recommended mitigation measures will reduce this impact rating to an acceptable LOW negative impact.

Nine (9) sites (NKM/21/2, NKM/21/4, NKM/21/6, NKM/21/16, NKM/21/18, NKM/21/20, NKM.21/21, NKM/21/24, and NKM/21/31) consist of sites characterised by cattle kraal/midden deposit. These sites were rated as IIIA and of High Heritage significance. The impact significance before mitigation on these archaeological sites will be HIGH negative. The impact of the proposed development will be regional/provincial in extent. The possibility of the impact occurring is highly probable. The expected duration of the impact is assessed as permanent. Implementation of the recommended mitigation measures will reduce this impact rating to an acceptable LOW negative impact.

Five (5) sites (NKM/21/1, NKM/21/3, NKM/21/5, NKM/21/8, and NKM/21/12) consist of cattle kraal/midden deposit as well as possible graves. These sites were rated as IIIA and of High Heritage significance. The impact significance before mitigation on the graves will be HIGH negative before mitigation. The impact of the proposed development will be regional in extent. The possibility of the impact occurring is highly probable. The expected duration of the impact is assessed as permanent. Implementation of the recommended mitigation measures will reduce this impact rating to an acceptable LOW negative impact.

Six (6) sites (NKM/21/9, NKM/21/10, NKM/21/11, NKM/21/19, NKM/21/23 and NKM/21/20) consist of features indicative of possible graves. These sites were rated as IIIA and of High Heritage significance. The impact significance before mitigation on the graves will be HIGH negative before mitigation. The impact of the proposed development will be regional in extent. The possibility of the impact occurring is highly probable. The expected duration of the impact is assessed as permanent. Implementation of the recommended mitigation measures will reduce this impact rating to an acceptable MEDIUM negative impact.

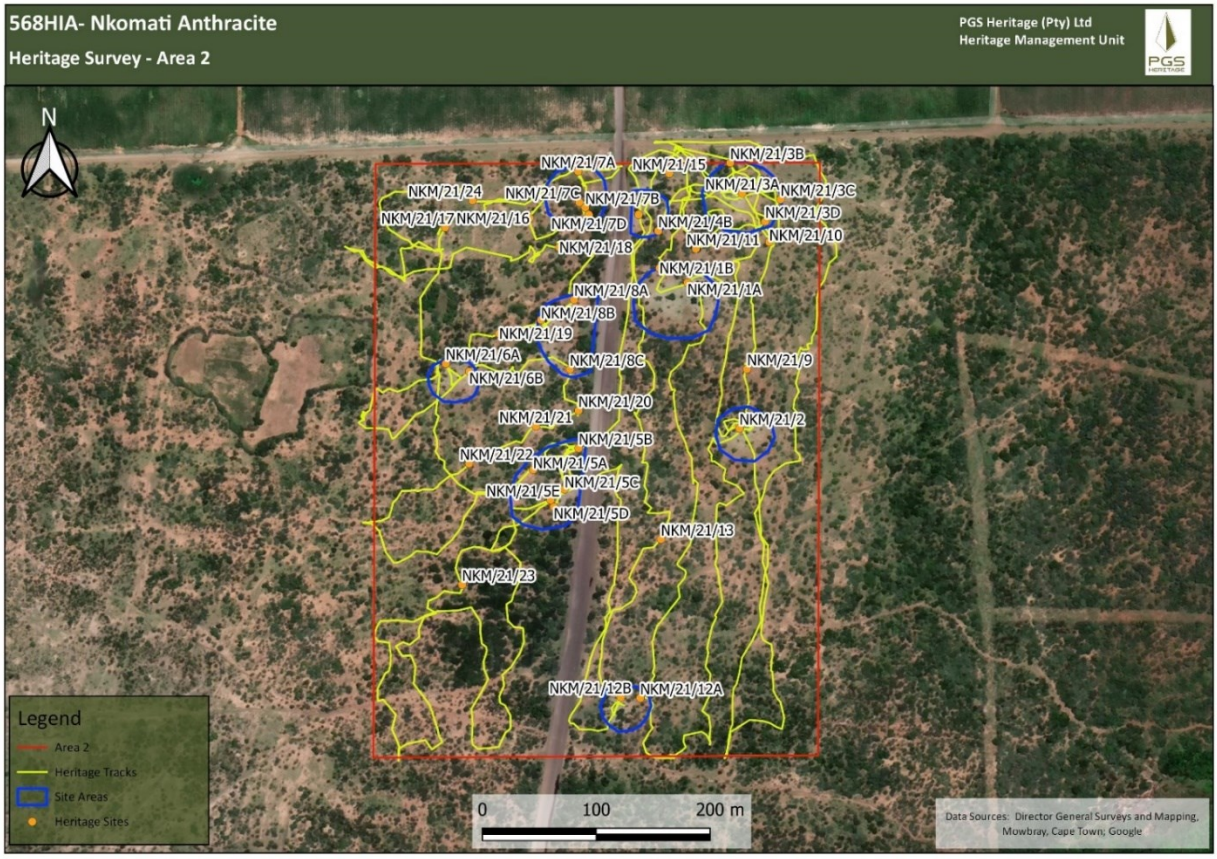

Figure 8-26: Block L Field Survey Sites (PHS Heritage, 2022)

8.12 Paleontology

The proposed Block L is underlain by sandstones and shales of the undifferentiated Permian-Triassic Karoo Supergroup. These rocks are undifferentiated as no Glossopteris flora or vertebrate fossils have been recovered from these sediments. If specimens are found in the sediments, they would be used to identify the specific strata from which they are recovered, similar to what was done in the Main Karoo Basin (Hancox et al., 2001; Rubidge et al., 1995; Johnson et al., 2006).

The N'komati Anthracite Mine is situated in the Kangwane Coalfield. This Coalfield is approximately 210,000 ha in extent and extends from near Komatipoort in the north, to the Mananga Border Post (eSwatini border) in the south (Hancox et al., 2014). The area is extensively weathered and covered by recent alluvial and fluvial sediments and thus representative outcrops of the Karoo Supergroup rocks are rare. In the Kangwane Coalfield the Karoo Supergroup succession consists of the Dwyka Group at the bottom, which are occasionally absent in places, followed by the Vryheid and Volksrust formations of the Ecca Group. Locally, equivalents of the Beaufort and Stormberg Group may occur. The succession is covered by the Lebombo Group volcanic formations, which are the temporal equivalent of the Drakensberg Group formations in the Main Karoo Basin (Hancox et al., 2014). Coal seams that can be utilized for mining are present in the fine- to coarse-grained sandstones and subordinate mudstones and siltstones of the Vryheid Formation.

The Vryheid Formation overlies Archaean basement granites or diamictites of the Dwyka Group unconformably. The Vryheid Formation is known to contain a rich assemblage of Glossopteris flora which is the source vegetation for the Vryheid Formation. Gymnospermous glossopterids dominated the peat and non-peat accumulating of Permian wetlands after continental deglaciation took place (Falcon, 1986c, Greb et al., 2006).

Recent palaeobotanical studies include that of Adendorff (2005), Bordy and Prevec (2008) and Prevec et al. (2008, 2009, 2010) and Prevec, (2011). Bamford (2011) has described numerous plant fossils from this formation (e.g., Azaniodendron fertile, Cyclodendron leslii, Sphenophyllum hammanskraalensis, Annularia sp., Raniganjia sp.,

Asterotheca spp., Liknopetalon enigmata, Hirsutum sp., Scutum sp., Ottokaria sp., Estcourtia sp., Arberia sp., Lidgetonnia sp., Noeggerathiopsis sp., Podocarpidites sp as well as more than 20 Glossopteris species. In the past, palynological studies have focused on the coal-bearing successions of the Vryheid Formation and include articles by Aitken (1993, 1994, 1998), and Millsteed (1994, 1999), while recent studies were conducted by Götz and Ruckwied, (2014).

Bamford (2011) is of the opinion that only a small amount of data has been published on these potentially fossiliferous deposits and that most likely good material is present around coal mines while in other areas the exposures are poor and of little interest. When plant fossils do occur, they are usually abundant. According to Bamford, it is not feasible to preserve all the sites but in the interests of science these sites ought to be well documented, researched and the collected fossils must be housed in an accredited institution.

To date no fossil vertebrates have been collected from the Vryheid formation. The occurrence of fossil insects is rare, while palynomorphs are diverse. Non-marine bivalves and fish scales have also been reported from this formation. Trace fossils are abundantly found but the diversity is low. The mesosaurid reptile, Mesosaurus has been found in the southern parts of the basin but may also be present in other areas of the Vryheid formation. Regardless of the rare and irregular occurrence of fossils in this biozone, a single fossil may be of scientific importance as many fossil taxa are known from only a single fossil.

There are no outcrops in the proposed mining area. It is thus recommended that an EIA level palaeontology report of the unassessed study areas is conducted when an excavation has started and is approximately 1-1.5 m deep. This study will assess the value and prominence of fossils in the development area and the effect of the proposed development on the palaeontological heritage

8.13 Socio-Economic

8.13.1 Municipal And Traditional Structures

Nkomazi Local Municipality (NLM) is located in Mpumalanga Province and is one of the five local municipalities that make up the Ehlanzeni District Municipality (EDM). The town of Malelane is the administrative seat of the NLM. The municipality is strategically placed between Swaziland (north of Swaziland) and Mozambique (east of Mozambique). It is linked with Swaziland by two provincial roads the R570 and R571 and with Mozambique by a railway line and the main national road (N4), which forms the Maputo Corridor.

The NLM is divided into 33 (thirty-three) municipal wards. The main urban areas include Malelane, Hectorspruit, KaMaqhekeza, Tonga, Kaapmuiden, Koomatipoort and Kamhlushwa. The NLM also consists of 8 (eight) Traditional Authorities (TA) situated in the southern section of the municipal area. The below table lists the different traditional authorities and the respective settlements or villages under their control. The study area is located in Mawewe TA.

Table 8-13 Traditional Authority Areas within Nkomazi Local Municipality

No	Traditional Authority	Settlement Area
1	Mlambo Tribal Authority	Mabidozini, Samora Park, Emacambeni, Mbangwane; Ekusulukeni, Khombaso; Tsambokhulu; Mananga; Masibekela; Mandulo; Mthatha, New Village, and Hlahleya.
2	Hhoyi Tribal Authority	Hhoyi, Ericsville and Goba.
3	Siboshwa Tribal Authority	Part of KaMaqhekeza; Block A (KwaZibukwane); Block B (KwaSibhejane); Block C (Esibayeni); Tonga and Los My Cherry, Ngwenyeni and Dludluma
4	Kwa-Lugedlane Tribal Authority	Mangweni and Steenbok
5	Mawewe Tribal Authority	Magudu; Mgobodzi; Madadeni; Sibange; Phakama.
6	Matsamo Tribal Authority	Jeppes Reef; Schoemansdal; Buffelspruit; Driekoppies; Middelplaas; Schulzendal, Mzinti; Ntunda; Phiva; Mdladla; Phosaville; Langeloop; Ekuphumuleni; Sikhwahlane.
7	Mhlaba Tribal Authority	Magogeni; Boschfontein; Skoonplaas.
8	Lomshiyo Tribal Authority	Louisville; Shiyalongubo, Sincobile

8.13.2 Socio-Economic Structures

8.13.2.1 Population

The population of the NLM in 2016 was 410 907 (Community Household Survey 2016). Of this total, 47.1% were under the age of 18, 49.3% were between 18 and 64, and the remaining 3.6% were 65 and older. The figures for the economically active age group of 18-65 for the EDM and Mpumalanga were 52.2% and 56.6% respectively. The dependency ratio is the ratio of non-economically active dependents (usually people younger than 15 or older than 64) to the working age population group (15-64). The higher the dependency ratio the larger the percentage of the population dependent on the economically active age group. This in turn translates reduced revenue for local authorities to meet the growing demand for services. The national dependency ratio in 2011 was 52.7%, while Mpumalanga was 56%. The traditional approach is based people younger than 15 or older than 64. The information provided provides information for the age group under 18. The total number of people falling within this age group will therefore be higher than the 0-15 age group. However, most people between the age of 15 and 17 are not economically active (i.e., they are likely to be at school).

Using information on people under the age of 18 is therefore likely to represent a more accurate reflection of the dependency ratio. Based on these figures, the dependency ratios for the NLM and EDM in 2016 were 103% and 92% respectively. The high dependency ratios reflect the limited employment and economic opportunities in the area. As indicated above, the high dependency ratios place a severe burden on the ability of the local and district municipalities to fund the provision of basic services.

In terms of race groups, Black Africans made up 98.8%% of the population on the NLM, followed by Whites, 0.9% and Coloureds, 0.2%. The figures for the EDM are similar, namely, Black Africans made up 97.1% of the population, followed by Whites, 2.1% and Coloureds, 0.6%. The main first language spoken in both the NLM and ELM was Siswati, 90.6% and 59.2% respectively.

8.13.2.2 Households and house types

There were a total number of 103 963 (2016) households in the NLM, which comprises approximately 20% of the households in the EDM. Of these 82.8% were formal houses, 6.5% were flats in backyards and 6.4% were shacks. The majority of the dwellings in the NLM are therefore formal structures. The majority of the formal structures in the NLM (81.1%) were also owned and fully paid off. This indicates a stable and settled population. Approximately 45% of the households in the NLM were headed by women, which is higher that the figure for the EDM (43.7%) and Mpumalanga (39.7%). The high percentage of women headed households reflects the limited employment opportunities in the area, specifically the tribal areas and the need for people to seek employment outside the NLM. Traditionally the men are the members of the households that move to seek work elsewhere and salaries are repatriated to support families. From a social perspective women headed households tend to be more vulnerable.

8.13.2.3 Household income

Based on the data from the 2011 Census, 17% of the households in the NLM had no formal income, 7% earned less than R 4 800, 12.7% earned between R 5 000 and R 10 000 per annum, 23% between R 10 000 and R 20 000 per annum and 19.8% between R 20 000 and 40 000 per annum (2016). The figures for the EDM were, 15% of the households had no formal income, 6.4% earned less than R 4 800, 10.7% earned between R 5 000 and R 10 000 per annum, 20.8% between R 10 000 and 20 000 per annum and 20.3% between R 20 000 and 40 000 per annum (Census 2011).

The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household (~ 40 000 per annum). Based on this measure, in the region of 79.5% of the households in the NLM and 73.2% in the EDM live close to or below the poverty line. The low-income levels reflect the rural nature of the local economy and the limited formal employment opportunities outside in the area. The low-income levels are a major concern given that an increasing

number of individuals and households are likely to be dependent on social grants. The low-income levels also result in reduced spending in the local economy and less tax and rates revenue for the NLM and EDM. This in turn impacts on the ability of the NLM to maintain and provide services.

Household income levels are likely to have been impacted by the COVID-19 pandemic. The number of households in the NLM and EDM that live close to or below the poverty line is likely to have increased over the last 18 months. This, coupled with the high dependency ratio, is a major cause of concern for the area.

8.13.2.4 Employment

The official unemployment rate in the NLM in 2016 was 15.9%, while 30.5% of the economically active sector of the population (15-64) were employed, and 46.1% were regarded as not economically active. The figures for the EDM in 2011 were 17.7% unemployed, 33.7% employed and 41,7% not economically active. The unemployment rates for the NLM are lower than the Provincial rate of 17.3% and the district rate of 17.7%. However, the COVID-19 pandemic is likely to have resulted in an increase in unemployment rates in both the NLM and EDM. Recent figures released by Stats South Africa also indicate that South Africa's unemployment rate is in the region of 36%, the highest formal unemployment rate in the world. The youth unemployment rate is in the region of 64%.

8.13.2.5 Education

In terms of education levels, the percentage of the population over 20 years of age in the NLM and EDM with no schooling was 17.7% and 13.8% (2016) respectively, compared to 11.3% for Mpumalanga. The percentage of the population over the age of 20 with matric was in the NLM and EDM was 31.1% and 36.2% respectively, compared to 36.1% for Mpumalanga. The lower education levels are likely to be linked to rural nature of the area.

9 Impact Assessment

9.1 Summary of Impacts

The impacts and risks identified in this section consider the impacts associated the proposed development of the Block L Opencast. These impacts are addressed firstly in summary in the following table, and in detail in the full impact tables which follow thereafter. These impact tables clearly define all of the impacts in terms of nature, significance, consequence, extent, duration and probability as well as the extent to which they can be reversed. The following table provides a summary of the possible impacts associated with the establishment of the Block L Opencast Pit.

Table 9-1 Summary of impacts associated with the proposed Block L Opencast Pit

Activity	Impacts
Construction	
Establishment of construction and operational areas	Disturbing archaeology; Altered topography.
Topsoil stripping and handling	Soil loss; Soil degradation; Reduced land capability and soil loss; Soil erosion; Soil compaction; Soil contamination Soils, land use and land capability; Dust; Alien and invasive species.
Overburden management	Soils, land use and land capability
Vehicular movement	Increased dust; Soil erosion/compaction; Noise and vibration; Traffic.
Human movement, disturbances	Soil erosion; Soil compaction; Alien and invasive species; Veld fires.
Storage and handling of potential pollutants i.e. chemicals, fuels, oils, lubricants, general waste.	Altered surface and ground water quality; Soil contamination.
Vegetation clearance	Altered biodiversity (fauna and flora)
Operation of machinery and vehicles	Increased dust; Increased noise and vibration; Altered air quality.
Placement of infrastructure and lighting	Visual; Altered topography.
Stakeholder management	Socio-economic (employment, community issues)
Storm water management	Altered surface and ground water quality and quantity; Soil erosion.
Waste management	Surface and ground water quality.
Operation	
Stockpile management	Altered topography
Topsoil handling	Soil loss; Soil degradation; Reduced land capability and soil loss; Soil erosion; Soil compaction; Soil contamination Soils, land use and land capability; Dust; Alien and invasive species.
Storm water management	Altered surface and ground water quality and quantity;

	Soil erosion.
Waste management	Surface and ground water quality.
Storage and handling of potential pollutants i.e. chemicals, fuels, oils, lubricants, general waste.	Altered surface and ground water quality; Soil contamination.
Dewatering	Reduced surface and ground water quantity
Vegetation clearance	Altered biodiversity (fauna and flora)
Increased disturbance / human activity	Alien and invasive species; Veld fires.
Infrastructure and lighting	Altered landscape; Altered topography.
Expansion of footprint	Archaeological disturbances.
Stakeholder management	Socio-economic (employment, community issues)
Closure	
Decommissioning and closure of mine and related infrastructure	Altered topography
Stockpile management	Soil loss; Soil degradation; Reduced land capability and soil loss; Soil erosion; Soil compaction; Soil contamination Soils, land use and land capability; Dust; Alien and invasive species.
Mine closure	Soil loss; Soil degradation; Reduced land capability and soil loss; Soil erosion; Soil compaction; Soil contamination Soils, land use and land capability; Dust; Alien and invasive species.
Storm water management	Altered surface and ground water quality and quantity; Soil erosion.
Waste management	Surface and ground water quality.
Storage and handling of potential pollutants i.e. chemicals, fuels, oils, lubricants, general waste.	Altered surface and ground water quality; Soil contamination.
Dewatering	Altered surface and ground water quantity
Disturbance / human activity	Alien and invasive species; veld fires
Remaining infrastructure/lighting	Alien and invasive species; Veld fires.
Mine closure	Socio-economic (employment, community issues)

9.2 Methodology Used in Determining and Ranking Impacts and Risks

The significance of the identified impacts will be determined using an accepted methodology from the Department of Environmental Affairs and Tourism Guideline Document on EIA Regulations, April 1998. As with all impact methodologies, the impact is defined in a semi-quantitative way and will be assessed according to methodology prescribed in the following section.

Table 9-2 Scale utilised for the evaluation of the Environmental Risk Ratings

Evaluation Component	Rating Scale and Description/criteria

MAGNITUDE of negative impact (at the indicated spatial scale)	**10 - Very high**: Bio-physical and/or social functions and/or processes might be *severely* altered. **8 - High**: Bio-physical and/or social functions and/or processes might be *considerably* altered. **6 - Medium**: Bio-physical and/or social functions and/or processes might be *notably* altered. **4 - Low**: Bio-physical and/or social functions and/or processes might be *slightly* altered. **2 - Very Low**: Bio-physical and/or social functions and/or processes might be *negligibly* altered. **0 - Zero**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	**10 - Very high (positive)**: Bio-physical and/or social functions and/or processes might be *substantially* enhanced. **8 - High (positive)**: Bio-physical and/or social functions and/or processes might be *considerably* enhanced. **6 - Medium (positive)**: Bio-physical and/or social functions and/or processes might be *notably* enhanced. **4 - Low (positive)**: Bio-physical and/or social functions and/or processes might be *slightly* enhanced. **2 - Very Low (positive)**: Bio-physical and/or social functions and/or processes might be *negligibly* enhanced. **0 - Zero (positive)**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
DURATION	**5 - Permanent** **4 - Long term**: Impact ceases after operational phase/life of the activity > 60 years. **3 - Medium term**: Impact might occur during the operational phase/life of the activity – 60 years. **2 - Short term**: Impact might occur during the construction phase - < 3 years. **1 - Immediate**
EXTENT (or spatial scale/influence of impact)	**5 - International**: Beyond National boundaries. **4 - National**: Beyond Provincial boundaries and within National boundaries. **3 - Regional**: Beyond 5 km of the proposed development and within Provincial boundaries. **2 - Local**: Within 5 km of the proposed development. **1 - Site-specific**: On site or within 100 m of the site boundary. **0 –** None.
IRREPLACEABLE (loss of resources)	**5 – Definite** loss of irreplaceable resources. **4 – High** potential for loss of irreplaceable resources. **3 – Moderate** potential for loss of irreplaceable resources. **2 – Low** potential for loss of irreplaceable resources. **1 – Very low** potential for loss of irreplaceable resources. **0 – None.**
REVERSIBILITY (of impact)	**5 –** Impact **cannot** be reversed. **4 – Low** potential that impact might be reversed. **3 – Moderate** potential that impact might be reversed. **2 – High** potential that impact might be reversed. **1 –** Impact **will be** reversible. **0 –** No impact.
PROBABILITY (of occurrence)	**5 - Definite:** >95% chance of the potential impact occurring. **4 - High probability:** 75% - 95% chance of the potential impact occurring. **3 - Medium probability:** 25% - 75% chance of the potential impact occurring **2 - Low probability:** 5% - 25% chance of the potential impact occurring. **1 - Improbable:** <5% chance of the potential impact occurring.
Evaluation Component	**Rating Scale and Description/criteria**
CUMULATIVE (impacts)	**High**: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern. ***Medium****:* The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern. ***Low****:* The activity is localised and might have a negligible cumulative impact. ***None****:* No cumulative impact on the environment.

Once the Environmental Risk Ratings have been evaluated for each potential environmental impact, the Significance Score of each potential environmental impact is calculated by using the following formula:

SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.

The maximum Significance Score value is 150.

The Significance Score is then used to rate the Environmental Significance of each potential environmental impact as per the Table below. The Environmental Significance rating process is completed for all identified potential environmental impacts both before and after implementation of the recommended mitigation measures.

