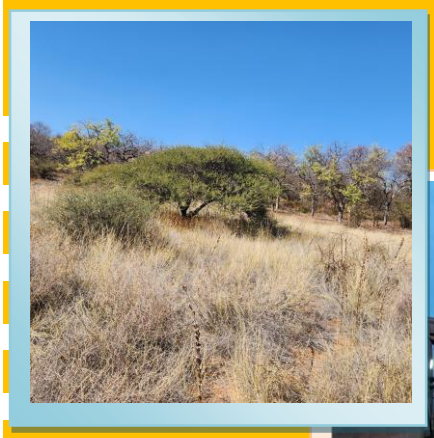
KINETIC MINING DEVELOPMENT SOUTH AFRICA

LDEDET REFERENCE:

DRAFT - SCOPING REPORT FOR THE PROPOSED COKE PLANT (3 MILLION/TONS/ANNUM) AND HEAT RECOVERY PLANT (390MW) ON THE FARMS BOAS 642 MS AND MARTHA 185 MT, WITHIN THE MAKHADO LOCAL MUNICIPALITIES, LIMPOPO – KINETIC MINING DEVELOPMENT SOUTH AFRICA (PTY) LTD



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DECEMBER 2025

DRAFT SCOPING REPORT
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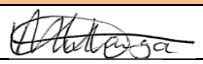
Prepared	Lead EAP	M Sikhitha	
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SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED

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IMPORTANT NOTICE

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

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

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application are submitted in the exact format of, and provide all the information required. Furthermore, please be advised that failure to submit the information required in the format provided 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 (EAP) must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE SCOPING PROCESS

1. The objective of the scoping process is to, through a consultative process—

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

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LIST OF ABBREVIATIONS:

ACRONYM	DESCRIPTION
AEL	Atmospheric Emissions License
APPA	Air Pollution Prevention Act
AQA	Air Quality Act
AU	Animal Unit
BID	Background Information Document
CARA	Conservation of Agriculture Resources Act, 1983
CE	Centres of Endemism
COGHSTA	Department of Cooperative Governance, Human Settlements and Traditional Affairs
DARD	Department of Agriculture and Rural Development
DFFE	Department of Forestry, Fisheries and the Environment
DMPR	Department of Mineral and Petroleum Resources
DWS	Department of Water and Sanitation
DSoE	Desired State of Environment
ECZ	Environmental Constraint Zone
EIA	Environment Impact Assessment
EAP	Environmental Assessment Practitioner
EMF	Environmental Management Framework
EMP	Environmental Management Report
EMZ	Environmental Management Zone
ERF	Plot of land, usually urban, marked off for building purposes
FRAI	Fish Response Assessment Index
GC	Gudani Consulting
GIS	Geographical Information System
GN	Government Notice
ICOMOS	International Council on Monuments and Sites
IEM	Integrated Environmental Management
IDP	Integrated Development Plan
IMP	Integrated Management Plans
ISCW	Institute for Soil Climate and Water
I&APs	Interested and Affected Parties
IUCN	International Union for Conservation of Nature
IWULA	Integrated Water Use License Application
KMDSA	Kinetic Mining Development South Africa (Pty) Ltd
KTPA	Kilo Tons Per Annum

LC	Land Capability Class
LDEDET	Limpopo Department of Economic Development, Environment and Tourism
LSU	Live Stock Unit
MaB	Man and the Biosphere
MAR	Mean Annual Run-off
MPRDA	Minerals and Petroleum Resources Development Act, 2002
MTPA	Million Tons Per Annum
MLM	Makhado Local Municipality
MMLM	Musina-Makhado Local Municipalities
MMSEZ	Musina-Makhado Special Economic Zone
NHRA	National Heritage Resources Act, 1999
NWA	National Water Act, 1998
NAAQS	National Ambient Air Quality Standards
NAEHMP	National Aquatic Ecosystem Health Monitoring Programme
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NRHP	National River Health Programme
NRWC	National Register of Water User Certificates
PMT	Project Management Team
PPP	Public Participation Process
POSA	Plants of South Africa
QDS	Quarter Degree Square
RHP	River Health Programme
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resource Agency
SANBI	South African National Biodiversity Institute
SANPARKS	South African National Parks
SAAQIS	South African Air Quality Information System
SAR	Special Administration Region (Chinese interpretation of SEZ)
SAWS	South African Weather Service
SDF	Spatial Development Framework
SEZ	Special Economic Zone
SEMP	Strategic Environmental Management Plan
ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VDM	Vhembe District Municipality

GLOSSARY OF TERMS

Aeromagnetic Survey	Surveys flown by helicopter or fixed wing aircraft to measure the magnetic susceptibility of rocks at or near the earth's surface
Alien species	A plant or animal species introduced from elsewhere: neither endemic nor indigenous.
Alternatives	A possible course of action, in place of another, that would meet the same purpose and need (of proposal). Alternatives can refer to any of the following but are not limited hereto: alternative sites for development, alternative site layouts, alternative designs, alternative processes and materials. In Integrated Environmental Management the so-called "no go" alternative refers to the option of not allowing the development and may also require investigation in certain circumstances.
Aluminium	Aluminium is a chemical element; it has symbol Al and atomic number 13. Aluminium has a density lower than that of other common metals, about one-third that of steel. It has a great affinity towards oxygen, forming a protective layer of oxide on the surface when exposed to air.
Ambient	The conditions surrounding an organism or area.
Archaean	The oldest rocks of the Precambrian era, older than about 2 500 Ma
Assessment	The process of collecting, organising, analysing, interpreting and communicating data that is relevant to some decision.
Basement	The igneous and metamorphic crust of the earth, underlying sedimentary deposits
Biodiversity	Measure of the number and relative abundance of biological species. The variability among living organisms from all sources including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.
Coal	A combustible black or brownish-black sedimentary rock usually occurring in rock strata in layers or veins called **coal beds** or **coal seams**. Coal is composed primarily of carbon along with variable quantities of other elements, chiefly hydrogen, sulfur, oxygen, and nitrogen.
Coking Coal	Coking coal, also known as metallurgical coal, is a specialized grade of coal used to produce coke, an essential fuel and reactant in steel production. It is a bituminous coal that is heated in the absence of oxygen to become coke, which acts as a reducing agent and a carbon source in a blast furnace. This process purifies the coal, increasing its carbon content, which is vital for making steel.
Coking Process	The coking process heats coal to high temperatures (around\(1000\)-1400°C) in the absence of air, creating coke and by-products. This thermal decomposition process drives off volatile compounds like water, methane, and tar, leaving