Table 9-3 Scale used for the evaluation of the Environmental Significance Ratings

Significance Score	Environmental Significance	Description/criteria
125 – 150	Very high (VH)	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
100 – 124	High (H)	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.
75 – 99	Medium-high (MH)	If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with a proposed project. Mitigation options should be relooked.
40 – 74	Medium (M)	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.
<40	Low (L)	An impact of low significance is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	Positive impact (+)	A positive impact is likely to result in a positive consequence/effect and is likely to contribute to positive decisions about whether or not to proceed with the project.

9.3 Summary of Positive and negative Impacts of Proposed Activity

9.3.1 Initial / Preferred Layout

The following provides a summary of the positive and negative impacts that the preferred layout is likely to have on the environment, all of which can be mitigated through the implementation of the mitigation measures provided in the impact assessment and EMP.

Possible Negative Impacts

- Disturbing archaeology;
- Altered topography;
- Soil loss;
- Soil degradation;
- Reduced land capability;
- Soil loss;
- Soil erosion;
- Soil compaction;
- Soil contamination;
- Soils, land use and land capability;
- Increased dust;
- Altered air quality;

- Alien and invasive species;
- Increased noise and vibration;
- Increased traffic;
- Altered surface and ground water quality;
- Altered surface and ground water quantity;
- Altered biodiversity (fauna and flora);
- Community issues.
- Possible Positive Impacts
- Job creation;
- Cost effective due to location next to haul road;
- Reduced disturbance due to location next to haul road;
- Compact design;
- Rehabilitation of land currently in an altered state.

9.3.2 Alternative Layout

The entire N'Komati Anthracite Mining Right Area was assessed to identify areas that could sustain the continued operation of the Mine without detrimental implications in terms of cost, social and environmental impacts. No such suitable alternatives were found. The location of the site is restricted by the mining right area and is dictated by the availability of anthracite seams. Alternatives would mean being in an unsuitable location or being more expansive.

The location of the site is restricted by the mining right area and is dictated by the availability of anthracite seams within the mining right area. The proposed layout is deemed to have the least environmental impact as it falls within the existing mining right area within an area already accessible from the existing haul road and already impacted by human influence. The final layout has been kept as compact as possible in order to keep the area of disturbance to a minimal to facilitate rehabilitation after mining has ceased.

Possible Negative Impacts

- Expansive design;
- Disturbing archaeology;
- Altered topography;
- Soil loss;
- Soil degradation;
- Reduced land capability;
- Soil loss;
- Soil erosion;
- Soil compaction;
- Soil contamination;
- Soils, land use and land capability;
- Increased dust;
- Altered air quality;
- Alien and invasive species;
- Increased noise and vibration;
- Increased traffic;
- Altered surface and ground water quality;
- Altered surface and ground water quantity;
- Altered biodiversity (fauna and flora);
- Community issues;
- Difficult rehabilitation;
- Unnecessary expansion of mining right area.
- Possible Positive Impacts
- Job creation.

9.4 Possible mitigation measures that could be applied and the level of risk.

The possible mitigation measures are extensively addressed in the extensive impact tables which follow in this section. Further to this, Section (j) includes the mitigation measures and the associated level of risk. The major impacts can be dealt with through good housekeeping, dust suppression, effective rehabilitation and keeping the footprint area as small as possible to reduce the disturbed area. As a result, the proposed layout is the most compact layout with the least environmental impacts and has been developed to facilitate the abstraction of the required volumes of anthracite whilst also allowing for the least possible environmental impacts.

Table 9-4 Possible mitigation measures

Aspect	Possible Mitigation Measures
Construction	
Topography	Footprint optimisation; Stockpile management; Restrict movement.
Soils, land use and land capability	Footprint optimisation; Stockpile management; Restrict movement; Soil management; Landscaping; Layout plan; Storm water management plan; Speed limits; Concurrent rehabilitation.
Surface water	Water balance; Storm water management plan; GN704; Waste management; Surface water monitoring; Waste management; Stockpile management; Operation/servicing restrictions on vehicles/machinery; Storage of chemicals.
Ground water	Water balance; Storm water management plan; GN704; Waste management; Ground water monitoring; Waste management; Stockpile management; Operation/servicing restrictions on vehicles/machinery; Storage of chemicals.
Biodiversity – fauna and flora	Demarcate construction area; Reduce vegetation clearance; Restrict movement; Protected trees management; Alien and invasive species management; Topsoil management; Prohibit fires; Restriction on locality.
Noise and vibration	Vehicular and machine maintenance; Noise monitoring; Personal Protective Equipment (PPE); Restrict speeds; Restrict blasting hours.
Visual	Visual screens; Lighting management; Stockpile shaping.
Air quality	Vehicular and machine maintenance;

	Dust monitoring; Dust suppression; Personal Protective Equipment (PPE).
Archaeology	Measures / procedures for encountering sites.
Socio-economic	Communication; Transparency; Social and labour plan; Employment Equity Act, 1996.
Operation	
Topography	Footprint optimisation; Stockpile management; Restrict movement; Concurrent rehabilitation.
Soils, land use and land capability	Footprint optimisation; Stockpile management; Concurrent rehabilitation; Restrict movement; Soil management; Landscaping; Layout plan; Storm water management plan; Speed limits.
Surface water	Water balance; Storm water management plan; GN704; Waste management; Surface water monitoring; Waste management; Stockpile management; Operation/servicing restrictions on vehicles/machinery; Hierarchy of use; Storage of chemicals.
Ground water	Water balance; Storm water management plan; GN704; Waste management; Ground water monitoring; Waste management; Stockpile management; Operation/servicing restrictions on vehicles/machinery; Storage of chemicals; Pit dewatering; Flow meters.
Biodiversity – fauna and flora	Demarcate operation area; Reduce vegetation clearance; Restrict movement; Protected trees management; Alien and invasive species management; Topsoil management; Prohibit fires; Restriction on locality; Concurrent rehabilitation.
Noise and vibration	Vehicular and machine maintenance; Noise and Vibration monitoring; Personal Protective Equipment (PPE); Restrict speeds; Restrict blasting hours.
Visual	Visual screens; Lighting management; Stockpile shaping.
Air quality	Vehicular and machine maintenance; Dust monitoring;

	Dust suppression; Personal Protective Equipment (PPE).
Archaeology	Measures / procedures for encountering sites.
Socio-economic	Communication; Transparency; Social and labour plan; Employment Equity Act, 1996.
Closure	
Topography	Stockpile management; Restrict movement; Rehabilitate according to rehabilitation plan.
Soils, land use and land capability	Footprint optimisation; Stockpile management; Total backfill; Restrict movement; Soil management; Landscaping; Layout plan; Storm water management plan; Speed limits; Rehabilitate according to rehabilitation plan.
Surface water	Water balance; Storm water management plan; GN704; Waste management; Surface water monitoring; Waste management; Stockpile management; Operation/servicing restrictions on vehicles/machinery; Storage of chemicals.
Ground water	Water balance; Storm water management plan; GN704; Waste management; Ground water monitoring; Waste management; Stockpile management; Operation/servicing restrictions on vehicles/machinery; Storage of chemicals; Total backfill.
Biodiversity – fauna and flora	Demarcate operation area; Rehabilitate according to rehabilitation plan; Restrict movement; Protected trees management; Alien and invasive species management; Topsoil management; Prohibit fires.
Noise and vibration	Vehicular and machine maintenance; Noise monitoring; Personal Protective Equipment (PPE); Restrict speeds; Restrict blasting hours.
Visual	Visual screens; Lighting management; Re-shaping; Rehabilitate according to rehabilitation plan.
Air quality	Vehicular and machine maintenance; Dust monitoring; Dust suppression; Personal Protective Equipment (PPE).
Archaeology	Measures / procedures for encountering sites.

Socio-economic	Communication; Transparency; Social and labour plan; Employment Equity Act, 1996.

9.5 Description of Impact Assessment Process

Impacts and risks were identified, assessed, and ranked through the undertaking of new specialist studies, the review of existing studies, numerous site visits, desktop review of available data and the assessment of monitoring data. The methodology utilised is described in detail under Section VI. The following is a summary of the existing and new specialist studies utilised in support of the Block L Opencast Pit.

Table 9-5 Specialist Studies Undertaken

LIST OF STUDIES UNDERTAKEN	
Existing Specialist Studies	Alien Invasive Species
New Specialist Studies	Air Quality
	Heritage
	Hydrogeology
	Noise and Vibration
	Palaeontology
	Rehabilitation and Financial Provision
	Social Impact Assessment
	Storm Water Management Plan
	Wetland Assessment (including ecology – fauna and flora)

9.6 Assessment of Each Potentially Significant Impact and Risk (Impact Assessment)

The following impact assessment has been undertaken to assess the possible impacts and associated mitigation measures pertaining to the establishment/construction, operation, maintenance, decommissioning/closure and rehabilitation of the Block L Opencast Pit. The following table provides the approximate timeframes for all the aspects of the Mangweni and Processing Plant Operations.

It is important to note that the EIA and associated impact tables are to cover Block L, whilst the EMP section in Part B will cover the entire Mangweni Area (including the Mangweni Underground, Mangweni Mini-pit and Block L), and the Processing Plant, which is anticipated to remain operational until 2032, however, this is likely to extend as further resources are quantified and accessed.

Table 9-6 Life of Operations at Mangweni and Processing Plant

Mangweni Opencast Mini-pit	
Construction	6 months
Operation	2 to 3 years
Decommissioning / Closure	6 months
Rehabilitation	6 months
Mangweni Underground	
Operation	2032 – dependant on resource availability
Decommissioning / Closure	2 years – dependant on resource availability
Block L Opencast	
Construction	6 months
Operation	5 years
Decommissioning/Closure	6 months
Rehabilitation	6 months
Processing Plant	
Operation	2052
Decommissioning / Closure	2 years – dependant on resource availability

Table 9-7 Environmental Impact Assessment

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECT	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
TOPOGRAPHY						
Establishment of construction and operational areas	Alteration to local topography	Topography	Construction and Operation	M	• Keep construction footprint as small as possible; • Stockpile different materials and soils in separate stockpiles; • Demarcate construction and operational areas; • Limit movement to within demarcated areas.	L
Operation of mine and related activities / infrastructure			Construction and Operation	M	• Demarcate construction and operation footprint areas; • Opencast mining to take place in accordance with approved mine plan; • Placement of stockpiles and infrastructure to be placed in accordance with the approved mine plan and rehabilitation plan.	L
Decommissioning and closure of mine and related infrastructure			Decommissioning and Closure	Positive	• Stockpiles to be used for backfilling of pit; • Placement of stockpiles according to mine layout plan; • Implement the rehabilitation plan (HEES, 2022) • Development of appropriate footprint rehabilitation and closure actions; • To return the area, as far as possible, to a topography as agreed upon in consultation with stakeholders; • Surface excavations will be closed as required in terms of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); • Remove temporary structures and infrastructure; • Landscape and topsoil disturbed areas and stockpiles to facilitate natural succession of suitable indigenous flora and supplement with composting and seeding if required; • Shape, rip and vegetate roads that do not have a post-closure use; • Ensure that the rehabilitated mine site is free-draining, and runoff is routed to natural drainage lines as far as possible.	Positive
SOILS, LAND USE AND LAND CAPABILITY						
Topsoil stripping and handling	Soil loss	Soils	Construction and Operation	MH	• Demarcate construction and operation footprint areas; • Topsoil is to be stripped and removed from all new development areas prior to disturbances and be stored within demarcated stockpile areas as per layout plan; • Topsoil that is stripped is to be removed to demarcated topsoil stockpile areas with as little compaction as possible; • Topsoil stockpile heights and slope angles to be determined by slope stability design; • Restrict mining and related activities to demarcated areas and limit possible disturbance and degradation of soils outside these areas; • Compile and maintain a mine wide soil resource plan indicating the nature and location of soil. • Soil stockpiles to be stored outside the 1:100 year flood line of any watercourse unless authorisation is obtained; • Place stockpiles within the mining area in suitable areas to facilitate rehabilitation; • Place the stripped topsoil within dedicated and demarcated stockpile areas with as little compaction as possible; • Endeavour that areas not directly affected by mining be beneficially used or left undisturbed that inter alia involves proper land management and associated soil conservation; • Protect the soil surface on unavoidable mining related disturbed areas against contamination, erosive and non-erosive soil degradation such as removal and compaction; • Practise single handling of topsoil as far as possible; • Mitigate all forms of soil erosion within 1 year of being identified. Establish the cause of erosion and implement at source corrective measures on a case-by-case basis to prevent the recurrence of erosion; • Landscape and vegetate disturbances to ensure these areas blend into the surrounding landscape and soil erosion is minimised.	M
	Soil degradation			M	• Avoid storage of topsoil for periods that the adversely affect the productive seed bank and/or organic content of the soil; • Store soil stockpiles outside the 1:100 year flood line of watercourses (unless the required authorisations are obtained), in areas where they will not be impacted upon by mining operations, and upslope of areas of disturbance or development, to prevent contamination by contaminated runoff or seepage; • Provide erosion protection measures such as vegetation and/or low-level berms around soil stockpile areas; • Stockpile height to be determined by slope stability design.	M
Overburden management	Reduced land capability and soil loss	Soils and land capability	Construction, operation, decommissioning and closure	M	• Stockpiles to be placed in accordance with the layout plan; • Stockpile height and slopes to be determined by slope stability design; • Overburden to be used for backfilling of the pit.	M

Mining and related activities	Soil erosion	Soils	Construction, operation, decommissioning and closure	M	• Nkomati shall take measures (e.g., installation of temporary and permanent drainage works, construction of berms, contouring of land, establishment of vegetation, etc.) to ensure that there is no undue soil erosion due to mining related activities;
					• Implement the site specific storm water management plan;
					• As far as practically possible construction must be undertaken in the dry season;
					• All forms of erosion will be mitigated within 1 year of identification;
					• The following infrastructure will be inspected, and eroded areas will be repaired when and if necessary:
					  ○ Linear infrastructure (roads – particularly untarred roads, railway lines and pipelines); and
					  ○ All surface water management infrastructures (canals, bunds, dams).
						M

Mining and related activities	Soil compaction	Soils	Construction, operation, decommissioning and closure	M	• Minimise soil hardening as far as possible; • Restrict vehicular movement to the demarcated operational footprint area; • Place the stripped topsoil within dedicated and demarcated stockpile areas with as little compaction as possible; • Rip compacted soils to 300mm and facilitate revegetation with suitable indigenous vegetation;	L

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECT	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
					• For concurrent rehabilitation purposes, rip the soils to at least 300mm before re-vegetating as to allow for seed germination and natural plant succession.	
Mining and related activities	Soil contamination	Soils	Construction, operation, decommissioning and closure	M	• All hazardous material spillages will be cleaned up and managed as soon as possible; • Ensure the presence of sufficient emergency spill kits; • Vehicles and machinery to be operated according to manufacturers' specifications; • Vehicles and machinery to be regularly serviced and maintained, within designated workshop areas (with a roof and concrete flooring) or off site; • Compile and maintain a mine-wide record of contaminated soils including the nature and extent of contamination; • Classify the areas of concern into high, moderate, or low risk areas in terms of further contamination potential, taking account the possible organic breakdown of contaminants over time; • Prioritise high risk areas, evaluate alternatives for their remediation, and implement remediation; • Assessment of degree of soil contamination through groundwater monitoring; • Establish new ground water monitoring points if required.	L
Mining and related activities	Altered land use and land capability	Land use and land capability	Operation and closure	MH	**Management of agricultural and grazing land** • Through rehabilitation, ensure that there are minimal impacts on the long term land capability of the area; • Engage with surrounding communities with regards to desirable post-mining land uses; • Undertake mining activities with long term land use in mind. **Loss of agricultural and wilderness land** • Restrict development and infrastructure to demarcated areas only; • Undertake mining in accordance with approved layout plan; • Undertake activities with the goal of returning land to pre-mining state. **Land Use Management - During Operations** • Include environmental education in the training activities of the staff, labourers, and subcontractors; • Undertake surveys on an annual basis to assess rehabilitation as part of working towards final closure. These surveys are also required for annual updates to the Mine's financial provision; • Placement of facilities and infrastructure to be carried out according to an approved layout plan; • Engage with surrounding communities with regards to desirable post-mining land uses. **Management of grazing and livestock during operations** • Develop educational material to inform surrounding communities of the risks involved with livestock being present on the mine during operations; • Prohibit the presence of livestock on the mining area during operation; • Ensure the mining area is fenced during operation and the fence is only removed after closure when the land is safe for humans and livestock. **Management of Rehabilitated Areas** • Investigate the grazing potential of the land after operation; • In consultation with stakeholders, return the land use, as far as possible, to the pre-mining land use or to a suitable land use as agreed through consultation with stakeholders; • Rehabilitated areas to be, as far as possible, left undisturbed. **Land-use planning during decommissioning and closure** • Prior to closure, develop a post-closure land use plan through consultation with the surrounding communities/stakeholders; • Prior to closure, determine/establish the contractual, legal obligations and financial liabilities in terms of current and post closure land uses and take these into consideration with regular updates of the post closure land use plan; • Generate and encourage new opportunities for final land use options; • Undertake final land use planning in coordination with the rehabilitation plan. **Re-instatement of Land Capability** • Determine the most desirable post-closure land use through consultation with relevant stakeholders; • Implement site specific rehabilitation plan; • Ensure that those areas designated for post closure grazing, farming or wilderness land are shaped to stable slopes, as far as possible, to facilitate revegetation and free drainage; • Rehabilitate stockpiles to a state aligned to the surroundings, as far as possible, to complement the surrounding natural land-uses.	L
SURFACE WATER						
Storm water management	Reduced surface water quality and quantity	Storm water	Construction, operation, decommissioning and closure	MH	**Storm Water Management** • Develop and maintain a site-specific water balance; • Develop, implement and maintain a site specific Storm Water Management Plan; • Ensure unpolluted water remains part of a clean water system, separate from any dirty area; • Design, construct, maintain and operate any clean water system at the mine or activity so that it is not likely to spill into any dirty water system more than once in 50 years; • Design, construct, maintain and operate any dirty water system at the mine or activity so that it is not likely to spill into any clean water system more than once in 50 years. • Design, construct, maintain and operate any dam that forms part of a dirty water system to have a minimum freeboard of 0.8 metres above full supply level; • Collect the water arising within any dirty area, including water seeping from mining operations, outcrops or any other activity, into a dirty water system; • Maintain the capacity requirements of all containment facilities through regular maintenance; • Implement a suitable surface water monitoring programme; • Inspect (and maintain if required) diversion trenches and berms after heavy storm events as to ensure the integrity and stability and to address erosion problems immediately;	L

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECT	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
					• Undertake pit dewatering to ensure safety of employees. **Restrictions on locality** • No water management facilities may be within the 1:100 year flood line or within 100m of a water resource/500m of a wetland unless prior permission is obtained from the Department of Human Settlements, Water and Sanitation; • No future sanitary convenience, fuel deposit, reservoir or depots that may pollute the water resource may be within the 1:50 year flood line. **Restrictions on the use of material** • No material that may pollute a water resource may be used in constructing dams, roads, walls and/or berms unless authorised in terms of a GN704 Exemption. **Access Control** • Implement and maintain access control to the mine and areas which may pose a health and/or safety risk (i.e. voids, pits etc.).	
Mining and related activities	Surface water contamination	Surface water quality	Construction, operation, decommissioning and closure	MH	**Prevention of water pollution of the surface water resource** • Implement and maintain surface water monitoring programme; • Education of mine staff on the potential impacts on the receiving with respect to the following: o The potential adverse effects and the prevention of these effects on the receiving water environment; o Water conservation and beneficial re-use; o Prevention and containment of spills of contaminated water; o Formulation and implementation of emergency procedures and protocols; and o Identifying and reporting of incidents and/or poor practices to effect corrective and remediation actions and measures. • Where practical, all future water management facilities, and associated infrastructure are to be designed, located, constructed and maintained to minimise water resource pollution, damage to riparian or in stream habitat through erosion, sedimentation, disturbance of vegetation or the alteration of flow characteristics; • Recycle water as far as practically possible; • Ensure all water systems are free of obstructions; • All domestic waste and wash water to be disposed of as per permit/licence requirements; • Implementation and maintenance of a water balance to deal with process water, stormwater run-off and other hydrological processes; • Develop, implement and update an Integrated Water and Waste Management Plan (IWWMP); • Implement the site specific storm water management plan. **Achievement of Zero Discharge** • Lining of any future dams to be determined by water quality and risk based approach; • Retain the capacity and/or functionality of storm water management facilities and dam(s) by regularly removing sludge and/or other accumulated material from these for safe off-site dispose of the collected material at applicable and relevant disposal facilities where relevant; • Implement the specific stormwater controls and measures as per the GN704 stormwater management plans; • Only discharge if licensing requirements are met.	L
On-site waste management	Surface and groundwater contamination	Surface and ground water quality	Construction, operation, decommissioning and closure	M	**Management of Increased Waste** • Implement the separation of general and hazardous waste; • All waste for disposal should be disposed of at a permitted/licensed landfill designated for that specific waste type. Should an external contractor be used, records of waste removal must be obtained and kept on file; • Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through odour and/or visual impacts; • Prevent any waste from being used for an unauthorised purpose; • General and Hazardous waste shall not be burnt. **Management Commitment – Overburden Stockpiles** • Stockpile handling to be carried out in accordance with the site specific layout and rehabilitation plans: o Slopes to be shaped and paddocked for storm water purposes; o Facilitate vegetation of slopes through establishing stable slopes and placement of topsoil (and assist with compost and seeding if required). **Management of Hazardous Waste** • All containers in which hazardous waste is stored should be sealed to prevent water ingress and should be intact, without any corrosion or damage which could lead to spills; • Should hazardous waste be stored on site in the future, the storage area must be bunded; • Hazardous waste should not be stored for extensive periods on site; • All hazardous waste destined for disposal should be disposed of at a hazardous landfill and a waste manifest should be provided by the transporter; • A licensed waste contractor should be contracted to remove hazardous waste; • The waste management procedure/s developed by the mine should be adhered to, to ensure compliance and accountability. **Management and Storage of General Waste** • Steps must be taken to ensure that: o The containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste; o Adequate measures are taken to prevent accidental spillage or leaking; o The waste cannot be blown away; o Nuisances such as odour, visual impacts and breeding of vectors do not arise; o Pollution of the environment and harm to health are prevented. o The waste management procedure/s developed by the mine should be adhered to, to ensure compliance and accountability; o General waste for disposal must be disposed of at a permitted/licensed facility which accepts this waste; o General waste separated at source for reuse and recycling such as wood, scrap metal and rubber, should be removed to the salvage yard for storage, refurbishment, reuse and recycling considerations.	L

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECT	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated

					Management of Unauthorised Disposal
					• No person may:
					  ○ Dispose of waste, or knowingly or negligently, cause or permit waste to be disposed of, in or on any land, water body or at any facility unless the disposal of that waste is authorise by law;
					  ○ and/or
					  ○ Dispose of waste in a manner that is likely to cause pollution of the environment or harm to health and well-being.
					Management of the dumping or impoundment of general waste
					• Dumping or impounding of rubble, litter, waste or discards of any description, whether solid or liquid, must take place only at the site or sites demarcated for such purpose in accordance with the measures stipulated in this document;
					• Illegal disposal, dumping and littering is to be prohibited.
					Management of Explosive boxes and Packaging - Increased waste generation
					• Explosive and explosive related wastes are regulated by the Explosive Act, which should be adhered to;
					• Boxes, cartons and paper bags that have contained explosives must be destroyed or appropriately disposed of as soon as practicably possible after being emptied for their explosive contents and may not be used again for any purpose;
					• Training to be provided to the suitable employees on cleaning of explosive containers;
					• Should a contractor be used for blasting, the EMP must be supplied to the contractor with specific reference to blasting applicable commitments.	

Storage and handling of chemicals, fuels, oil, lubricants etc.	Hydrocarbon pollution	Surface and ground water quality	Construction, operation, decommissioning and closure	M	• Handle and dispose of associated packaging of chemicals / hazardous materials and related waste in accordance with manufacturers' instructions; • Employ emergency measures with accidental spills of the above as per manufacturers' instructions; • Ensure emergency spill kits are present on site; • Train relevant staff on waste management and waste handling procedures; • Implement surface water and ground water monitoring programmes; • Vehicles and machinery to be regularly serviced and maintained, either within the dedicated workshop areas at Mangweni or Plant; • Vehicles and machinery to be operated according to manufacturers' specifications; • Storage and handling of chemicals, fuels, lubricants, oils and all other hazardous materials must be undertaken as to pose the least risk of leaks and contamination. This will need to be within a dedicated bunded store; • Chemicals must be stored and handled according to the relevant "directions of use" of the product; • All commitments made with reference to hazardous waste management must be adhered to; • All oils, lubricants, fuels and chemicals are to be stored in bunded areas (this includes generators and generator bulk / day tanks) in sealed containers and/or under a roof; • Access control must be implemented to areas where hazardous chemicals are stored.	L
Mining and related activities	Destruction of wetlands	Surface water quality	Construction, operation, decommissioning and closure	M	• Remain within demarcated footprint areas; • Respect buffer zones unless appropriate licenses have been obtained; • Implement site specific storm water management plan and maintain clean and dirty water separation infrastructure; • Safely store potential contaminants; • Clean up and report spills of significance; • Revegetate/rehabilitate disturbed areas; • Control spread of alien and invasive species.	L
	Reduced surface water flow	Surface water quantity	Construction, operation, decommissioning and closure	M	**Water Balance** • Develop and maintain a site-specific water balance; • Water balance to include aspects such as surface water use, groundwater use, sources of water and how water moves around the site; • Implement, manage and maintain the water balance as to manage water more effectively and efficiently throughout the life of mine; • Re-use and recycle water; • Flow meters to be installed at all major inflow and outflow sources; • Implement and maintain a suitable surface and groundwater monitoring programme; • Implement a hierarchy of use as to optimise the re-use of contaminated water and limit the abstraction of raw water. **Storm Water Management** • Design, construct and maintain effective clean and dirty water separation systems on site as to allow clean water to leave the site as clean without being contained or contaminated; • Establish, implement and maintain a site specific storm water management plan.	L
GROUND WATER						
Hydrocarbon spills	Ground water contamination	Ground water quality	Construction, operation, decommissioning and closure	M	**General Management measures** • All management / mitigation measures outlined in the surface water section above must be fully implemented (not repeated in this section); • Maintain the capacity requirements of any future water storage facilities through regular maintenance; • No future sanitary convenience, fuel deposit, reservoir or depots that may pollute the water resource may be within the 1:50 year flood line; • Develop and implement a ground water monitoring programme; • The hydrogeological flow and contaminant transport models should be updated if and when required; • A suitable groundwater monitoring program must be implemented and maintained – water levels, quantity and quality should be monitored; • Storage and handling of chemicals, fuels, lubricants, oils and all other hazardous materials must be undertaken as to pose the least risk of leaks and contamination; • Chemicals must be stored and handled according to the relevant "directions of use" of the product; • All commitments made with reference to hazardous waste management must be adhered to;	L

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECT	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
					• All oils, lubricants, fuels and chemicals are to be stored in bunded areas (this includes generators and generator bulk / day tanks) in sealed containers and/or under a roof; • Access control must be implemented to areas where hazardous chemicals are stored. **Water Balance** • As per surface water section above. **Vehicles and Machinery** • Vehicles and machinery to be regularly serviced and maintained, either within the dedicated workshop areas or off site; • Vehicles and machinery to be operated according to manufacturers' specifications.	
Operation and closure of dirty water areas	Reduced ground water quality / contamination	Ground water quality	Operation and closure	M	**Management of Any future Dirty Water Containment Facilities** • Develop and maintain a site-specific water balance; • Implement and maintain a site specific Storm Water Management Plan; • Design, construct, maintain and operate any dirty water system at the mine so that it is not likely to spill into any clean water system more than once in 50 years; • Design, construct, maintain and operate any dam that forms part of a dirty water system to have a minimum freeboard of 0.8 metres above full supply level in compliance with GN704; • Collect the water arising within any dirty area, including water seeping from mining operations, outcrops or any other activity, into a dirty water system (PCD or Void); • Design, construct and maintain all water systems in such a manner as to guarantee the serviceability of such conveyances for flows up to and including those arising as a result of the maximum flood with an average period of recurrence of once in 50 years; • Maintain the capacity requirements of any future facilities through regular maintenance; • Implement a suitable surface and ground water monitoring programme. • Rehabilitation of Any Future Dirty Water Containment Facilities • Develop and implement a suitable closure plan for any future dirty water containment facilities; • Develop and implement a site specific rehabilitation plan; • Allow for the dirty/contaminated water within any future containment facilities to evaporate; • Liner requirements of any future facilities to be determined by water quality and risk based approach; • Decontamination and cleaning of demolition material within dedicated areas prior to salvage, recycling or re-use; • Remove liners for safe disposal at a suitable classified waste disposal site and obtain the safe disposal certificates; • Rip dam embankments (to 300mm) and allow for the rehabilitation of the area; • Facilitate revegetation as soon as possible as to protect the rehabilitated area from water and wind erosion.	L
Dewatering of mining area	Reduced ground water quantity	Ground water quantity	Operation and closure	M	• Develop and maintain a site-specific water balance; • Insert flow meters; • Implement a site specific ground water monitoring programme inclusive of ground water levels; • License all abstractions; • Re-use and recycle water as far as practicably possible to reduce raw water intake; • Rip and revegetate hard/compacted surfaces to a depth of 300mm to facilitate ground water recharge; • Opencast pit to be rehabilitated to pre-mining state; • Maintain ground water monitoring programme, inclusive of ground water levels, post closure until it can be proven that it is no longer necessary.	L
Ceased dewatering	Recovery of ground water level	Ground water quantity	Post-closure	Positive	• Positive impact - no mitigation needed.	Positive
BIODIVERSITY – FAUNA AND FLORA						
Habitat destruction / vegetation clearance	Reduced biodiversity	Habitat destruction	Construction, operation, decommissioning and closure	M	**Habitat Destruction** • Demarcate construction and operation footprint areas; • Operate in accordance with the approved mine plan; • Keep vegetation clearance to a minimum; • Facilitate natural succession of disturbed areas by ripping compacted areas to 300mm, placement of topsoil and supplementing with fertilizer and seeding if required. **Protection of Biodiversity** • Develop and maintain a database of protected and vulnerable species within the mining area; • Actively remove and control alien and invasive plant species; • Implement and monitor plans to control and prevent the spread of alien and invader species; • Limit habitat disturbance and fragmentation; • Training and awareness to protect natural systems and importance of biodiversity; • Keep tracks and access roads to a minimum on site and where possible, make use of existing roads; • Restrict development and infrastructure to demarcated areas; • Manage fire breaks to prevent destruction and damage to vegetation; • Use of herbicides and pesticides to be kept to a minimum; • Make use of indigenous vegetation for rehabilitation; • Vegetate through natural succession and assist with seeding if required. **Management of Protected Trees**	L

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECT	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
					• Preference will be to leave protected trees undisturbed, however, if required, the necessary permits are to be obtained before any protected trees are removed. • Re-instate a suitable land capability and indigenous vegetation on rehabilitated areas; • Ensure that those areas designated for grazing and other agricultural uses would be shaped to follow the natural topography as far as possible and matching up with natural • surface features such as streams, hills etc., to create a coherent landscape that would facilitate implementation and sustaining the planned agricultural land use; • Topsoil and shape/slope stockpiles to a stable gradient to facilitate revegetation and supplement with fertiliser and seeding if required; • Identify areas where the desired land capability is unlikely to be achieved and implement the required corrective actions.	
Increased disturbances	Alien and invasive species	Flora	Construction, operation, decommissioning and closure	M	• Recurring Category 1a and 1 b and Category 1 and 2 invasive species must be controlled and eradicated; • Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment; • The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent • such species from producing off-spring, forming seed, regenerating, or re-establishing itself in any manner; • Management will arrange eradication of prohibited alien species, Category 1a and 1 b (NEM:BA) and Category 1 and 2 (CARA) invasive species by a competent contractor; • Once eradication has taken place, record must be noted thereof in the Alien and Invasive Species register and will be monitored by means of monthly Environmental inspections; • The use of herbicides and pesticides will be limited as far as possible; • Monitoring of Alien and Invasive Species ton continue for a reasonable time period post closure.	L
Mining and related activities	Degradation of the aquatic environment	Aquatic fauna and flora	Construction, operation, decommissioning and closure	M	• Ensure that any new mining or mining related activities remain outside the 1:100 year floodline, 100m or a watercourse or 500m of a wetland unless the necessary authorisations have been obtained; • Limit construction activities to demarcated areas; • Implement training and awareness programmes to all staff / contractors regarding the importance and protection of sensitive environments; • Undertake the relevant licensing procedures for commencing activities within sensitive environments; • Implement site specific storm water management plan and rehabilitation plan to reduce sedimentation and degradation of surrounding areas.	L
Increased human activity	Veld fires	Fauna and flora	Construction, operation, decommissioning and closure	M	• No informal fires are allowed within the area as to prevent veld fires; • Adequate firefighting equipment should be present on site; • The Mine should provide fire-fighting training to selected construction staff; • Correct Personal Protective Equipment (PPE) should be used; • Optimise the use of firebreaks to improve land use management (roads can be used as fire breaks if suitably located). • No informal fires are allowed within the area as to prevent veld fires; • Adequate firefighting equipment should be present on site; • The Mine should provide fire-fighting training to selected construction staff; • Correct Personal Protective Equipment (PPE) should be used; • Optimise the use of firebreaks to improve land use management (roads can be used as fire breaks if suitably located).	L
NOISE AND VIBRATION						
Mining and related activities	Increased noise levels	Noise	Construction, operation, decommissioning and closure	L	**Management of Elevated Noise Levels** • Develop and implement regular engineering maintenance schedules for mine equipment; • Develop and implement a vehicle and equipment maintenance plan; • Develop and implement a noise monitoring program; • Implement appropriate Personal Protective Equipment (PPE) in working areas with elevated noise levels; • Develop and implement noise grievance procedure; • Vehicular speeds should be restricted as to limit noise levels; • Regular maintenance schedules for vehicles and machinery must include the checking of the functional state of all intake and exhaust noise attenuators, the effectiveness of enclosures or any other noise control measures; • Noise monitoring and reducing systems may not be tampered with, removed, put out of action, damaged or impaired; • All vehicles and machinery to be operated according to manufacturers' specifications. **Management of Vibration** • Atmospheric conditions should be considered before charging and blasting; • Blasting to be carried out during day time hours; • Blasting notices to be fixed at clearly visible points to surrounding land occupiers 24 hours prior to blasting; • Undertake survey of surrounding dwellings (to determine the number of dwellings and structural integrity thereof).	L
VISUAL						
Infrastructure and lighting	Visual intrusion	Visual	Construction and Operation	L	**Management Commitment - Visual intrusion** • Minimise the aesthetic impact of intrusive mining infrastructure; • Make use of stockpiles to create a visual screen; • Minimise the scarring of soil surface and land features. **Management of visual intrusion** • Minimise the impact of illumination of the mine on adjacent landowners by ensuring that lighting is focused to necessary areas by facing inwards and downwards.	L

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECT	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
Remaining infrastructure and features			Decommissioning and Closure	L	• Stockpiles to be reshaped/sloped and vegetated until they are used for backfilling; • No permanent structures are to be expected for the Mini-Pit, however, all temporary structures must be removed during closure.	L
AIR QUALITY						
Increased machinery and vehicles	Increased dust	Air quality	Construction, operation, decommissioning and closure	L	• Vehicles and machinery to be regularly serviced; • Vehicles and machinery to be operated according to manufacturers' specifications; • Implement and maintain dust suppression on dirt roads and areas of potential risk; • Implement and maintain dust monitoring (and adjust dust suppression accordingly); • Issue masks as part of PPE to persons working within areas of risk; • Implement and maintain a speed limit on all internal/haul roads.	L
ARCHAEOLOGICAL (CULTURAL/HERITAGE)						
Continued mining	Uncovering / disturbance of sensitive sites and artefacts	Archaeology	Construction, operation, decommissioning and closure	M	• Provide map of sensitive areas to ECO and Contractors and any mine staff associated with construction to ensure no sites are unduly disturbed. Special focus must be on any kraal/midden or similar areas as the likelihood of human remains in these areas are high; • Should any graves, archaeological or paleontological objects or material be exposed during excavation, work on the area where the graves, objects or material were found, shall cease immediately and a suitably qualified archaeologist be appointed as soon as possible to handle the necessary applications and processes; • Under no circumstances shall archaeological or paleontological objects or material be destroyed, damaged, excavated, altered, defaced or otherwise disturbed without the necessary permits; • The mine shall advise its staff and contractors of the penalties associated with the unlawful removal of archaeological or paleontological artefacts, as set out in the National Heritage Resources Act, 1999 (Act 25 of 1999) section 51.	L
TRAFFIC						
Increased volume of vehicles	Increased traffic	Traffic	Construction, operation and decommissioning	L	• Manage the increase in traffic in terms of congestion, road surface damage, safety concerns, dust and erosion; • Ensure that roads are maintained at all times to an acceptable standard; • Ensure that all mine vehicles are road worthy; • Implement and maintain dust suppression on all internal haul and access roads; • Implement and maintain speed limits on all internal access and haul roads; • Mine vehicles (cars, trucks etc.) obey laws of the road when using private and public roads.	L
SOCIO-ECONOMIC						
Stakeholder management	Community issues	Socio-economic	Construction, operation, decommissioning and closure	L	• Manage development in an environmentally sustainable and transparent manner; • Maintain open communication channels and transparency between the Mine and I&AP's; • Avoid or minimise potential negative environmental, health, safety, social or economic impacts on I&APs; • For all new activities or developments listed according to regulatory approvals, I&AP shall be consulted through the required public participation methods; • A data base of all I&APs will be kept up to date and easily accessible; • I&APs will be given the opportunity to raise any comments or concerns regarding mining and mining related activities through an established line of communication; • Implement the site specific Social and Labour Plan; • The records of complaints and non-conformances are to be kept and used as a tool for continual improvement by the mine.	L
	Job creation		Construction, operation, decommissioning and closure	Positive	• Engagement with community through mining forum; • Transparent recruitment process; • Maintain existing employment policies (Employment Equity Act, 1996; employment of locals etc.).	L
Employee health and safety	Injury, loss of life		Construction, operation, decommissioning and closure	M	• Implement relevant aspects of the Occupational Health and Safety Act, 1993 (Act 85 of 1993); • Provide employees, contractors, and visitors with suitable personal protective equipment; • Maintain health and safety induction procedures for all employees, contractors, and visitors; • Maintain an incidents register on site; • Hold regular health and safety talks; • Ensure areas posing high risks are fenced and have access control measures in place.	L
Mine closure	Job losses		Decommissioning and Closure	L	• Consideration will be given to measures that will reduce difficulties of retrenched employees in finding work elsewhere and consequent unemployment for long periods; • Ensure that skills transfer programmes are successful throughout the operational life of the mine; • Ensure that the social closure objectives are incorporated into the Social & Labour Plan; • Engage transparently with stakeholders prior to closure.	L

9.7 Summary of Specialist Reports

Table 9-8 Summary of Specialist Reports

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Existing Specialist Studies			
Alien Invasive Species	• Various alien and invasive species have been identified within the N'Komati Anthracite Mining area; • These must be controlled and their spread/eradication monitored.	All relevant specialist recommendations are included in this Basic Assessment under Section 1(j), as well as attached in the full specialist studies as appendices to this report.	
New Specialist Studies			
Air Quality	• Routine water spraying of roads; • Dust monitoring and monthly reporting; • Revegetation of disturbed areas.	All relevant specialist recommendations are included in this Basic Assessment under Section 1(j), as well as attached in the full specialist studies as appendices to this report.	
Heritage Impact Assessment (PGS Heritage)	• Sites of archaeological resource, multi-occupational, cattle kraals and possible graves and burial grounds were found; • All of the above impacts can be reduced through implementation of mitigation measures.	All relevant specialist recommendations are included in this Basic Assessment under Section 1(j), as well as attached in the full specialist studies as appendices to this report.	
Hydrogeology (FFGPMS cc)	• Ground water monitoring (quality and quantity); • Remediation of activity and impacts.	All relevant specialist recommendations are included in this Basic Assessment under Section 1(j), as well as attached in the full specialist studies as appendices to this report.	
Noise	• The noise calculations revealed that the noise level at the abutting noise receptors will be insignificant; • The threshold value of 7.0dBA will not be exceeded during the day and/or night- time periods. • There will be a shift in the prevailing ambient noise level in the immediate vicinity of the mining activities but at a distance exceeding 500m from the mining activities, the intrusion level will be minimal and in line with the Noise Control Regulations.	All relevant specialist recommendations are included in this Basic Assessment under Section 1(j), as well as attached in the full specialist studies as appendices to this report.	
Palaeontology (Banzai Environmental, 2022)	• Further study required if sites discovered.	All relevant specialist recommendations are included in this Basic Assessment under Section 1(j), as well as attached in the full specialist studies as appendices to this report.	
Rehabilitation and Financial Provision (HEES, 2022)	• Site specific rehabilitation plan; • Two options for financial provision (partial backfill and slope stabilization, or total backfill).	All relevant specialist recommendations are included in this Basic Assessment under Section 1(j), as well as attached in the full specialist studies as appendices to this report.	
Social Impact Assessment	• No recommendations (report provides an overview of social status quo)		

Soils, Land Use and Land Capability (ESS, 2021)	• If not well managed, the opencast mining and associated activities could have a moderate or high negative impact, however, if soil management plan is implemented then mitigation can reduce impacts to acceptable levels of risk.	All relevant specialist recommendations are included in this Basic Assessment under Section 1(j), as well as attached in the full specialist studies as appendices to this report.
Stormwater Management Plan (HEES, 2022)	• Site specific storm water management plan to be implemented and maintained, including paddocks and diversion trenches.	All relevant specialist recommendations are included in this Basic Assessment under Section 1(j), as well as attached in the full specialist studies as appendices to this report.
Wetland Delineation and Impact Assessment	• Mining will impact on wetlands and watercourse habitats within the mining footprint; • A new post-mining landscape will be created; • Through implementing mitigation measures the negative impacts on water quality and quantity can be reduced; • Rehabilitation of the disturbed areas should ensure sufficient compaction of replaced soils to limit ingress of surface water; • Revegetation of disturbed areas is critical.	All relevant specialist recommendations are included in this Basic Assessment under Section 1(j), as well as attached in the full specialist studies as appendices to this report.

9.8 Environmental Impact Statement

The key findings of the environmental impact assessment are that the areas of concern are:

- Impacts on topography;
- Soil loss during construction and operation;
- Rehabilitation with reference to post-closure land use and land capability;
- Storm water management;
- Possible surface and ground water contamination;
- Possible negative impacts on surface water resources.

The specialist studies were undertaken in order to address these key findings and to effectively mitigate any impacts. There were no significant impacts which could not be significantly mitigated through the implementation of the recommended mitigation measures. These mitigation measures will be included into the EMP to create an auditable set of commitments to be adhered to. A summary of the impact assessment in terms of the activities to be undertaken through each phase of the Block L Opencast Pit. As is clear from the significance score after mitigation, all impacts can be mitigated to acceptable levels though the implementation of the recommended mitigation measures provided in the impact assessment table.

Table 9-9 Summary of Impact Assessment

NAME OF ACTIVITY	POTENTIAL IMPACT	PHASE	SIGNIFICANCE if not mitigated	SIGNIFICANCE if mitigated
TOPOGRAPHY				
Establishment of construction and operational areas	Alteration to local topography	Construction and Operation	M	L
Operation of mine and related activities / infrastructure		Construction and Operation	M	L
Decommissioning and closure of mine and related infrastructure		Decommissioning and Closure	Positive	Positive
SOILS, LAND USE AND LAND CAPABILITY				
Topsoil stripping and handling	Soil loss	Construction and Operation	MH	M
	Soil degradation		M	M
Overburden management	Reduced land capability and soil loss	Construction, operation, decommissioning and closure	M	M
Mining and related activities	Soil erosion	Construction, operation, decommissioning and closure	M	M
Mining and related activities	Soil compaction	Construction, operation, decommissioning and closure	M	L
Mining and related activities	Soil contamination	Construction, operation, decommissioning and closure	M	L
Mining and related activities	Altered land use and land capability	Operation and closure	MH	L
SURFACE WATER				
Storm water management	Reduced surface water quality and quantity	Construction, operation, decommissioning and closure	MH	L
Mining and related activities	Surface water contamination	Construction, operation, decommissioning and closure	MH	L
On-site waste management	Surface and groundwater contamination	Construction, operation, decommissioning and closure	M	L

NAME OF ACTIVITY	POTENTIAL IMPACT	PHASE	SIGNIFICANCE if not mitigated	SIGNIFICANCE if mitigated
Storage and handling of chemicals, fuels, oil, lubricants etc.	Hydrocarbon pollution	Construction, operation, decommissioning and closure	M	L
Construction, operation, decommissioning and closure of Block L	Destruction of wetlands	Construction, operation, decommissioning and closure	M	L
Mining and related activities	Reduced surface water flow	Construction, operation, decommissioning and closure	M	L
GROUND WATER				
Hydrocarbon spills	Ground water contamination	Construction, operation, decommissioning and closure	M	L
Operation and closure of dirty water areas	Reduced ground water quality / contamination	Operation and closure	M	L
Dewatering of mining area	Reduced ground water quantity	Operation and closure	M	L
Ceased dewatering	Recovery of ground water level	Post-closure	Positive	Positive
BIODIVERSITY – FAUNA AND FLORA				
Habitat destruction / vegetation clearance	Reduced biodiversity	Construction, operation, decommissioning and closure	M	L
Increased disturbances	Alien and invasive species	Construction, operation, decommissioning and closure	M	L
Mining and related activities	Degradation of the aquatic environment	Construction, operation, decommissioning and closure	M	L
Increased human activity	Veld fires	Construction, operation, decommissioning and closure	M	L
NOISE AND VIBRATION				
Mining and related activities	Increased noise levels	Construction, operation, decommissioning and closure	L	L
VISUAL				
Infrastructure and lighting	Visual intrusion	Construction and Operation	L	L
Remaining infrastructure and features		Decommissioning and Closure	L	L
AIR QUALITY				
Increased machinery and vehicles	Increased dust	Construction, operation, decommissioning and closure	L	L
ARCHAEOLOGICAL (CULTURAL/HERITAGE)				
Continued mining	Uncovering / disturbance of sensitive sites and artefacts	Construction, operation, decommissioning and closure	M	L
TRAFFIC				
Increased volume of vehicles	Increased traffic	Construction, operation and decommissioning	L	L
SOCIO-ECONOMIC				
Stakeholder management	Community issues	Construction, operation, decommissioning and closure	L	L
	Job creation	Construction, operation, decommissioning and closure	Positive	L
Mine closure	Job losses	Decommissioning and Closure	L	L

9.9 Final Site Map

The following maps show the layout of the final site in relation to the greater mining area.

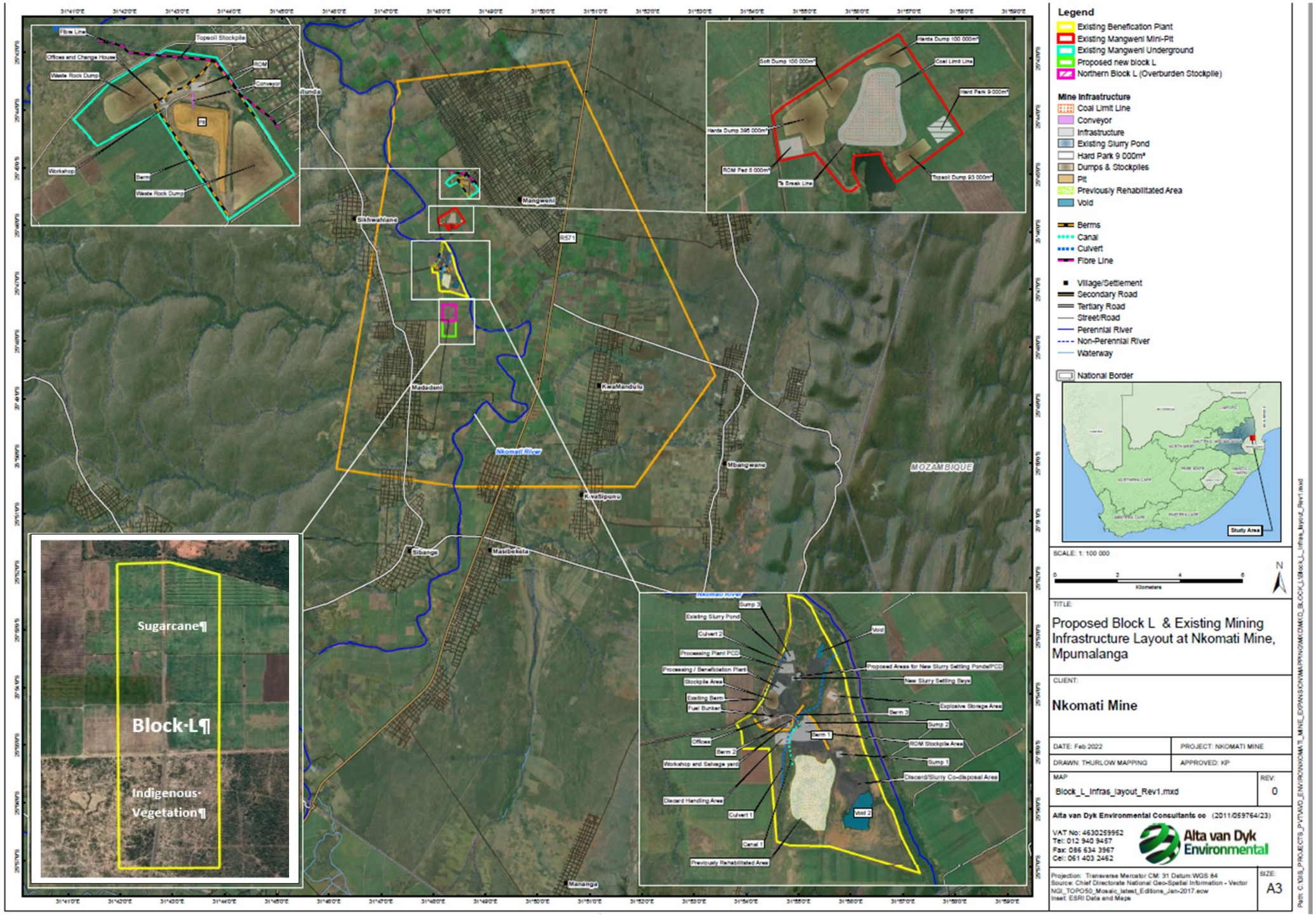

Figure 9-1: Final Site Map

9.10 Summary of Positive and Negative Impacts/Risks of Proposed Activity

The following is a summary of the possible positive and negative impacts associated with the Block L Opencast Pit. The impacts of the following can be reduced through the implementation of the recommended mitigation measures.

Negative:

- Alteration to local topography;
- Soil loss;
- Soil degradation;
- Altered land capability;
- Soil erosion;
- Soil compaction;
- Soil contamination;
- Reduced surface water quality and quantity;
- Hydrocarbon pollution;
- Reduced ground water quality and quantity;
- Reduced biodiversity;
- Destruction of wetlands;
- Alien and invasive species;
- Degradation of aquatic environment;
- Veld fires;
- Increased noise;
- Visual intrusion;
- Increased dust;
- Increased traffic;
- Disturbances to cultural/heritage areas;
- Community issues.

Positive:

- Rehabilitation of disturbed land;
- Job creation.

9.11 Aspects for Further Consideration

9.11.1 Impact Management Objectives and Impact Management Outcomes

The following management objectives/outcomes should be considered and/or included in the EMPr:

Table 9-10: Impact Management Objectives

Infrastructure and Activities	• Ensure physical stability to facilitate the implementation of the planned end land use; • Closing, dismantling, decontaminating, removing and disposing of surface infrastructure with no post closure beneficial use; • Stabilising the upper surfaces and outer slopes of stockpiles; • Ripping, shaping, and vegetating of general disturbed surface areas; • Infill and/or shape and re-vegetate the opencast area in accordance with rehab plan.
Local Environmental Quality	• To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contamination arising from the mining area as well as to sustain catchment yield as far as possible after closure; • Rehabilitate in accordance with approved rehabilitation plan.
Biodiversity	• Protect and conserve the biodiversity of the total N'Komati Mining Area; • Stabilise disturbed areas to prevent erosion in the short- to medium-term until a suitable vegetation cover has established;

	• Establish viable self-sustaining vegetation communities that will encourage the re-introduction of local fauna, as far as possible; • Ensure that the rehabilitated portions of the mining area are safe and stable in the long-term for the planned end land use, which is agriculture; • Promote the sustainable management and use of natural resources through the adoption of best practices that integrates conservation needs and development priorities.
Topography	• Mitigate the impact of mining infrastructure and backfilled mining areas on topography; • Ensure that all activities are carried out with the post mining landform in site.
Surface Water	• Prevent the contamination of the surface water as a result of reagent or hydrocarbon spillages during transportation of the substances; • Implement a surface water monitoring programme to identify potential impacts on the receiving water environment
Groundwater	• Monitor impacts of potential dewatering; • Construct all infrastructure that may pose a risk to the ground water resources according to best practices; • Implement a ground water monitoring programme; • Put measures in place that will ensure the protection of the water resources.
Air Quality	• Ensure that ambient air quality remains within the accepted levels; • Limit dust generation (nuisance and/or health effects to surrounding landowners/communities and compromising the desired long term post mining land use); • Ensure that cleaner technologies are investigated throughout the Life of Mine; • The necessary dust suppression techniques will be applied at all areas that poses a threat to air quality; • Implement an air quality monitoring programme to ensure that risks in terms of air quality are always addressed.
Geology	• Mining activities will be undertaken in such a manner that it will ensure the geological stability of the area during operation and closure.
Aesthetic Appearance	• To leave behind a rehabilitated mining site that, in general is not only neat and tidy, but provides an acceptable overall aesthetic appearance that does not compromise the planned end land use: o Backfilling and/or shaping and vegetation of stockpiles; o Tidying up the rehabilitated mining area from demolition waste and rubble; o Landscaping the site to blend in with the surrounding landscape as far as possible; o Shaping and levelling general surface rehabilitated areas to create landforms that emulate the surroundings, facilitate the planned agriculture and are free draining. Ensure that the rehabilitated mining area is suitably prepared for vegetation or vegetated where feasible.
Health and Safety	• To limit the possible health and safety threats to humans and animals; • Remove, for safe disposal, all potential process related contaminants (ensuring that no hazardous waste is present on the rehabilitated site after closure); • Demonstrating through a review of monitoring data that no possible surface and/or groundwater contaminant sources remain on the rehabilitated mining area that could compromise the planned end land use (whether agriculture or other) and/or pose healthy threats; • Fence any areas posing potential health and safety risk.
Socio-economic	• To ensure that any infrastructure transfers, measures and/or contributions made by the mine towards the long-term socio-economic benefit of the local communities, are sustainable (taking into consideration the Social and Labour Plan in place at the time of closure, to determine actions needed); • Identify infrastructure that will be of value/benefit to local communities and transferring these to third parties as agreed between the mine and these parties and/or the stakeholders; • Timeously communicate and negotiate with local communities and stakeholders on the closure of the mine; • Training and awareness to empower the ex-employees and community to effectively manage the financial and/or commercial resources transferred from the mine; • Clearly define the roles of the parties responsible for future management of the transferred facilities.

9.11.2 Aspects for Inclusion as Conditions of Authorisation

It is the professional opinion of the EAP that the following aspects should be included as conditions of the Authorisation:

- The approval of the Basic Assessment assumes the approval of the attached specialist studies and EMP and thus compliance with the recommendations of the specialist studies and EMP submitted in support of this application are required;
- Implementation of a surface and ground water monitoring programme;
- Compliance with the BAR and EMP submitted in support of this application;
- All contractors and sub-contractors must be provided with a copy of the EMP and Environmental Authorisation prior to the commencement of any of the authorised activities;
- Compliance with all other relevant legislation must be ensured.

9.11.2.1 Assumptions and Uncertainties

A combination of new specialist studies and an extensive review of existing studies for the area were undertaken in support of this application in order to ensure that there are no significant assumptions, uncertainties and/or gaps in knowledge. It is difficult to know what is underground in terms of heritage/palaeontology and should any sites be uncovered all work must stop and a suitably qualified person appointed to oversee the way forward.

9.11.2.2 Reasoned Opinion as to Whether Proposed Activity Should Be Authorised or Not

The proposed activity should be authorised as it is necessary to ensure the continued operations of the existing N'Komati Anthracite Mine thus continuing to provide employment within the area. The activity will take place within an already disturbed area that falls within the existing mining right area, thus posing minimal new environmental impacts/risks to the area, all of which can be sufficiently managed through the implementation of the mitigation measures listed in the impact assessment and the EMP.

9.11.2.3 Conditions for Inclusions in Authorisation

It is the professional opinion of the EAP that the following aspects should be included as conditions of the Authorisation:

- The approval of the Basic Assessment assumes the approval of the attached specialist studies and EMP and thus compliance with the recommendations of the specialist studies submitted in support of this application are required;
- Implementation of a surface and ground water monitoring programme;
- Compliance with the BAR and EMP submitted in support of this application;
- All contractors and sub-contractors must be provided with a copy of the EMP and Environmental Authorisation prior to the commencement of any of the authorised activities;
- Compliance with all other relevant legislation must be ensured.

9.11.2.4 Period for Which Environmental Authorisation is Required

Whilst the planned life of Block L is 5 year, the Environmental Authorisation is required for the life of the entire Mangweni Operations and the Processing Plant as the EMP which is being amended covers both the Mangweni Operations and the Processing Plant which will be operational for the life of the mining right. This is currently valid until 2052 and thus it is recommended that the Environmental Authorisation be granted for the maximum possible period.

9.11.2.5 Undertaking

This undertaking is provided at the end of the EMPr and is applicable to both the Basic Assessment Report and the Environmental Management Programme Report.

10 FINANCIAL PROVISION FOR BLOCK L OPERATIONS

10.1 Financial Provision Calculation

Civil3D model was created with the total Block L mining area and depths. This provided a scaled model from which Cut & Fill or Fill or Cut volumes could be extracted. Area and length measurements were also possible from this model.

The rates are obtained from previous similar projects and are subject to review as it was not tendered for in this specific project. However, N'Komati Mine has a contractor on site who provided the rate for the excavation and hauling of material. The following assumptions are made:

- The concurrent rehabilitation will be executed in the 2023-2027 financial year,
- The rate for importation of growth medium was reduced from the contractors quote as it will be soft excavation,
- A contingency of 20% is allowed,
- Preliminary and General cost of 30% is allowed; and
- VAT of 15% is excluded in the summary cost.

The principles as described in this report were used in the determination of quantities. The quantities were determined as if the mine must close in 2023 and then as if the mine closes for every year up to 2027. A summary of the cost is then provided.

The methodology for costing is based on the rehabilitation plan. The roll – over method of mining requires some material to be stockpiled as this will provide the initial space to mine. Overburden material will be deposited on the Northern Block L overburden stockpile.

The mining operation will excavate overburden during the mining period. This overburden will be stockpiled. The footprint will be cleared of topsoil (topsoil moved to be used after shaping) and the overburden from the pit deposited.

The side slopes of the overburden stockpiles must be shaped to a slope of 1 (V) : 3 (H) and slope length not more than ±40 m.

Water retention benches will be constructed with a bench every ±10 m height and maximum bench lengths of 40m. All run-off from the stockpiles must be retained on these benches and evaporated or infiltrated.

The Block L void will be protected by a safety berm of 3 m high, with a 1m crest and a slope of 1(V) : 2(H). This material can be obtained from the overburden material.

Confirmation is given by the applicant that the amount can be provided for from operating expenditure. Annual rehabilitation will be undertaken as part of daily operations as the mine intends to make use of the roll over method of mining. As a result, the costs thereof will be covered by the operational costs.

Table 10-1: Financial Provision Summary

Year	2023	2024	2025	2026	2027
Annual rehabilitation	R525 784	R2 536 112	R2 814 641	R2 145 756	R0
Final rehabilitation	R4 552 244	R6 149 779	R6 212 513	R6 736 934	R8 128 152

10.2 Information Required by Competent Authority

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

As part of the environmental impact assessment process, the current socio-economic conditions and potential socio-economic impacts have been assessed. Further to this, an extensive Public Participation Process inclusive of Stakeholder Engagement has been undertaken in support of this application to identify and address any further socio-economic issues. The proposed project site is covered by the current Social and Labour Plan. The establishment of the Block L Opencast Pit will ensure the continued operations of the N'Komati Anthracite Mine, thus allowing the continued benefits to the surrounding communities. The Social Impact Assessment and Stakeholder Engagement Process have been appended to this report.

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

A Heritage Impact Assessment and a Palaeontological Impact Assessment have been undertaken. Both of which have been appended to this report. Recommendations of both reports are that if any sites of significance are to be disturbed or are discovered, all work must stop until a suitably qualified person has been appointed and carried out the necessary processes.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1 CONTENT OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

Table 1-1: Content of EMP

Regulations 2017 - Appendix 4 – Content of Environmental Management Programme (EMPr)	Location in this Report
1. An EMPr must comply with section 24N of the Act and Include -	
(a) details of –	Part B Section 2.1
(i) the EAP who prepared the EMPr; and	
(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Part B Section 2.2
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Part B Figure 2.5
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development, including -	Part B Section 3
(i) planning and design;	
(ii) pre-construction activities;	
(iii) construction activities;	
(iv) rehabilitation of the environment after construction and where applicable post closure; and	
(v) where relevant, operational activities;	
(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes, contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to -	Part B Section 4.3
(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
(ii) comply with any prescribed environmental standards or practices;	
(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	
(iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Part B Section 5.4
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Part B Section 5.4
(i) and indication of the persons who will be responsible for the implementation of the impact management actions;	Part B Section 5.4
(j) the time periods within which the impact management actions contemplated paragraph (f) must be implemented;	Part B Section 5.4
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Part B Section 5.4
(l) a programme for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Part B Section 5.4
(m) an environmental awareness plan describing the manner in which -	Part B Section 5.4
(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	

(n) any specific information that may be required by the competent authority	Part A Section 10.2

2 INTRODUCTION

2.1 Details of the EAP

Table 2-1: Details of the EAP

Contact Person	Alta van Dyk
Company Details	Alta van Dyk Environmental Consultants 012 940 9457 082 782 4005 alta@avde.co.za
Postal Address	Postnet Suite #745 Private Bag X1007 Lyttelton 0140
Physical Address	Unit 3698 4 Garcia Peak Midlands Estate
Main Author	Kai Petty 061 403 2462 kai@avde.co.za

2.2 Description of the Activity

The description of the aspects of the activity have been covered during Part A as required. The information provided in PART A (which is the Scope of Assessment and Basic Assessment Report), assesses the impacts of the proposed Mangweni Mini-pit. This EMP section is applicable to the greater Mangweni Area and the Processing Plant as it is an amendment of the 2020 AVDE EMP.

Existing/Current Infrastructure

The following are existing facilities/infrastructure present within the Mangweni and Processing Plant areas:

Mangweni Underground

- Overburden stockpiles;
- Haul road;
- Workshop and salvage yard;
- Mangweni underground pit;
- Historic stockpiles;
- Waste rock stockpiles;
- ROM Stockpiles;
- North Void;
- Pipeline (dewatering);
- Generators;
- Sub-station.

Mangweni Minipit

- Hards Overburden stockpile;
- Softs Overburden stockpile;
- Opencast Mini-Pit;
- RoM stockpile;

- Generators;
- Topsoil stockpile;
- Hards park;
- Storm Water Upgrades – paddocks for stockpiles, canal maintenance.

Processing Plant:

- Slurry ponds;
- Process water dams;
- ROM stockpiles;
- Offices;
- Workshops;
- Salvage yard;
- Discard handling area;
- Void 1;
- Void 2;
- Fuel stores;
- Explosive stores;
- Processing plant;
- Slurry settling bays;
- Filter press;
- Storm water sumps, canals and berms;
- Co-disposal area/facility at Void 2.

Block L Opencast

- Haul road crossings;
- Stormwater infrastructure (trenches; paddocks);
- Overburden stockpile;
- Pit dewatering infrastructure (pumps, pipes etc.);
- Temporary ablutions.

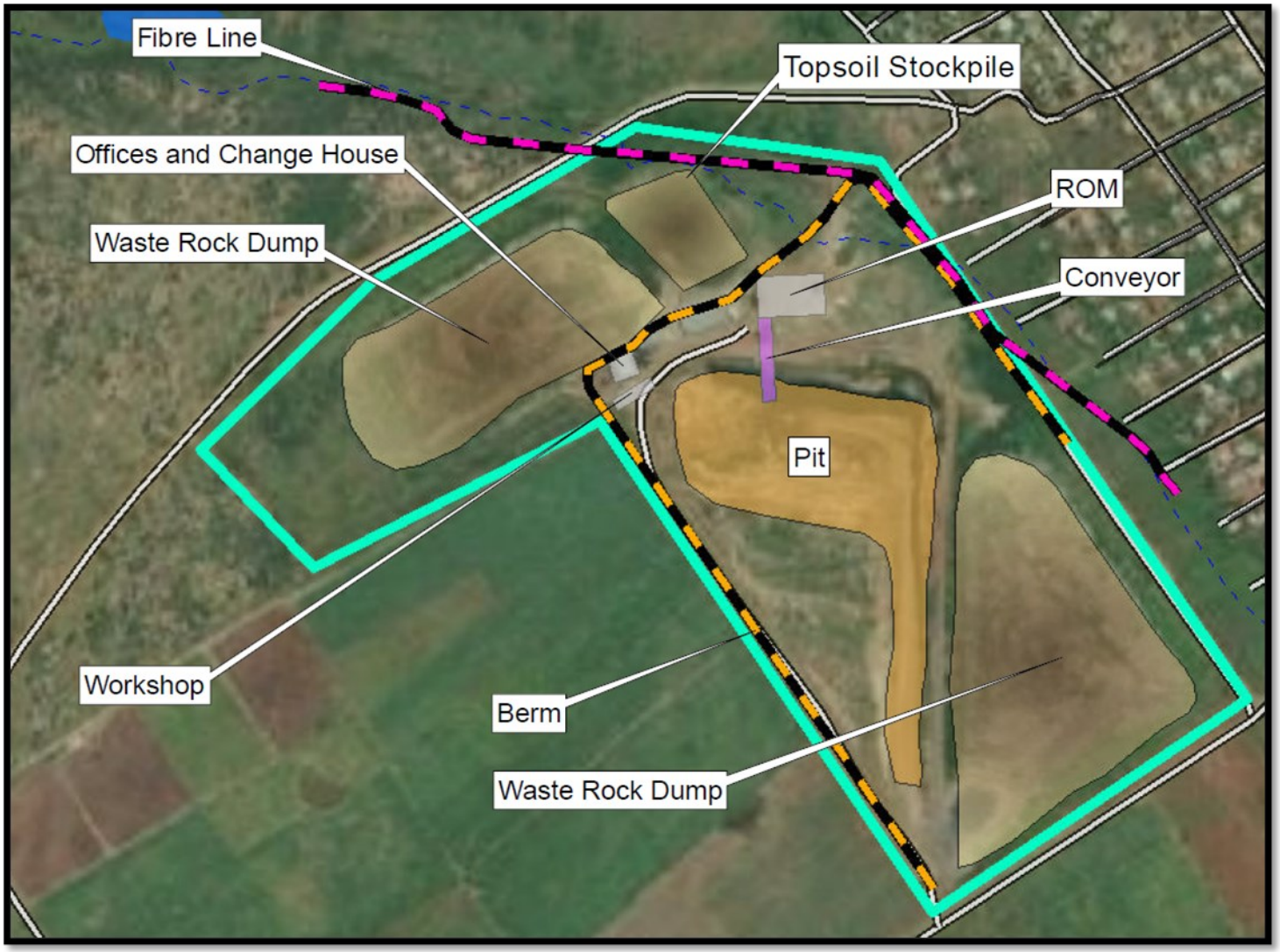

Figure 2-1 Existing Mangweni Underground (Thurlow Mapping, 2022)

Figure 2-2 Existing Processing Plant (Thurlow Mapping, 2022)

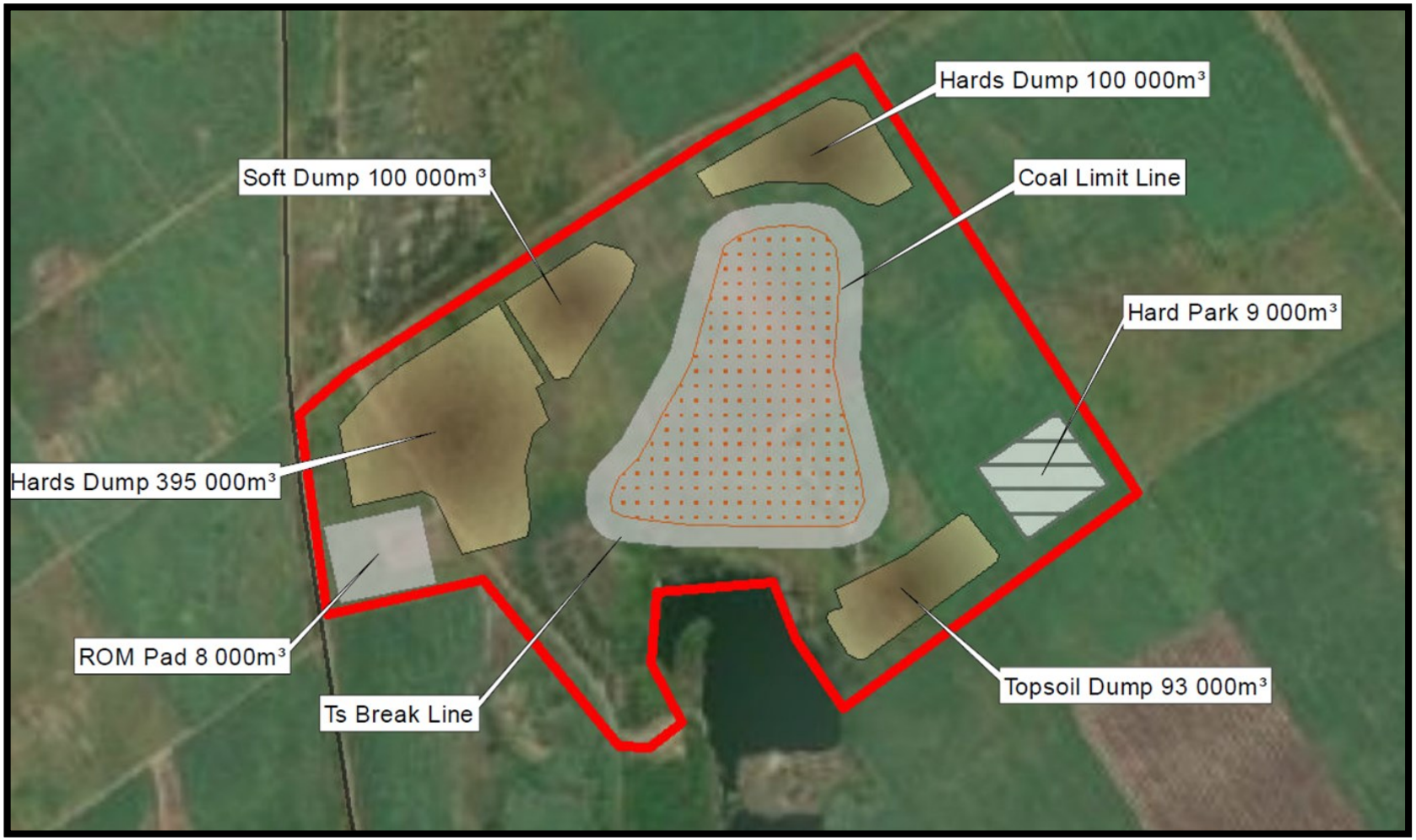

Figure 2-3 Existing Mangweni Mini Pit (Thurlow Mapping, 2022)

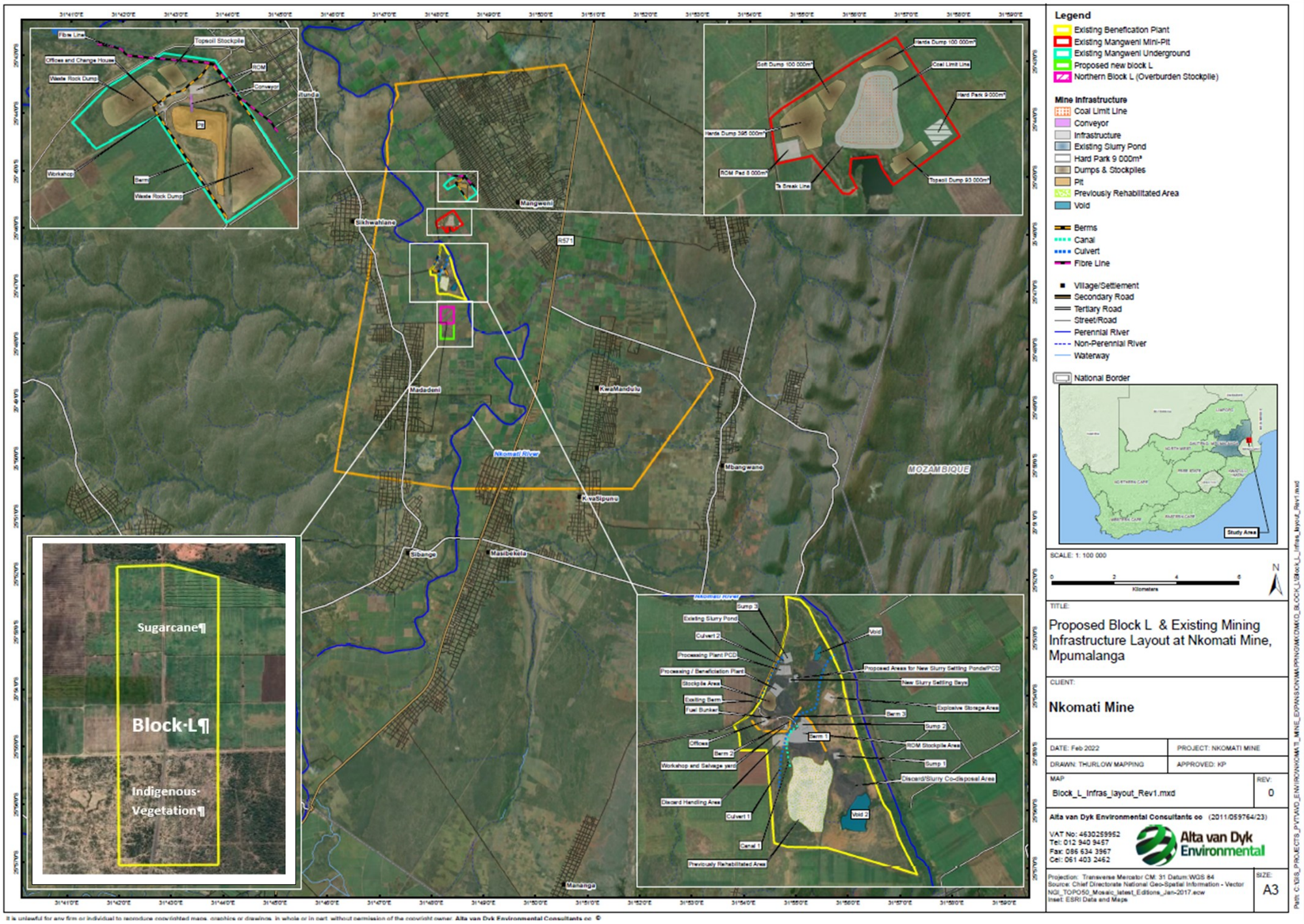

Figure 2-4 Composite Map (Thurlow Mapping, 2022)

3 DESCRIPTION OF IMPACT MANAGEMENT OBJECTIVES

3.1 Closure Objectives

The following management objectives have been determined. These include the Mangweni Underground, Mangweni Opencast Mini-pit, Block L and the Plant Are.

Table 3-1: Management/Closure Objectives

Component	Closure Objectives
Infrastructure and Activities	• Ensure physical stability to facilitate the implementation of the planned end land use; • Closing, dismantling, decontaminating, removing and disposing of surface infrastructure with no post closure beneficial use; • Stabilising the upper surfaces and outer slopes of stockpiles; • Ripping, shaping, and vegetating of general disturbed surface areas; • Infill and/or shape and re-vegetate the opencast areas.
Local Environmental Quality	• To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contamination arising from the mining area as well as to sustain catchment yield as far as possible after closure; • Rehabilitate the environment in accordance with the rehabilitation plan.
Biodiversity	• Protect and conserve the biodiversity of the total N'komati Mining Area; • Stabilise disturbed areas to prevent erosion in the short- to medium-term until a suitable vegetation cover has established; • Establish viable self-sustaining vegetation communities that will encourage the re-introduction of local fauna, as far as possible; • Ensure that the rehabilitated portions of the mining area are safe and stable in the long-term for the planned end land use, which is agriculture; • Promote the sustainable management and use of natural resources through the adoption of best practices that integrates conservation needs and development priorities.
Topography	• Mitigate the impact of mining infrastructure and backfilled mining areas on topography; • Ensure that all activities are carried out with the post mining landform in site.
Surface Water	• Prevent the contamination of the surface water as a result of reagent or hydrocarbon spillages during transportation of the substances; • Implement a surface water monitoring programme to identify potential impacts on the receiving water environment.
Groundwater	• Monitor impacts of potential dewatering; • Construct all infrastructure that may pose a risk to the ground water resources according to best practices; • Implement a ground water monitoring programme; • Put measures in place that will ensure the protection of the water resources.
Air Quality	• Ensure that ambient air quality remains within the accepted levels; • Limit dust generation (nuisance and/or health effects to surrounding landowners/communities and compromising the desired long term post mining land use); • Ensure that cleaner technologies are investigated throughout the Life of Mine; • The necessary dust suppression techniques will be applied at all areas that poses a threat to air quality; • Implement an air quality monitoring programme to ensure that risks in terms of air quality are always addressed.
Geology	• Mining activities will be undertaken in such a manner that it will ensure the geological stability of the area during operation and closure.
Aesthetic Appearance	• To leave behind a rehabilitated mining site that, in general is not only neat and tidy, but provides an acceptable overall aesthetic appearance that does not compromise the planned end land use: o Backfilling/shaping and vegetation of stockpiles; o Tidying up the rehabilitated mining area from demolition waste and rubble; o Landscaping the site to blend in with the surrounding landscape as far as possible; o Shaping and levelling general surface rehabilitated areas to create landforms that emulate the surroundings, facilitate the planned agriculture and are free draining. Ensure that the rehabilitated mining area is suitably prepared for vegetation or vegetated where feasible.

Health and Safety	• To limit the possible health and safety threats to humans and animals; • Remove, for safe disposal, all potential process related contaminants (ensuring that no hazardous waste is present on the rehabilitated site after closure); • Demonstrating through a review of monitoring data that no possible surface and/or groundwater contaminant sources remain on the rehabilitated mining area that could compromise the planned end land use (whether agriculture or other) and/or pose healthy threats; • Fence any areas posing potential health and safety risk.
Socio-economic	• To ensure that any infrastructure transfers, measures and/or contributions made by the mine towards the long-term socio-economic benefit of the local communities, are sustainable (taking into consideration the Social and Labour Plan in place at the time of closure, to determine actions needed); • Identify infrastructure that will be of value/benefit to local communities and transferring these to third parties as agreed between the mine and these parties and/or the stakeholders; • Timeously communicate and negotiate with local communities and stakeholders on the closure of the mine; • Training and awareness to empower the ex-employees and community to effectively manage the financial and/or commercial resources transferred from the mine; • Clearly define the roles of the parties responsible for future management of the transferred facilities.

3.2 Volumes and Rate of Water

The following is a summary of the existing licensed water uses for the Nkomati Anthracite Mine as well as a summary of the new water uses that will be applied for

Table 3-2: Licensed Water Uses (05/X13J/ACGIJ/1864)

Purpose / Activity	Properties	Volume / Dimensions	Coordinates
Section 21(a)			
Taking water from borehole for domestic use.	Un-surveyed state land owned by Matsamo Tribal Authority	1320 m^3/a	n/a
Taking water from Madadeni Opencast pit for reuse in the processing plant.	Un-surveyed state land owned by Mawewe Tribal Authority	3650 m^3/a	25.830526° S 31.798890° E
Taking water from underground as make up water.	Portion 0 of Wildebeest 494 JU	54 750 m^3/a	25.7454181° S 31.810150° E
Taking water from Defunct open cast pit as make-up water.	Portion 0 of Rustplek 495 JU	65 700 m^3/a	25.767353° S 31.804758° E
Abstraction of groundwater through Mangweni Borehole for domestic use	Portion 0 of Wildebeest 494 JU	6 600 m^3/a	25.752603° S 31.806839° E
Abstraction of groundwater through a borehole for domestic use	Portion 20 of Land Parcel 701 of the Major Region JU	5 500 m^3/a	25.832163° S 31.791786° E
Abstraction of water from North Void for use in processing plant	Portion 0 of Rustplek 495 JU	407 000 m^3/a	25.766884° S 31.804350° E
Abstraction of water found in Madadeni in Void 2 to be used in the processing plant	Land Parcel 701 of the Major Region JU	80 300 m^3/a	25.782971° S 31.805455° E
Section 21(c) and (i)			
Pipeline crossing on Nkomati River, transporting water from the underground mine to the processing plant.	Sweethome 496 JU Unsurveyed state land owned by Matsamo Tribal Authority	3m 2500m	25.770055° S 31.801111° E
Diverting the Madadeni Drainage Channel	Un-surveyed state land owned by Matsamo Tribal Authority	3m 1300m	25.834977° S 31.802777° E
Section 21(g)			
Disposing of dirty water found from underground into a return water dam	Un-surveyed state land owned by Matasamo tribal authority	55 760 m^3/a	25.77177778° S 31.80111111° E
Disposing of dirty water into a pollution control dam (south dam)	Un-surveyed state land owned by Matasamo tribal authority	55 470 m^3/a	25.77416667° S 31.80111111° E
Discard dumps	Un-surveyed state land owned by Matasamo tribal authority	135 920.88 m^3/a	25.77888889° S 31.80222222° E

Purpose / Activity	Properties	Volume / Dimensions	Coordinates
Disposal of sewage into septic tanks and French drain	Un-surveyed state land owned by Matasamo tribal authority	216 m^3/a	25.778018° S 31.800034° E
Disposal of dirty water into a pollution control dam (north dam)	Portion 0 of Wildebeest 494 JU	55 470 m^3/a	25.75388889° S 31.80361111° E
Coal Stockpiling	Un-surveyed state land owned by Matasamo tribal authority	360 000 tons	25.77666667° S 31.800277778°E
Dust suppression	Unsurveyed state land owned by Matsamo Tribal Authority Unsurveyed state land owned by Mawewe Tribal Authority Portion 0 of Wildebeest 494 JU Portion 0 of Sweet Home 496 JU Portion 0 of Rustplek 495 JU	36 775 m^3/a	All Haul Roads
Stockpiling of Run of mine and product of the Madadeni Stockpile area	Un-surveyed state land owned by Mawewe tribal authority	160 000 m^3/a	25.83000000° S 31.79666667° E
Disposal of dry slurry into a dry slurry stockpiling area	Un-surveyed state land owned by Matasamo tribal authority	28 800 m^3/a	25.77527778° S 31.80138889° E
Disposal of slurry into slurry settling dam	Un-surveyed state land owned by Matasamo tribal authority	25 000 m^3/a	25.77555556° S 31.80194444° E
Disposal of dirty water into the discard dumps evaporation dam	Un-surveyed state land owned by Matasamo tribal authority	37 670 m^3/a	25.778442° S 31.802529° E
Backfilling of Madadeni opencast pit during mine closure	Un-surveyed state land owned by Matasamo tribal authority	135 920.88 m^3/a	25.830256° S 31.798253° E
Backfilling of old void pit 1	Un-surveyed state land owned by Matasamo tribal authority	135 920.88 m^3/a	25.774957° S 31.803434° E
Backfilling of old void pit 2	Un-surveyed state land owned by Matasamo tribal authority	135 920.88 m^3/a	25.783502° S 31.806093° E
Disposal of dirty water into Madadeni PCD	Un-surveyed state land owned by Mawewe tribal authority	18 615 m^3/a	25.832939° S 31.801290° E
Hard and Fine Discard Stockpile (co-disposal)	Un-surveyed state land owned by Matasamo tribal authority	360 000 t/a	25.781782° S 31.805862° E
Plant Storm Water Sump 2	Un-surveyed state land owned by Matasamo tribal authority	5 313 m^3/a	25.777563° S 31.802303° E
Plant Storm Water Sump 1	Un-surveyed state land owned by Matasamo tribal authority	4 036 m^3/a	25.779696° S 31.804897° E
Mangweni Opencast Mini pit Run of Mine Stockpile	Portion 0 of Rustplek 495 JU	200 000 t/a	25.764005° S 31.805090° E
ROM Stockpiling at Mangweni Underground Mining Area	Portion 0 of Wildebeest 494 JU	200 000 t/a	25.752811° S 31.808968° E
Plant Run of Mine Stockpile	Un-surveyed state land owned by Matasamo tribal authority	360 000 t/a	25.780227° S 31.804843° E
Storage of water in North Void	Portion 0 of Rustplek 495 JU	407 000 m^3/a	25.766749° S 31.804618° E
Storage of water in Void 2 (Void South of Plant)	Un-surveyed state land owned by Matasamo tribal authority	80 300 m^3/a	25.783058° S 31.805991° E
Section 21(j)			
Removing water found in underground working	Portion 0 of Wildebeest 494 JU	54 750m^3/a	25.75444444° S 31.80944444° E
Taking water from Madadeni Opencast pit for reuse in the processing plant	Unsurveyed state land owned by Mawewe Tribal Authority	3 650 m^3/a	25.76555556° S 31.79638889° E
Removal of water found in Madadeni Underground – to be stored in Void 2	Unsurveyed state land owned by Mawewe Tribal Authority	80 300 m^3/a	25.831236° S 31.797794° E
Removal of water found in Mangweni opencast pit – to be stored in North Void	Portion 0 of Rustplek 495 JU	407 000 m^3/a	25.763754° S 31.804232° E

Table 3-3: Development Phases

Purpose	Properties	Volume / Dimensions	Area	Coordinates
Section 21(a)				
Abstraction of water found in Block L Opencast Pit	Unsurveyed state land owned by Mawewe Tribal Authority	TBC	Block L (South of Processing Plant)	25° 47' 45.66" S 31° 48' 14.62" E
Section 21(c) and (i)				
Mining activities within 500m of a wetland	Unsurveyed state land owned by Mawewe Tribal Authority	N/A	Block L (South of Processing Plant)	25° 47' 45.66" S 31° 48' 14.62" E
Section 21(j)				
Removal of water found in Mangweni opencast pit – to be stored in Void 2	Un-surveyed state land owned by Mawewe tribal authority	TBC	Block L (South of Processing Plant)	25° 47' 45.66" S 31° 48' 14.62" E

N'Komati Anthracite Mine is in possession of an existing Water Use License (Licence No: 05/X13J/ACGIJ/1864) and a GN704 Exemption (Exemption: 27/2/2/X13J/049). As per the above, the mine is in the process of preparing to apply for a new water use license for Block L.

4 ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan (EMP) is a site-specific programme developed to ensure that all the necessary measures needed to protect the environmental and comply with relevant environmental legislation are identified and implemented. An EMP was written in 2020 by Alta van Dyk Environmental Consultants which covered the Mangweni and Plant Areas. This EMP has been written to amend the 2020 AVDE EMP. There are no fundamental changes to the EMP as the existing EMP already covers underground and opencast mining, as well as covering the existing plant area which is to remain unchanged.

4.1 Environmental Management Plan Table

Table 4-1: Environmental Management Plan

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
TOPOGRAPHY					
Establishment of construction and operational areas - topography	Construction and operation	165ha	**GENERAL** • Keep construction footprint as small as possible; • Stockpile separate materials and soils in separate stockpiles; • Demarcate construction and operational areas; • Limit movement to within demarcated areas.	N/A	Prior to operation
Operation of mine and related activities / infrastructure - topography	Construction and operation	60ha	**GENERAL** • Demarcate construction and operation footprint areas; • Mining to take place in accordance with approved mine plan; • Placement of stockpiles and infrastructure to be placed in accordance with the approved mine plan, layout plans and rehabilitation plan (shaping of stockpiles, stable slopes).	N/A	Prior to operation
Decommissioning and closure of mine and related infrastructure - topography	Decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** • Remaining stockpiles/dams/ramps to be shaped to a stable slope (1:3) to allow for revegetation; • Implement the site specific rehabilitation plans (HEES, 2019 for Mangweni and Plant; HEES 2022 for Block L) and/or any subsequent updates thereof; • Assessment of geochemical nature and long-term pollution potential for all waste rock dumps in order to determine whether any specific measures such as covers, liners, PCDs need to be installed to protect the surface and groundwater resource; • To return the area, as far as possible, to a topography as agreed upon in consultation with stakeholders; • Demolish and remove or repurpose selected structures and infrastructure in consultation with stakeholders and I&APs; • Shape, rip and vegetate the remaining earth embankments of impoundment dams and ponds, as well as roads that do not have a post-closure use, to slopes that are stable and integrated, as far as possible, into the surrounding surface topography; • Shape final landforms to a stable gradient and establishing free drainage after rehabilitation.	Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).	Within 1 year of closure
		53ha	**OPENCAST** • Implement the site specific rehabilitation plans (HEES, 2019 for Mangweni and Plant; HEES 2022 for Block L) and/or any subsequent updates thereof; • The decommissioned shafts and surface excavations will be closed as required in terms of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); • Make use of north void for storage (water and/or overburden/discard); • Return the land to pre-mining state or any other land use as agreed with the surrounding communities; • Ensure that the rehabilitated mine site is free-draining, and runoff is routed to natural drainage lines as far as possible.		
		50ha	**UNDERGROUND** • Mangweni Underground stockpiles to be used for cut and fill and/or fill for re-profiling of existing stockpiles to a stable slope working towards sustainable rehabilitation and closure, or any suitable combination thereof as per approved rehabilitation plan; • The decommissioned shafts and surface excavations will be closed as required in terms of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); • Landscape and topsoil disturbed areas and stockpiles to facilitate natural succession of suitable indigenous flora and supplement with composting and seeding if required; • Make use of voids for storage (water and/or overburden/discard); • Ensure that the rehabilitated mine site is free-draining, and runoff is routed to natural drainage lines as far as possible.		
		85ha	**PLANT** • Make use of void 2 for storage (water and/or overburden/discard/slurry); • Landscape and topsoil disturbed areas and stockpiles to facilitate natural succession of suitable indigenous flora and supplement with composting and seeding if required; • Ensure that the rehabilitated site is free-draining, and runoff is routed to natural drainage lines as far as possible.		
Decommissioning and closure of mine and related infrastructure – surface subsistence	Operation and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** • Demarcate footprint areas to be as small as possible; • Remain within demarcated areas; • Mining to take place in accordance with approved mine plan; • An active surface subsidence monitoring programme, in accordance with the specifications of the DMR's Directive of Mine Surveyors, must be implemented on any applicable areas; • Any formal claims that should arise regarding subsidence as a result of mining activities should be investigated. Where it is clear that N'komati has caused the subsidence, the Mine will implement appropriate mitigation measures timeously. These mitigation measures may include repair of damaged infrastructure, landscaping and rehabilitation.	N/A	Prior to closure
		53ha	• Implement the site specific rehabilitation plans (HEES, 2019 for Mangweni and Plant; HEES 2022 for Block L) and/or any subsequent updates thereof.		
		50ha	**UNDERGROUND** • Underground support pillars to be left in situ. • Implement the site specific rehabilitation plans (HEES, 2019 for Mangweni and Plant; HEES 2022 for Block L) and/or any subsequent updates thereof.		
SOILS, LAND USE AND LAND CAPABILITY					

Topsoil stripping and handling – soil loss	Construction and operation	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** • Demarcate construction and operation footprint areas; • Topsoil is to be stripped and removed from all new development areas prior to disturbances and be stored within demarcated stockpile areas as per layout plan; • Topsoil that is stripped is to be removed to demarcated topsoil stockpile areas with as little compaction as possible; • Restrict mining and related activities to demarcated areas and limit possible disturbance and degradation of soils outside these areas; • Compile and maintain a mine wide soil resource plan indicating the nature and location of soil. • Soil stockpiles to be stored outside the 1:100 year flood line of any watercourse unless prior authorisation is obtained; • Erosion protection measures will be put in place at the soil stockpile areas, for example low-level berms or vegetation; • Stockpile height to be determined by slope stability design as per rehabilitation plan; • Protect the soil surface on unavoidable mining related disturbed areas against contamination, erosive and non-erosive soil degradation such as removal and compaction; • Practise single handling of topsoil as far as possible; • Mitigate all forms of soil erosion within 1 year of being identified. Establish the cause of erosion and implement at source corrective measures on a case-by-case basis to prevent the recurrence of erosion; • Landscape and vegetate disturbances such as ramps/dams and other remaining mining features to ensure these areas blend into the surrounding landscape.	Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).	From the commencement of construction throughout operations
		53ha	**OPENCAST** • Place stockpiles within the mining area in suitable areas to facilitate concurrent and final rehabilitation; • Compile and implement a soils stripping and utilization plan for all new mining areas, which details all new topsoil and useable soil stripping, movement, storage and placement activities.		
Topsoil stripping and handling – soil degradation	Construction and operation	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** • Avoid storage of topsoil for periods that the adversely affect the productive seed bank and/or organic content of the soil; • Store soil stockpiles outside the 1:100 year flood line of watercourses unless prior authorisation is obtained, in areas where they will not be impacted upon by mining operations, and upslope of areas of disturbance or development, to prevent contamination by contaminated runoff or seepage; • Provide erosion protection measures such as vegetation and/or low-level berms around soil stockpile areas; • Stockpile height to be determined by slope stability design.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999; Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).	From the commencement of construction throughout operations
Overburden management	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** • Stockpiles to be placed in accordance with the mine layout plan and rehabilitation plan; • Stockpile height and slopes to be determined by slope stability design as per rehabilitation plan; • Overburden to be used for shaping/sloping of existing stockpiles at plant and underground.		From the commencement of construction through to closure
		53ha	**OPENCAST** • Implement the site specific rehabilitation plans (HEES, 2019 for Mangweni and Plant; HEES 2022 for Block L) and/or any subsequent updates thereof.		

Mining and related activities – soil erosion	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)**
			• Nkomati shall take measures (e.g. installation of temporary and permanent drainage works, construction of berms, contouring of land, establishment of vegetation etc.) to ensure that there is no undue soil erosion due to mining related activities;
			• Implement a site-specific storm water management plan;
			• All forms of erosion will be mitigated within 1 year of identification;
			• The following infrastructure will be inspected, and eroded areas will be repaired when and if necessary:
			  o Linear infrastructure (roads – particularly untarred roads, railway lines and pipelines); and
			  o All surface water management infrastructures (canals, bunds, dams);
			• Stockpile height and slope shapes to be determined by slope stability design.
				National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999; Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).	From the commencement of construction through to closure

Mining and related activities – soil compaction	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** • Minimise soil hardening as far as possible, and implement and maintain a rigorous storm water management system for the operational areas; • Restrict vehicular movement to the demarcated operational footprint area; • Place the stripped topsoil within dedicated and demarcated stockpile areas with as little compaction as possible; • As far as practically possible construction must be undertaken in the dry season as to minimise irreversible soil compaction in disturbed areas; • Rip compacted soils to 300mm and facilitate revegetation with suitable indigenous vegetation; • For concurrent rehabilitation purposes, rip the soils to at least 300mm before re-vegetating as to allow for seed germination and natural plant succession.		From the commencement of construction through to closure

Mining and related activities – soil contamination	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)**
			• All hazardous material spillages will be cleaned up and managed as soon as possible;
			• Ensure the presence of sufficient emergency spill kits;
			• Vehicles and machinery to be operated according to manufacturers' specifications;
			• Vehicles and machinery to be regularly serviced and maintained, within designated workshop areas (with a roof and concrete flooring) or off site;
			• Compile and maintain a mine-wide record of contaminated soils including the nature and extent of contamination;
			  o Classify the areas of concern into high, moderate or low risk areas in terms of further contamination potential, taking account the possible organic breakdown of contaminants over time;
			  o Prioritise high risk areas, evaluate alternatives for their remediation, and implement remediation;
			• Establish and implement a site-specific storm water management plan (to be updated with significant changes);
			• Assessment of degree of soil contamination through groundwater monitoring.
				National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999; Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).	From the commencement of construction through to closure

Mining and related activities – altered land use and land capability	Operation and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** **Management of agricultural and grazing land** • Through rehabilitation, ensure that there are minimal impacts on the long-term land capability of the area; • Limit and manage the loss of wilderness land; • Engage with surrounding communities with regards to desirable post-mining land uses; • Undertake mining activities with long term land use in mind. **Loss of agricultural and wilderness land** • Restrict development and infrastructure to demarcated areas only; • Undertake mining in accordance with approved layout plan. **Land Use Management - During Operations** • Include environmental education in the training activities of the staff, labourers and subcontractors; • Undertake surveys on an annual basis in order to assess rehabilitation as part of working towards final closure. These surveys are also required for annual updates to the Mine's financial provision; • Placement of facilities and infrastructure to be carried out according to an approved layout plan; • Engage with surrounding communities with regards to desirable post-mining land uses. **Management of grazing and livestock during operations** • Develop educational material to inform surrounding communities of the risks involved with livestock being present on the mine; • Prohibit the presence of livestock on the mining area; • Ensure the mining/operational area is fenced. **Management of Rehabilitated Areas** • The opportunity for using buildings and infrastructure for alternative purposes post closure must be investigated through consultation with stakeholders. If suitable alternative uses for the existing infrastructure cannot be found, infrastructure must be demolished; • Investigate the grazing potential of the land; • Rehabilitated areas to be, as far as possible, left undisturbed. **Land-use planning during decommissioning and closure** • Prior to closure, develop a post-closure land use plan through consultation with the surrounding communities/stakeholders; • Prior to closure, determine/establish the contractual, legal obligations and financial liabilities in terms of current and post closure land uses and take these into consideration with regular updates of the post closure land use plan; • Generate and encourage new opportunities for final land use options; • Undertake final land use planning in coordination with the rehabilitation plan. **Re-instatement of Land Capability** • Determine the most desirable post-closure land use through consultation with relevant stakeholders; • Implement site specific rehabilitation plan; • Ensure that those areas designated for post closure grazing or wilderness land are shaped to stable slopes, as far as possible, to facilitate revegetation and free drainage; • Rehabilitate stockpiles to a state aligned to the surroundings, as far as possible, to complement the surrounding natural land-uses; • Identify those areas already within the rehabilitated areas where the desired land-capability could not be achieved due to inappropriate rehabilitation and institute the required corrective action.		From the commencement of construction throughout operations
		53ha	**OPENCAST** • Implement the site specific rehabilitation plans (HEES, 2019 for Mangweni and Plant; HEES 2022 for Block L) and/or any subsequent updates thereof; • In consultation with stakeholders, return the land use, as far as possible, to the pre-mining land use or to a suitable land use as agreed through consultation with stakeholders.		
		50ha	**UNDERGROUND** • Return disturbed areas as far as possible, to pre-mining land capability (with the exception of final void(s) which can be used for storage of water for community).		
		85ha	**PLANT** • Return disturbed areas as far as possible, to pre-mining land capability (with the exception of final void(s) which can be used for storage of water for community).		
SURFACE WATER					

Storm water management – surface water quality and quantity	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)**
			Storm Water Management
			• Develop and maintain a site-specific water balance;
			• Develop, implement and maintain a site-specific Storm Water Management Plan. The measures contained within the Storm Water management Plan include but are not limited to:
			  ○ Establishment of new storm water dams/sumps;
			  ○ Maintenance of storm water infrastructures such as dams, trenches and canals;
			  ○ Establishment of erosion protection measures such as paddocks;
			  ○ Use of voids for storage of water;
			  ○ Re-instatement of natural flow lines.
			• Ensure unpolluted water remains part of a clean water system, away from any dirty area;
			• Design, construct, maintain and operate any clean water system at the mine or activity so that it is not likely to spill into any dirty water system more than once in 50 years;
				National Water Act, 1998 (Act 36 of 1998);
				DWA, GN704, 4 June 1999.
					SWMP must be implemented with the commencement of construction, through operation and closure. Certain aspects will remain post-closure.

			• Design, construct, maintain and operate any dirty water system at the mine or activity so that it is not likely to spill into any clean water system more than once in 50 years. • Design, construct, maintain and operate any dam that forms part of a dirty water system to have a minimum freeboard of 0.8 metres above full supply level; • Collect the water arising within any dirty area, including water seeping from mining operations, outcrops or any other activity, into a dirty water system; • Maintain the capacity requirements of all facilities through regular maintenance; • Implement a suitable surface water monitoring programme; • Inspect (and maintain if required) diversion trenches and berms after a heavy storm events as to ensure the integrity and stability and to address erosion problems immediately; • Maintain the design capacity of the river diversion through frequent cleaning and removal of vegetation and debris; • Undertake pit/shaft dewatering in order to ensure safety of employees. **Restrictions on locality** • No water management facilities may be within the 1:100 year flood line or within 100m of a water resource unless prior permission is obtained from the Department of Human Settlements, Water and Sanitation; • No future sanitary convenience, fuel deposit, reservoir or depots that may pollute the water resource may be within the 1:50 year flood line. **Restrictions on the use of material** • No material that may pollute a water resource may be used in constructing dams, roads, walls and/or berms unless authorised in terms of a GN704 Exemption; • Water quality monitoring shows that discard and slurry are not causing pollution of voids and thus may be used to backfill the voids (pending Water Use License requirements). **Access Control** • Implement and maintain access control to the mine and areas which may pose a health and/or safety risk (i.e. dams, shafts etc.).		

Mining and related activities – surface water contamination (including wetlands)	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)**
			Prevention of water pollution of the surface water resource
			• Implement and maintain surface water monitoring programme;
			• Education of mine staff on the potential impacts on the receiving environment with respect to the following:
			  ○ The potential adverse effects and the prevention of these effects on the receiving water environment;
			  ○ Water conservation and beneficial re-use;
			  ○ Prevention and containment of spills of contaminated water;
			  ○ Formulation and implementation of emergency procedures and protocols; and
			  ○ Identifying and reporting of incidents and/or poor practices to effect corrective and remediation actions and measures.
			• Where practical, all future water management facilities, and associated infrastructure are to be designed, located, constructed and maintained to minimise water resource pollution, damage to riparian or in stream habitat through erosion, sedimentation, disturbance of vegetation or the alteration of flow characteristics;
			• Recycle water as far as practically possible;
			• Ensure all water systems are free of obstructions;
			• All domestic waste and wash water to be disposed of as per permit/licence requirements;
			• Implementation and maintenance of a water balance to deal with process water, stormwater run-off and other hydrological processes;
			• Develop, implement and update an Integrated Water and Waste Management Plan (IWWMP);
			• Implement the site-specific storm water management plan.
			Achievement of Zero Discharge
			• Lining of any future dams to be determined by water quality and risk-based approach;
			• Retain the capacity and/or functionality of storm water management facilities and dam(s) by regularly removing sludge and/or other accumulated material from these for safe off-site dispose of the collected material at applicable and relevant disposal facilities where relevant;
			• Implement the specific stormwater controls and measures as per the GN704 stormwater management plans;
			• Only discharge water if licensing requirements are met.
				National Water Act, 1998 (Act 36 of 1998);
				DWA, GN704, 4 June 1999.
					SWMP must be implemented with the commencement of construction, through operation and closure.
					Certain aspects will remain post-closure.

On-site waste management – surface and ground water contamination	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** **Management of Increased Waste** • Implement the separation of general and hazardous waste; • All waste for disposal should be disposed of at a permitted/licensed landfill designated for that specific waste type. Should an external contractor be used, records of waste removal must be obtained and kept on file; • Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through odour and/or visual impacts; • Prevent any waste from being used for an unauthorised purpose; • General and Hazardous waste shall not be burnt. **Management Commitment – Overburden Stockpiles** • Stockpile handling to be carried out in accordance with the site-specific rehabilitation plan: • Slopes to be shaped to 1:3 and stepped for storm water purposes; • Facilitate vegetation of slopes through establishing stable slopes and placement of topsoil (and assist with compost and seeding if required). **Management of Hazardous Waste** • All containers in which hazardous waste is stored should be sealed to prevent water ingress and should be intact, without any corrosion or damage which could lead to spills; • Hazardous waste to be stored within a bunded area; • Hazardous waste should not be stored for extensive periods on site;	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.	On-site waste management measures must be in place with the commencement of construction and remain in place through operation and closure.

			• All hazardous waste destined for disposal should be disposed of at a hazardous landfill and a waste manifest should be provided by the transporter; • A licensed waste contractor should be contracted to remove hazardous waste; • The waste management procedure/s developed by the mine must be adhered to, to ensure compliance and accountability. **Management and Storage of General Waste** • Steps must be taken to ensure that: o The containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste; o Adequate measures are taken to prevent accidental spillage or leaking; o The waste cannot be blown away; o Nuisances such as odour, visual impacts and breeding of vectors do not arise; o Pollution of the environment and harm to health are prevented. o The waste management procedure/s developed by the mine should be adhered to, to ensure compliance and accountability; o General waste for disposal must be disposed of at a permitted/licensed facility which accepts this waste; o General waste separated at source for reuse and recycling such as wood, scrap metal, rubber, should be removed to the salvage yard for storage, refurbishment, reuse and recycling considerations. **Management of Unauthorised Disposal** • No person may: o Dispose of waste, or knowingly or negligently, cause or permit waste to be disposed of, in or on any land, water body or at any facility unless the disposal of that waste is authorised by law; and/or o Dispose of waste in a manner that is likely to cause pollution of the environment or harm to health and well-being. **Management of the dumping or impoundment of general waste** • Dumping or impounding of rubble, litter, waste or discards of any description, whether solid or liquid, must take place only at the site or sites demarcated for such purpose in accordance with the measures stipulated in this document; • Illegal disposal, dumping and littering is to be prohibited. **Management of Explosive boxes and Packaging - Increased waste generation** • Explosive and explosive related wastes are regulated by the Explosive Act, which should be adhered to; • Boxes, cartons and paper bags that have contained explosives must be destroyed or appropriately disposed of as soon as practicably possible after being emptied for their explosive contents and may not be used again for any purpose; • Training to be provided to the suitable employees on cleaning of explosive containers; • Should a contractor be used for blasting, the EMP must be supplied to the contractor with specific reference to blasting applicable commitments. **Discard and Slurry Management** • Backfilling of North Void and Void 2 with discard and slurry to continue, pending licensing requirements and water quality monitoring.		
Storage and handling of chemicals, fuels, oil, lubricants etc.	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** • Handle and dispose of associated packaging of chemicals / hazardous materials and related waste in accordance with manufacturers' instructions; • Employ emergency measures with accidental spills of the above as per manufacturers' instructions; • Ensure emergency spill kits are present on site; • Train relevant staff on waste management and waste handling procedures; • Implement surface water ground water monitoring programme; • Vehicles and machinery to be regularly serviced and maintained, either within the dedicated workshop areas or off site; • Vehicles and machinery to be operated according to manufacturers' specifications; • Storage and handling of chemicals, fuels, lubricants, oils and all other hazardous materials must be undertaken as to pose the least risk of leaks and contamination. This will need to be within a dedicated bunded store; • Chemicals must be stored and handled according to the relevant "directions of use" of the product; • All commitments made with reference to hazardous waste management must be adhered to. • All oils, lubricants, fuels and chemicals are to be stored in bunded areas (this includes generators and generator bulk / day tanks) in sealed containers and/or under a roof; • Access control must be implemented to areas where hazardous chemicals are stored.	Hazardous Substances Act, 1973 (Act 15 of 1973)	Measures must be in place with the commencement of construction and remain in place through operation and closure.
Mining and related activities – reduced surface water flow	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** **Water Balance** • Develop and maintain a site-specific water balance; • Water balance to include aspects such as surface water use, groundwater use, sources of water and how water moves around the site; • Implement, manage and maintain the water balance as to manage water more effectively and efficiently throughout the life of mine; • Re-use and recycle water and minimise clean/raw water consumption; • Flow meters to be installed at all major inflow and outflow sources as to support the compilation and maintenance of the water balance; • Implement and maintain a suitable surface and groundwater monitoring programme; • Implement a hierarchy of use as to optimise the re-use of contaminated water and limit the abstraction of raw water. **Storm Water Management** • Design, construct and maintain effective clean and dirty water separation systems on site as to allow clean water to leave the site as clean without being contained or contaminated; • Establish, implement and maintain a site-specific storm water management plan.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.	Measures must be in place with the commencement of construction and remain in place through operation and closure.
GROUND WATER					
Hydrocarbon spills – ground water contamination	Construction, operation,	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** **General Management measures** • All management / mitigation measures outlined in the surface water section above must be fully implemented (not repeated in this section);	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.	Measures must be in place with the commencement of

	decommissioning and closure		• Maintain the capacity requirements of any future water storage facilities through regular maintenance; • No future sanitary convenience, fuel deposit, reservoir or depots that may pollute the water resource may be within the 1:50 year flood line; • The hydrogeological flow and contaminant transport models should be updated if and when required; • A suitable groundwater monitoring program must be implemented and maintained – water levels, quantity and quality should be monitored; • Storage and handling of chemicals, fuels, lubricants, oils and all other hazardous materials must be undertaken as to pose the least risk of leaks and contamination; • Chemicals must be stored and handled according to the relevant "directions of use" of the product; • All commitments made with reference to hazardous waste management must be adhered to; • All oils, lubricants, fuels and chemicals are to be stored in bunded areas (this includes generators and generator bulk / day tanks) in sealed containers and/or under a roof; • Access control must be implemented to areas where hazardous chemicals are stored. **Water Balance** • As per surface water section above. **Vehicles and Machinery** • Vehicles and machinery to be regularly serviced and maintained, either within the dedicated workshop areas or off site; • Vehicles and machinery to be operated according to manufacturers' specifications. **Underground Operations** • Do not store any potential pollutants unnecessarily underground for any extended period of time; • Remove water found underground as soon as possible to ensure employee safety and prevent/reduce the exposure of water to potential pollutants; • Servicing, refuelling and maintenance of vehicles and machinery to take place above ground within the dedicated workshop area as far as practicably possible.		construction and remain in place through operation and closure.
Operation and closure of dirty water areas	Operation and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** **Management of Any future Dirty Water Containment Facilities** • Develop and maintain a site-specific water balance; • Implement and maintain a site-specific Storm Water Management Plan; • Design, construct, maintain and operate any dirty water system at the mine so that it is not likely to spill into any clean water system more than once in 50 years; • Design, construct, maintain and operate any dam that forms part of a dirty water system to have a minimum freeboard of 0.8 metres above full supply level in compliance with GN704; • Collect the water arising within any dirty area, including water seeping from mining operations, outcrops or any other activity, into a dirty water system (PCD, Void, paddocks etc); • Design, construct and maintain all water systems in such a manner as to guarantee the serviceability of such conveyances for flows up to and including those arising as a result of the maximum flood with an average period of recurrence of once in 50 years; • Maintain the capacity requirements of any future facilities through regular maintenance; • Implement a suitable surface and ground water monitoring programme. **Rehabilitation of Any Future Dirty Water Containment Facilities** • Develop and implement a suitable closure plan for any future dirty water containment facilities; • Develop and implement a site-specific rehabilitation plan; • Allow for the dirty/contaminated water within any future containment facilities to evaporate; • Liner requirements of any future facilities to be determined by water quality and risk-based approach; • Decontamination and cleaning of demolition material within dedicated areas prior to salvage, recycling or re-use; • Remove liners for safe disposal at a suitable classified waste disposal site and obtain the safe disposal certificates; • Rip dam embankments (to 300mm) and allow for the rehabilitation of the area; • Facilitate revegetation as soon as possible as to protect the rehabilitated area from water and wind erosion.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.	Measures must be in place with the commencement of construction and remain in place through operation and closure.
Dewatering of mining area	Operation and closure	280ha	**MINING AREAS (UNDERGROUND AND OPENCAST)** • Develop and maintain a site-specific water balance; • Insert flow meters; • Implement a site-specific ground water monitoring programme inclusive of ground water levels; • License all abstractions; • Re-use and recycle water as far as practicably possible to reduce raw water intake; • Rip and revegetate hard/compacted surfaces to a depth of 300mm to facilitate ground water recharge; • Implement site specific rehabilitation plan; • Maintain ground water monitoring programme, inclusive of ground water levels, post closure until it can be proven that it is no longer necessary.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.	Measures must be in place with the commencement of operations and remain in place through operation and closure.
BIODIVERSITY – FAUNA AND FLORA					
Habitat destruction / vegetation clearance – reduced biodiversity	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** **Habitat Destruction** • Demarcate construction and operation footprint areas; • Operate in accordance with the approved mine plan; • Keep vegetation clearance to a minimum; • Facilitate natural succession of disturbed areas by ripping compacted areas to 300mm, placement of topsoil and supplementing with fertilizer and seeding if required. **Protection of Biodiversity** • Develop and maintain a database of protected and vulnerable species within the mining area;	National Environmental Management Act, 1998 (Act 107 of 1998).	Measures must be in place with the commencement of construction and remain in place through operation and closure.

			• Actively remove and control alien and invasive plant species; • Implement and monitor plans to control and prevent the spread of alien and invader species; • Limit habitat disturbance and fragmentation; • Training and awareness to protect natural systems and importance of biodiversity; • Keep tracks and access roads to a minimum on site and where possible, make use of existing tracks; • Restrict development and infrastructure to demarcated areas; • Manage fire breaks to prevent destruction and damage to vegetation; • Use of herbicides and pesticides to be kept to a minimum; • Make use of indigenous vegetation for rehabilitation; • Vegetate through natural succession and assist with seeding if required; • Prohibit encroachment into the ox-bow and Nkosi Dam. **Management of Protected Trees** • Preference will be to leave protected trees undisturbed, however, if required, the necessary permits are to be obtained before any protected trees are removed. **Re-instate a suitable land capability and indigenous vegetation on rehabilitated areas** • Ensure that those areas designated for grazing and other agricultural uses would be shaped to gentle slopes following the natural topography as far as possible and matching up with natural surface features such as streams, hills etc., to create a coherent landscape that would facilitate implementation and sustaining the planned agricultural land use; • Topsoil and shape/slope stockpiles to a stable gradient (1:3) to facilitate revegetation and supplement with fertiliser and seeding if required; • Identify areas where the desired land capability is unlikely to be achieved and implement the required corrective actions.		
Alien and invasive species	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT)** • Recurring Category 1a and 1 b and Category 1 and 2 invasive species must be controlled and eradicated; • Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment; • The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing off-spring, forming seed, regenerating or re-establishing itself in any manner; • Management will arrange eradication of prohibited alien species, Category 1a and 1 b (NEM:BA) and Category 1 and 2 (CARA) invasive species by a competent contractor; • Once eradication has taken place, record must be noted thereof in the Alien and Invasive Species register and will be monitored by means of monthly Environmental inspections; • The use of herbicides and pesticides will be limited as far as possible; • Monitoring of Alien and Invasive Species ton continue for a reasonable time period post closure.	National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004)	Measures must be in place with the commencement of construction and remain in place for a reasonable time period post-closure.
Mining and related activities – degradation of the aquatic environment	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT** **Management of- Destruction/Loss of Sensitive Landscapes** • As far as possible, mining and mining related activities will not impact on sensitive environments; • Sensitive environments to be located/mapped and avoided as far as possible. **Management of Sensitive Landscapes** • Ensure that any new mining or mining related activities remain outside the 1:100 year floodline unless the necessary authorisations have been obtained; • Limit construction activities to demarcated areas; • Implement training and awareness programmes to all staff/ contractors regarding the importance and protection of sensitive environments; • Undertake the relevant licensing procedures for commencing activities within sensitive environments; • Implement site specific storm water management plan and rehabilitation plan to reduce sedimentation and degradation of surrounding areas.	National Water Act, 1998 (Act 36 of 1998); National Environmental Management Act, 1998 (Act 107 of 1998).	Measures must be in place with the commencement of construction and remain in place through operation and closure.
Increased human activity – veld fires	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT** • No informal fires are allowed within the area as to prevent veld fires; • Adequate firefighting equipment should be present on site; • The Mine should provide fire-fighting training to selected construction staff; • Correct PPE should be used; • Optimise the use of firebreaks to improve land use management (roads can be used as fire breaks if suitably located).	Occupational Health and Safety Act, 1993 (Act 85 of 1993)	Measures must be in place with the commencement of construction and remain in place through operation and closure.
NOISE AND VIBRATION					
Increased noise	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT** **Management of Elevated Noise Levels** • Develop and implement regular engineering maintenance schedules for mine equipment; • Develop and implement a vehicle and equipment maintenance plan; • Develop and implement a noise monitoring program; • Implement appropriate Personal Protective Equipment in working areas with elevated noise levels; • Develop and implement noise grievance procedure; • Vehicular speeds should be restricted as to limit noise levels; • Regular maintenance schedules for vehicles and machinery must include the checking of the functional state of all intake and exhaust noise attenuators, the effectiveness of enclosures or any other noise control measures; • Noise monitoring and reducing systems may not be tampered with, removed, put out of action, damaged or impaired; • All vehicles and machinery to be operated according to manufacturers' specifications. **Management of Vibration**	Occupational Health and Safety Act, 1993 (Act 85 of 1993)	Measures must be in place with the commencement of construction and remain in place through operation and closure.

			• Atmospheric conditions should be considered before charging and blasting; • Blasting to be carried out during day-time hours; • Blasting notices to be fixed at clearly visible points to surrounding land occupiers 24 hours prior to blasting; • Undertake survey of surrounding dwellings (to determine the number of dwellings and structural integrity thereof); • Undertake negotiations with residents that may need to be relocated due to proximity to blasting.		
VISUAL					
Placement of infrastructure and lighting	Construction and Operation	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT** **Management Commitment - Visual intrusion** • Minimise the aesthetic impact of intrusive mining infrastructure; • Make use of stockpiles to create a visual screen from residents where possible • Minimise the scarring of soil surface and land features. **Management of visual intrusion** • Minimise the impact of illumination of the mine on adjacent landowners by ensuring that lighting is focused to necessary areas by facing inwards and downwards.	N/A	Measures must be in place with the commencement of construction and remain in place through operation and closure.
Remaining infrastructure and features	Decommissioning and Closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT** • Stockpiles to be reshaped/sloped and revegetated and/or used for backfilling and/or any combination thereof provided it is undertaken in accordance with the approved rehabilitation plan; • Infrastructure to remain post-closure will be determined through consultation with stakeholders, the rest will be demolished, and the areas rehabilitated.	Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).	
AIR QUALITY					
Increased machinery and vehicles - dust	Construction, operation, decommissioning and closure	Mangweni, Block L and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT** • Vehicles and machinery to be regularly serviced; • Vehicles and machinery to be operated according to manufacturers' specifications; • Implement and maintain dust suppression on dirt roads and areas of potential risk; • Implement and maintain dust monitoring (and adjust dust suppression accordingly); • Issue masks as part of PPE to persons working within areas of risk; • Implement and maintain a speed limit on all internal/haul roads.	National Environmental Management Air Quality Act, 2004 (Act 39 of 2004)	Measures must be in place with the commencement of construction and remain in place through operation and closure.
ARCHAEOLOGY					
Continued mining - Uncovering / disturbance of sensitive sites and artefacts	Construction, operation, decommissioning and closure	Mangweni and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT** • Should any graves, archaeological or paleontological objects or material be exposed during excavation, work on the area where the graves, objects or material were found, shall cease immediately and a suitably qualified archaeologist be appointed as soon as possible to handle the necessary applications and processes; • Under no circumstances shall archaeological or paleontological objects or material be destroyed, damaged, excavated, altered, defaced or otherwise disturbed without the necessary permits; • The mine shall advise its staff and contractors of the penalties associated with the unlawful removal of archaeological or paleontological artefacts, as set out in the National Heritage Resources Act, 1999 (Act 25 of 1999) section 51.	National Heritage Resources Act, 1999 (Act 25 of 1999)	Measures must be in place with the commencement of construction and remain in place through operation and closure.
TRAFFIC					
Increased traffic	Construction, operation and decommissioning	Mangweni and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT** • Manage the increase in traffic in terms of congestion, road surface damage, safety concerns, dust and erosion; • Ensure that roads are maintained at all times to an acceptable standard; • Ensure that all mine vehicles are road worthy and regularly serviced as per specifications; • Implement and maintain dust suppression on all internal haul and access roads; • Implement and maintain speed limits on all internal access and haul roads; • Mine vehicles (cars, trucks etc.) obey laws of the road when using private and public roads.	N/A	Measures must be in place with the commencement of construction and remain in place through operation and closure.
SOCIO-ECONOMIC					
Stakeholder management	Construction, operation, decommissioning and closure	Mangweni and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT** • Manage development in an environmentally sustainable and transparent manner; • Maintain open communication channels and transparency between the Mine and I&AP's; • Maintain the Nkomati Mining Forum and hold regular engagement meetings with the Forum; • Avoid or minimise potential negative environmental, health, safety, social or economic impacts on I&APs; • For all new activities or developments listed according to regulatory approvals, I&AP shall be consulted through the required public participation methods; • A data base of all I&APs will be kept up to date and easily accessible; • I&APs will be given the opportunity to raise any comments or concerns regarding mining and mining related activities through an established line of communication; • Develop and implement a site specific Social and Labour Plan; • The records of complaints and non-conformances are to be kept and used as a tool for continual improvement by the mine.	Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).	Measures must be in place with the commencement of construction and remain in place through operation and closure.
Health and Safety	Construction, operation,	Mangweni and Plant	• Implement relevant aspects of the Occupational Health and Safety Act, 1993 (Act 85 of 1993); • Provide employees, contractors and visitors with suitable personal protective equipment;		

	decommissioning and closure		• Maintain health and safety induction procedures for all employees, contractors and visitors; • Maintain an incidents register on site; • Hold regular health and safety talks; Ensure areas posing high risks are fenced and have access control measures in place.		Measures must be in place 1 year prior to closure.
Job losses/closure	Decommissioning and Closure	Mangweni and Plant	**GENERAL (OPENCAST, UNDERGROUND AND PLANT** • Consideration will be given to measures that will reduce difficulties of retrenched employees in finding work elsewhere and consequent unemployment for long periods; • Ensure that skills transfer programmes are successful throughout the operational life of the mine; • Ensure that the social closure objectives are incorporated into the Social & Labour Plan; • Engage transparently with stakeholders prior to closure.		

4.2 Impact Management Objectives

Table 4-2: Impact Management Objectives

ACTIVITY (whether listed or not listed).	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
TOPOGRAPHY					
Establishment of construction and operational areas	Alteration to local topography	Topography	Construction and operation	• Reduce footprint area; • Optimise excavations, earthworks, levelling and profiling; • Planning for final land use.	Smallest possible footprint area
Operation of mine and related activities / infrastructure			Construction and operation	• Reduce and demarcate footprint area; • Optimise mine plan; • Improved rehabilitation.	Compliance with approved mine plan
Decommissioning and closure of mine and related infrastructure			Decommissioning and closure	• Stockpile optimisation; • Rehab according to approved rehab plan; • Modify stockpile heights and slopes; • Optimise rehabilitation; • Reduce footprint area; • Modify for closure; • Close shafts; • Remedy disturbed areas; • Manage and monitor natural succession; • Modify through landscaping/shaping; • Road and infrastructure rehab.	Stable slopes; Rehabilitation of disturbed areas; Revegetation; Free draining rehabilitated areas.
Decommissioning and closure of mine and related infrastructure	Surface subsistence		Operation and closure	• Reduce footprint area; • Backfill opencast Mini-Pit; • Modify underground workings; • Monitor surface subsidence; • Remedy through claims process.	Surface subsistence to be avoided o impacts mitigated.
SOILS, LAND USE AND LAND CAPABILITY					
Topsoil stripping and handling	Soil loss	Soils, Land Use and Land Capability	Construction and operation	• Reduce footprint area; • Stockpile optimisation; • Modify stockpile heights and slopes; • Manage/restrict stockpile locations; • Remedy disturbances.	Reduced soil loss; Compliance with mine plan; Compliance with rehabilitation plan.
	Soil degradation			• Modify stockpile heights and slopes; • Manage/restrict stockpile locations; • Implement erosion protection measures.	Reduced soil degradation; Compliance with GN704; Compliance with mine plan and rehabilitation plan.
Overburden management	Reduced land capability and soil loss		Construction, operation, decommissioning and closure	• Manage/restrict stockpile locations; • Modify stockpile heights and slopes; • Remedy disturbances.	
Mining and related activities	Soil erosion		Construction, operation, decommissioning and closure	• Storm Water Management Plan; • Remedy disturbances; • Modify stockpile heights and slopes.	Reduced soil erosion; Compliance with Storm Water Management Plan.
Mining and related activities	Soil compaction		Construction, operation, decommissioning and closure	• Restrict movement; • Reduce footprint areas; • Remedy disturbances; • Storm Water Management Plan; • Implement rehabilitation (rip and revegetate).	Reduced soil compaction; Compliance with rehabilitation plan.

Mining and related activities	Soil contamination		Construction, operation, decommissioning and closure	• Remedy spills; • Control vehicle/machinery operation and services; • Ground water monitoring; • Prioritise areas.	Reduced soil contamination; Cleaner site.
Mining and related activities	Altered land use and land capability		Operation and closure	**Management of wilderness and grazing land** • Restrict loss of land; • Community engagement; • Reduce footprint area; • Remedy disturbances. **Loss of agricultural and wilderness land** • Restrict footprint areas; • Remedy disturbances. **Land Use Management - During Operations** • Establish environmental training; • Undertake surveys; • Control / restrict locations of facilities and infrastructure; • Community engagement. **Management of grazing and livestock during operations** • Community engagement; • Control livestock; • Establish fencing. **Management of Rehabilitated Areas** • Repurpose buildings; • Stakeholder consultation; • Remedy disturbances. **Land-use Planning during decommissioning and closure** • Stakeholder engagement; • Modify planning; • Control legal obligations. **Re-instatement of Land Capability** • Remedy disturbances; • Stakeholder engagement; • Modify stockpile heights and slopes.	Sustainable long term land use and land capability; Compliance with post closure land use commitments and rehabilitation plan.
SURFACE WATER					
Storm water management	Reduced surface water quality and quantity	Surface water	Construction, operation, decommissioning and closure	**Storm Water Management** • Storm Water Management Plan (SWMP); • Control dirty water areas; • Stop mixing of clean and dirty water; • Additional GN704 Exemptions must be applied for if required; • Surface water monitoring; • Reduce spillages. **Restrictions on locality** • GN704 Exemptions; • Restrict locality. **Restrictions on the use of material** • GN704 Exemptions. **Access Control** • Implement access control.	Improved surface water quality and quantity; Compliance with GN704; Compliance with SWMP.
Mining and related activities	Surface water contamination		Construction, operation, decommissioning and closure	**Prevention of water pollution of the surface water resource** • Surface water monitoring; • Improve education and training; • GN704; • Integrate Water and Waste Management Plan (IWWMP); • Reduce waste; • Remedy pollution incidents. **Achievement of Zero Discharge** • Modify liner requirements; • Maintenance; • GN704 Exemptions; • Storm Water Management Plan (SWMP).	Improved surface water quality and quantity; Compliance with GN704; Compliance with SWMP.
On-site waste management	Surface and groundwater contamination		Construction, operation, decommissioning and closure	**Management of Increased Waste** • Reduce pollution; • Control general and hazardous waste;	Improved management of general and hazardous waste; Improved surface and ground water quality.

				• Prohibit burning of waste; • Control disposal of waste and disposal records. **Management Commitment – Overburden Stockpiles** • Modify stockpile heights, locations and slopes; • Facilitate re-vegetation. **Management of Hazardous Waste** • Control separation and handling of waste; • Modify storage areas; • Prevent spillages; • Waste management procedures. **Management and Storage of General Waste** • Modify storage facilities; • Waste management procedures. **Management of Unauthorised Disposal** • Prohibit unauthorised disposal; • Restrict location of waste. **Management of the dumping or impoundment of general waste** • Control disposal/storage; • Prohibit littering and illegal dumping. **Management of Explosive boxes and Packaging - Increased waste generation** • Control explosives and disposal of related waste; • Improve training; • Distribute EMP to contractor.	
Storage and handling of chemicals, fuels, oil, lubricants etc.	Hydrocarbon pollution		Construction, operation, decommissioning and closure	• Control explosives and disposal of related waste; • Control/Remedy spills; • Establish emergency procedures; • Undertake training; • Modify storage; • GN704 compliance.	Improved surface water quality and quantity; Compliance with GN704; Compliance with SWMP.
Mining and related activities	Reduced surface water flow		Construction, operation, decommissioning and closure	**Water Balance** • Maintain water balance; • Reduce uptake of water; • Re-use/recycle water; • Surface and ground water monitoring. **Storm Water Management** • Storm Water Management Plan (SWMP).	Up to date water balance; Improved water efficiency; Compliance with WUL and SWMP.
GROUND WATER					
Hydrocarbon spills	Ground water contamination	Ground water	Construction, operation, decommissioning and closure	**General Management measures** • GN704 Compliance; • SWMP; • Modify storage; • Control handling; • Remedy spills. **Water Balance** • Maintain water balance. **Vehicles and Machinery** • Control servicing, maintenance and operation of machinery. **Underground Operations** • Modify storage; • Control dewatering; • Control servicing, maintenance and operation of machinery.	Improved ground water quality; Compliance with GN704; Compliance with SWMP; Up to date water balance; Efficient remediation of ground water issues.
Operation and closure of dirty water areas	Reduced ground water quality / contamination		Operation and closure	**Management of Any future Dirty Water Containment Facilities** • Water balance; • GN704 compliance; • SWMP. **Rehabilitation of Any Future Dirty Water Containment Facilities** • Closure plan; • Rehabilitation plan; • Remedy disturbed areas; • Ground water monitoring.	Improved ground water quality; Compliance with GN704; Compliance with SWMP; Up to date water balance; Efficient remediation of ground water issues.
Dewatering of mining area	Reduced ground water quantity		Operation and closure	• Water balance; • GN704 compliance; • SWMP;	Improved ground water quality; Compliance with GN704; Compliance with SWMP;

				• Re-use/recycle water; • Control access; • Ground water monitoring.	Up to date water balance; Efficient remediation of ground water issues.
Ceased dewatering	Recovery of ground water level		Post-closure	• Positive impact - no mitigation needed.	Increased availability of ground water.
BIODIVERSITY – FAUNA, FLORA AND WETLAND AREA					
Habitat destruction / vegetation clearance	Reduced biodiversity	Biodiversity	Construction, operation, decommissioning and closure	**Habitat Destruction** • Reduce footprint; • Mine plan; • Reduce vegetation clearance; • Remedy disturbances; • Rehabilitation plan. **Protection of Biodiversity** • Control alien and invasive species; • Implement training and awareness; • Reduce tracks/roads/disturbances; • Respect wetland buffers unless licensing undertaken; • Control/prohibit fires; • Remedy disturbances. **Management of Protected Trees** • Control and/or prevent disturbances of protected trees. **Re-instate a suitable land capability and indigenous vegetation on rehabilitated areas** • Remedy disturbances; • Control land use; • Remedy steep slopes; • Remedy undesirable land use.	Maintained biodiversity; Sustainable land capability, vegetation cover and faunal species.
Increased disturbances	Alien and invasive species		Construction, operation, decommissioning and closure	• Control alien and invasive species; • Implement training and awareness.	Alien and invasive species control / eradication; Compliance with NEM;BA.
Mining and related activities	Degradation of the aquatic environment		Construction, operation, decommissioning and closure	**Management of- Destruction/Loss of Sensitive Landscapes** • Control location; • Reduce disturbances; • Surface water monitoring. **Management of Sensitive Landscapes** • Control location; • Reduce disturbances; • Implement training and awareness; • SWMP.	Preservation of aquatic environment.
Increased human activity	Veld fires		Construction, operation, decommissioning and closure	• Control/prohibit fires; • Remedy disturbances; • Control human movements/activities.	Reduction in veld fires; Preservation of faunal and floral biodiversity.
NOISE AND VIBRATION					
Mining and related activities	Increased noise levels	Noise and vibration	Construction, operation, decommissioning and closure	**Management of Elevated Noise Levels** • Control maintenance of machines and vehicles; • Issue PPE; • Reduce vehicle speeds; • Noise monitoring (remedy areas with high results). **Management of Vibration** • Control blasting; • Remedy blasting impacts; • Blasting notices; • Dwelling survey.	Reduced noise levels; Improved employee and surrounding community health and safety; Reduced community issues.
VISUAL					
Infrastructure and lighting	Visual intrusion	Visual	Construction and Operation	**Management Commitment - Visual intrusion** • Remedy aesthetic impacts; • Maintain visual screen. **Management of visual intrusion** • Control lighting directionality.	Reduced visual intrusion; More suitable landscapes post closure.
Remaining infrastructure and features	Visual intrusion		Decommissioning and Closure	• Modify stockpile heights and slopes; • Stakeholder engagement; • Stockpile management.	
AIR QUALITY					

Increased machinery and vehicles	Increased dust	Air quality	Construction, operation, decommissioning and closure	• Control vehicle and machinery services; • Dust monitoring and suppression; • Control / reduce vehicle speeds.	Improved air quality; Reduced dust.
ARCHAEOLOGICAL (CULTURAL/HERITAGE)					
Continued mining	Uncovering / disturbance of sensitive sites and artefacts	Archaeology	Construction, operation, decommissioning and closure	• Avoid disturbances (if possible); • Implement measures for if sites are uncovered; • Remedy disturbances.	Correct handling of archaeological sites.
TRAFFIC					
Increased volume of vehicles	Increased traffic	Traffic	Construction, operation and decommissioning	• Dust monitoring and suppression; • Remedy road disturbances; • Maintain vehicles and roads; • Control / reduce vehicle speeds.	Reduced dust; Improved road quality; Reduced impacts on road users.
SOCIO-ECONOMIC					
Stakeholder management	Community issues	Socio-economic	Construction, operation, decommissioning and closure	• Stakeholder engagement; • Manage Interested and Affected Parties; • Control records of complaints / non-conformances; • Nkomati Mining Forum; • Social and Labour Plan.	Effective communication; Reduced community issues; Long term benefit to surrounding communities.
Health and Safety	Injury, loss of life		Construction, operation, decommissioning and closure	• Occupational Health and Safety Act, 1993 (Act 85 of 1993); • Personal Protective Equipment; • Health and safety inductions; • Incidents register • Health and safety talks; • Fencing/access control.	
Mine closure	Job losses		Decommissioning and Closure	• Control retrenchment process; • Skills transfer programme; • Social and Labour Plan.	

4.3 Impact Management Actions

Table 4-3: Impact Management Actions

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
TOPOGRAPHY				
Establishment of construction and operational areas	Alteration to local topography	• Reduce footprint area; • Optimise excavations, earthworks, levelling and profiling; • Planning for final land use.	Prior to operation	N/A
Operation of mine and related activities / infrastructure		• Reduce and demarcate footprint area; • Optimise mine plan; • Improved rehabilitation.	Prior to operation	N/A
Decommissioning and closure of mine and related infrastructure		• Stockpile optimisation; • Implement rehabilitation plan; • Modify stockpile heights and slopes; • Optimise rehabilitation; • Reduce footprint area; • Modify for closure; • Close shafts; • Remedy disturbed areas; • Manage and monitor natural succession; • Modify through landscaping/shaping; • Road and infrastructure rehabilitation.	Within 1 year of closure	Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).
Decommissioning and closure of mine and related infrastructure	Surface subsistence	• Reduce footprint area; • Implement rehabilitation plan; • Modify underground workings; • Monitor surface subsidence; • Remedy through claims process.	Prior to closure	N/A
SOILS, LAND USE AND LAND CAPABILITY				
Topsoil stripping and handling	Soil loss	• Reduce footprint area; • Stockpile optimisation;	From the commencement of construction throughout operations	Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002);

		• Modify stockpile heights and slopes; • Manage/restrict stockpile locations; • Remedy disturbances.		National Environmental Management Act, 1998 (Act 107 of 1998).
	Soil degradation	• Modify stockpile heights and slopes; • Manage/restrict stockpile locations; • Implement erosion protection measures.	From the commencement of construction throughout operations	
Overburden management	Reduced land capability and soil loss	• Manage/restrict stockpile locations; • Modify stockpile heights and slopes; • Remedy disturbances.	From the commencement of construction through to closure	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999; Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).
Mining and related activities	Soil erosion	• Storm Water Management Plan; • Remedy disturbances; • Implement rehabilitation plan; • Modify stockpile heights and slopes.	From the commencement of construction through to closure	
Mining and related activities	Soil compaction	• Restrict movement; • Reduce footprint areas; • Remedy disturbances; • Storm Water Management Plan; • Implement rehabilitation (rip and revegetate).	From the commencement of construction through to closure	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999; Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).
Mining and related activities	Soil contamination	• Remedy spills; • Control vehicle/machinery operation and services; • Ground water monitoring; • Prioritise areas.	From the commencement of construction through to closure	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999; Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).
Mining and related activities	Altered land use and land capability	**Management of wilderness and grazing land** • Restrict loss of land; • Community engagement; • Reduce footprint area; • Remedy disturbances. **Loss of agricultural and wilderness land** • Restrict footprint areas; • Remedy disturbances. **Land Use Management - During Operations** • Establish environmental training; • Undertake surveys; • Control / restrict locations of facilities and infrastructure; • Community engagement. **Management of grazing and livestock during operations** • Community engagement; • Control livestock; • Establish fencing. **Management of Rehabilitated Areas** • Repurpose buildings; • Stakeholder consultation; • Remedy disturbances. **Land-use Planning during decommissioning and closure** • Stakeholder engagement; • Modify planning; • Control legal obligations. **Re-instatement of Land Capability** • Remedy disturbances; • Stakeholder engagement; • Modify stockpile heights and slopes.	From the commencement of construction throughout operations	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999; Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).
SURFACE WATER				
Storm water management	Reduced surface water quality and quantity	**Storm Water Management** • Storm Water Management Plan (SWMP); • Control dirty water areas; • Stop mixing of clean and dirty water; • GN704 Exemptions; • Surface water monitoring; • Reduce spillages.	SWMP must be implemented with the commencement of construction, through operation and closure. Certain aspects will remain post-closure.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.

		Restrictions on locality • GN704 Exemptions; • Restrict locality. **Restrictions on the use of material** • GN704 Exemptions. **Access Control** • Implement access control.		
Mining and related activities	Surface water contamination	**Prevention of water pollution of the surface water resource** • Surface water monitoring; • Improve education and training; • GN704 Exemptions; • IWWMP; • Reduce waste; • Prevent, minimize, remedy pollution incidents. **Achievement of Zero Discharge** • Discharge only if licensing requirements are met; • GN704 Exemptions; • Storm Water Management Plans.	SWMP must be implemented with the commencement of construction, through operation and closure. Certain aspects will remain post-closure.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.
On-site waste management	Surface and groundwater contamination	**Management of Increased Waste** • Reduce pollution; • Control general and hazardous waste; • Prohibit burning of waste; • Control disposal of waste and disposal records. **Management Commitment – Overburden Stockpiles** • Modify stockpile heights, locations and slopes; • Facilitate re-vegetation. **Management of Hazardous Waste** • Control separation and handling of waste; • Modify storage areas; • Prevent spillages; • Waste management procedures. **Management and Storage of General Waste** • Modify storage facilities; • Waste management procedures. **Management of Unauthorised Disposal** • Prohibit unauthorised disposal; • Restrict location of waste. **Management of the dumping or impoundment of general waste** • Control disposal/storage; • Prohibit littering and illegal dumping. **Management of Explosive boxes and Packaging - Increased waste generation** • Control explosives and disposal of related waste; • Improve training; • Distribute EMP to contractors.	On-site waste management measures must be in place with the commencement of construction and remain in place through operation and closure.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999; National Environmental Management Waste Act, 2008 (Act 59 of 2008).
Storage and handling of chemicals, fuels, oil, lubricants etc.	Hydrocarbon pollution	• Control explosives and disposal of related waste; • Control/Remedy spills; • Establish emergency procedures; • Undertake training; • Fuel storage within bunded area; • Hydrocarbons (i.e. oil, lubricants, chemicals etc.) to be stored under roofed area, within a bunded area; • GN704 compliance.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	Hazardous Substances Act, 1973 (Act 15 of 1973)
Mining and related activities	Reduced surface water flow	**Water Balance** • Maintain water balance; • Reduce uptake of water; • Re-use/recycle water; • Surface and ground water monitoring. **Storm Water Management** • Storm Water Management Plan (SWMP).	Measures must be in place with the commencement of construction and remain in place through operation and closure.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.
GROUND WATER				
Hydrocarbon spills	Ground water contamination	**General Management measures** • GN704 Exemptions; • SWMP; • Modify storage;	Measures must be in place with the commencement of construction and remain in place through operation and closure.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.

		• Control handling; • Remedy spills. **Water Balance** • Maintain water balance. **Vehicles and Machinery** • Control servicing, maintenance and operation of machinery. **Underground Operations** • Hydrocarbons (i.e. oil, lubricants, chemicals etc.) to be stored under roofed area, within a bunded area; • Control dewatering; • Control servicing, maintenance and operation of machinery.		
Operation and closure of dirty water areas	Reduced ground water quality / contamination	**Management of Any future Dirty Water Containment Facilities** • Water balance; • GN704 compliance; • SWMP. **Rehabilitation of Any Future Dirty Water Containment Facilities** • Closure plan; • Rehabilitation plan; • Remedy disturbed areas; • Ground water monitoring.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.
Dewatering of mining area	Reduced ground water quantity	• Water balance; • GN704 compliance; • SWMP. • Re-use/recycle water; • Control access; • Ground water monitoring.	Measures must be in place with the commencement of operations and remain in place through operation and closure.	National Water Act, 1998 (Act 36 of 1998); DWA, GN704, 4 June 1999.
Ceased dewatering	Recovery of ground water level	• Positive impact - no mitigation needed.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	N/A
BIODIVERSITY – FAUNA, FLORA AND WETLAND AREA				
Habitat destruction / vegetation clearance	Reduced biodiversity	**Habitat Destruction** • Reduce footprint; • Mine plan; • Reduce vegetation clearance; • Remedy disturbances; • Rehabilitation plan. **Protection of Biodiversity** • Control alien and invasive species; • Respect wetland buffers unless licensing undertaken; • Implement training and awareness; • Reduce tracks/roads/disturbances; • Control/prohibit fires; • Remedy disturbances. **Management of Protected Trees** • Control and/or prevent disturbances of protected trees. **Re-instate a suitable land capability and indigenous vegetation on rehabilitated areas** • Remedy disturbances; • Control land use; • Remedy steep slopes; • Remedy undesirable land use.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	National Environmental Management Act, 1998 (Act 107 of 1998).
Increased disturbances	Alien and invasive species	• Control alien and invasive species; • Implement training and awareness.	Measures must be in place with the commencement of construction and remain in place for a reasonable time period post-closure.	National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004)
Mining and related activities	Degradation of the aquatic environment	**Management of- Destruction/Loss of Sensitive Landscapes** • Control location; • Reduce disturbances; • Surface water monitoring. **Management of Sensitive Landscapes** • Reduce disturbances; • Implement training and awareness; • SWMP.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	National Water Act, 1998 (Act 36 of 1998); National Environmental Management Act, 1998 (Act 107 of 1998).

Increased human activity	Veld fires	• Control/prohibit fires; • Remedy disturbances; • Control human movements/activities.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	Occupational Health and Safety Act, 1993 (Act 85 of 1993)
NOISE AND VIBRATION				
Mining and related activities	Increased noise levels	**Management of Elevated Noise Levels** • Control maintenance of machines and vehicles; • Issue appropriate PPE; • Reduce vehicle speeds; • Noise monitoring (remedy areas with high results). **Management of Vibration** • Control blasting; • Remedy blasting impacts; • Blasting notices.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	Occupational Health and Safety Act, 1993 (Act 85 of 1993)
VISUAL				
Infrastructure and lighting	Visual intrusion	**Management Commitment - Visual intrusion** • Remedy aesthetic impacts; • Maintain visual screen. **Management of visual intrusion** • Control lighting directionality.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	N/A
Remaining infrastructure and features	Visual intrusion	• Modify stockpile heights and slopes; • Stakeholder engagement; • Stockpile management.		Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998).
AIR QUALITY				
Increased machinery and vehicles	Increased dust	• Control vehicle and machinery services; • Dust monitoring and suppression; • Control / reduce vehicle speeds.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	National Environmental Management Air Quality Act, 2004 (Act 39 of 2004)
ARCHAEOLOGICAL (CULTURAL/HERITAGE)				
Continued mining	Uncovering / disturbance of sensitive sites and artefacts	• Avoid disturbances (if possible); • Implement measures for if sites are uncovered; • Remedy disturbances.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	National Heritage Resources Act, 1999 (Act 25 of 1999)
TRAFFIC				
Increased volume of vehicles	Increased traffic	• Dust monitoring and suppression; • Remedy road disturbances; • Maintain vehicles and roads; • Control / reduce vehicle speeds.,	Measures must be in place with the commencement of construction and remain in place through operation and closure.	N/A
SOCIO-ECONOMIC				
Stakeholder management	Community issues	• Dust monitoring and suppression; • Remedy road disturbances; • Maintain vehicles and roads; • Control / reduce vehicle speeds.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002); National Environmental Management Act, 1998 (Act 107 of 1998). Occupational Health and Safety Act, 1993 (Act 85 of 1993).
Health and safety	Injury / loss of life	• Occupational Health and Safety Act, 1993 (Act 85 of 1993); • Personal Protective Equipment; • Health and safety inductions; • Incidents register • Health and safety talks; • Fencing/access control.	Measures must be in place with the commencement of construction and remain in place through operation and closure.	
Mine closure	Job losses	• Control retrenchment process; • Skills transfer programme; • Social and Labour Plan.	Measures must be in place 1 year prior to closure.	

5 FINANCIAL PROVISION FOR EMP AREA

5.1 Closure Objectives

Closure Objectives are provided in the previous section. Landowner consultation has occurred as the land is under the jurisdiction of the Mawewe Tribal Authority. Meeting minutes and attendance register will be submitted with the Final Basic Assessment Report.

5.2 Rehabilitation Plan

A new rehabiltiation plan has been developed by HEES (Pty) Ltd and has been appended to this report in full.

The following table summarises the expected time of closure for Mangweni Opencast, Block L Opencast, Mangweni Underground and the Processing Plant. Please note that the dates are variable due to the fact that drilling is currently underway to establish the availability of further resources to keep the mine open for an extended period of time. Should suitable resources be found, mining may not commence without the required approvals.

Table 5-1: Development Phases

Area	Year
Mangweni Opencast Mini-Pit	2022
Block L Opencast	2027
Mangweni Underground	2032
Processing Plant	2052

The rehabilitation plan has been developed in order to work towards the closure objectives in terms of the following aspects:

- Infrastructure and Activities;
- Local Environmental Quality;
- Biodiversity;
- Topography;
- Surface Water;
- Ground Water;
- Air Quality;
- Geology;
- Aesthetic Appearance;
- Health and Safety; and
- Socio-Economic.

5.3 Financial Provision and Rehabilitation

Rehabilitation of Block L allows for the partial backfill of the open pit with the allowance of a work area as to provide for the future expansion of the mining block to both the north and the south. With premature closure, the void and stockpile will be safeguarded and stabilized.

The basis of the recommended annual rehabilitation for Block L is:

- The final faces of the Northern Block L overburden stockpile must be finished and vegetated to within the required slope as mining continues.

The basis of the recommended final rehabilitation for Block L is:

- The final faces of the Northern Block L overburden stockpile must be finished and depositioned within the required slope.
- The Opencast Pit must be secured by a suitable effective barricading such as a 3m high security berm with access to the existing ramp. Should a void remain it will provide water to the surrounding communities for stock water use.
- The stormwater diversion trenches must be filled and vegetated.
- Inactive haul roads must be ripped and vegetated. At LoM all haul roads must be ripped and vegetated.

There is a financial guarantee in place which has been appended to this report. This guarantee is for the entire mine and will need to include the additional amount of **R8 128 152** for the Block L Opencast Pit in the 2022 financial provision update.

Table 5-2: Financial Provision for Closure

Year	2023	2024	2025	2026	2027
Annual rehabilitation	R525 784	R2 536 112	R2 814 641	R2 145 756	R0
Final rehabilitation	R4 552 244	R6 149 779	R6 212 513	R6 736 934	R8 128 152

Table 5-3: Details of Planned Annual Rehabilitation (HEES, 2019)

Item	Infrastructure activity	Planned remaining life of activity	Already disturbed (m^2)	% of area for rehabilitation	% available for rehabilitation	Available area vs planned area	Why not concurrent rehab	Detail of rehab planned	Closure objective	Closure design criteria
Mangweni Underground										
ROM	Shape for slope to sump and construct sump	1 year	NA l- on OB3	NA	NA	NA	Will do concurrent rehabilitation of the side slopes as OB3. Rest of area still in operation	Shape of side slope to 1(V):3 (H) from overburden material from pit. Cover sump with topsoil or finer overburden and ameliorate the material with compost, fertiliser and vegetate with local seed mix. Construct sump of size 20 x 20 m and 1.6 m deep with 5 m wide spillway of 0.8 m deep. This is described under the SWMP.	Reduce solids in run off.	Clean and dirty water separation.
OB1	Shape side slope	Indefinite	42236	27	>27	NA	Will do concurrent rehabilitation of the side slopes. However, due to Equipment constraint the vegetation of the slopes will only occur during the 2020 financial year.	Shape of side slope to 1(V):3 (H) with 5m wide benches to retain runoff. Benches every 10 m vertical distance and slopes not more than 40 m. Cover with topsoil or finer overburden and ameliorate the material with compost, fertiliser and vegetate with local seed mix will occur during the next financial year.	Reduce erosion; grazing after closure; increased slope stability.	Slope less than 18 degrees; slope length less than 40m; clean run-off.
OB2	Shape side slope	Indefinite	11833	100	NA	Will remove stockpile for rehab	Will do concurrent rehabilitation of the side slopes. However, due to equipment constraint the topsoil of the slopes of the stockpiles will only occur during the 2020 financial year.	Shape of remaining side slope to 1(V):3 (H) By cut method. Ameliorate the material with compost, fertiliser and vegetate with local seed mix will occur during the next financial year.	Reduce erosion; grazing after closure; increased slope stability.	Slope less than 18 degrees; slope length less than 40m; clean run-off.
OB3	Removal of topsoil and shape side slope	Indefinite	65947	18	18	Area limited by project area	Will do concurrent rehabilitation of the side slopes. However, due to equipment constraint the topsoil of the slopes of the stockpiles will only occur during the 2020 financial year.	Shape of side slope to 1(V):3 (H) from overburden material from pit. By Cut & Fill method. Ameliorate the material with compost, fertiliser and vegetate with local seed mix will occur during the next financial year.	Reduce erosion; grazing after closure; increased slope stability.	Slope less than 18 degrees; slope length less than 40m; clean run-off.
Workshop	Formalise workshop area and install oil separator under maintenance area	2032	855	100	100	NA	Will do concurrent rehabilitation of the side slopes.	Construct sloped floor with bund wall and roof to prevent rain entering dirty area.	Reduced contamination.	Reduced contamination.
Mangweni Opencast and Block L										
N/A – not in operation yet. No rehabilitation is thus planned for the coming year. North Void to be kept as an open source of water to the community.										
Processing Plant										
N/A – the processing plant is still in operation and the entire area is used. No rehabilitation of the processing plant is thus planned for whilst it is operational. It is however important to note that there is a previously rehabilitated area to the South of the plant offices. The vegetation of this area must be monitored and measures such as fertilising and/or seeded must be implemented to assist the growth of flora on this area if it is deemed necessary. Void 2 (void south of the processing plant) is currently used for storage and supply of water, and is currently being backfilled with discard and slurry. This is expected to continue for the coming year.										

5.4 Mechanisms For Monitoring Compliance

Table 5-4: Mechanisms for Monitoring Compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Spills, contamination.	Surface water quality	Variables as defined by the existing Water Use License must be monitored for. The Water Use License includes monitoring points which covers the Mangweni area and the Processing Plant. It is suggested that these existing monitoring points continue to be used as they already cover the Mangweni area and the Processing Plant. Should additional monitoring points be required these must be timeously established.	The responsibility for compliance is vested with the applicant. The applicant must appoint an Environmental Control Officer to oversee the mechanisms for monitoring compliance.	It is recommended that the existing monitoring frequency be continued as per the Water Use License. This includes monthly surface water monitoring and quarterly ground water monitoring along with quarterly monitoring reports. Bi-annual biomonitoring is also undertaken and must be continued.
Spills, contamination.	Ground water quality			
Dewatering	Ground water quantity			
Movement of vehicles and operation of machinery	Increased noise	Noise monitoring is undertaken at areas identified as sensitive and/or potentially posing a risk of high noise levels. This must be extended to such areas within/surrounding the Block L area during its operation.		Monthly noise monitoring is undertaken at all existing operational areas. Monthly noise monitoring must be extended to the Block L Opencast area for the life of its operation.

Vehicular movement	Nuisance dust	Dust monitoring is carried out at areas posing high risk such as roads to determine if additional dust suppression measures are required. This must be extended to the Block L Opencast.		It is recommended that monthly dust monitoring be undertaken, and additional monitoring points be added around the Block L Opencast, with specific reference to the surrounding sugar cane farmers and residents.
Storm water management	Surface water quality and GN704 compliance	Storm water infrastructure integrity, functionality and capacity must be inspected.		It is recommended that the Environmental Control Officer undertake monthly inspections on all storm water infrastructure.
Alien and invasive species	Establishment of alien and invasive species	Inspections must be carried out to identify and eradicate alien and invasive species. Special attention must be given to disturbed areas and previously rehabilitated areas.		It is recommended that the Environmental Control Officer undertake monthly inspections for alien and invasive species.
Waste handling	Increased litter, soil contamination, surface and ground water contamination.	Waste must be separated into general and hazardous streams, appropriately stored and disposed of.		Monthly inspections must be undertaken by the Environmental Control Officer on waste skips to determine whether general and hazardous waste is separated. The oil stores and salvage yard must be included into this inspection to ensure compliance.

5.4.1 Monitoring Points

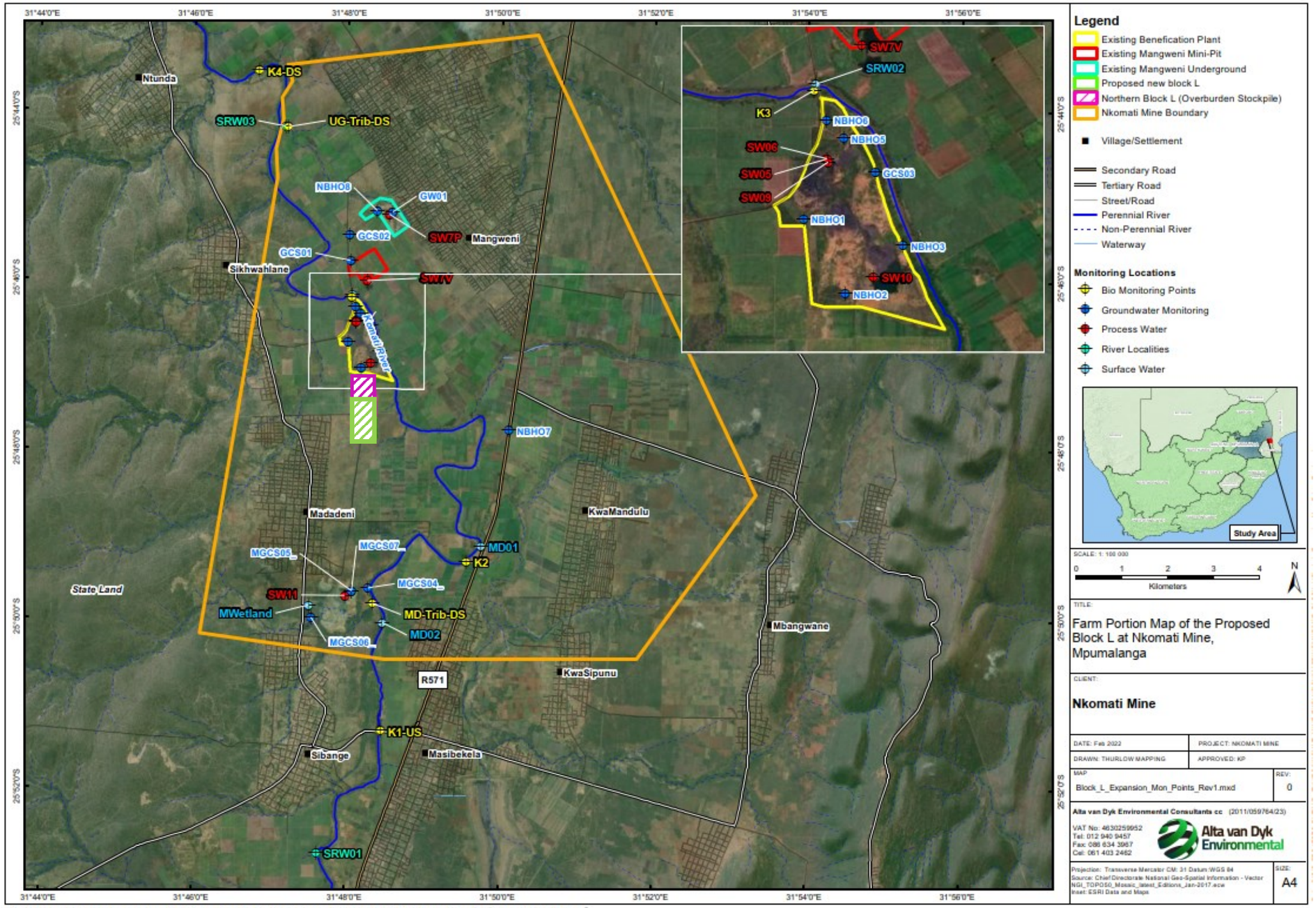

Figure 5-1: Monitoring

5.4.2 EMP Performance Assessment

EmP performance Assessments are currently undertaken every two years. It is recommended that this practise be continued.

5.4.3 Environmental Awareness Plan

Environmental awareness must be included as part of the induction process to the site. Further to this, environmental risks and responsibilities must be communicated through to contractors and subcontractors. It is recommended that monthly awareness talks are given by the Environmental Control officer in order to inform employees and contractors of the risks associated with each task.

5.4.4 Risk Mitigation

An impact assessment complete with extensive mitigation measures to deal with risks and mitigation measures to avoid pollution or degradation of the environment has been completed and attached. It is recommended that an Environmental Control Officer be appointed by Nkomati Anthracite Mine (Pty) Ltd and be directly assigned the responsibility of compliance with the EMP. The following measures are tools at the disposal of the Environmental Control Officer in order to ensure avoid pollution or the degradation of the environment:

- Surface water monitoring;
- Ground water monitoring;
- Bio-monitoring;
- Dust monitoring;
- Noise monitoring;
- Site inspections for:
- Waste management;
- Alien and invasive species;
- Storm water infrastructure.
- Emergency training (awareness and response) to employees and contractors;
- Safety and environment awareness training.

6 UNDERTAKING BY THE EAP

The EAP herewith confirms

a) the correctness of the information provided in the reports ☒

b) the inclusion of comments and inputs from stakeholders and I&APs ; ☒

c) the inclusion of inputs and recommendations from the specialist reports where relevant; ☒ and

d) that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected. parties are correctly reflected herein. ☒

Signature of the environmental assessment practitioner:

Alta van Dyk Environmental Consultants

Name of company:

Date:

7 REFERENCES

Government Notice No. 983 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 327 - Listing Notice 1;

Government Notice No. 984 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 325 – Listing Notice 2; and

Government Notice No. 985 in Gazette No. 38282 on 4 December 2014, as amended on 7 April 2017 in Gazette No. 40772 as Government Notice No. 324 – Listing Notice 3;

Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002)

National Environmental Management Act, 1998 (Act 107 of 1998)

National Water Act, 1998 (Act 36 of 1998)

The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)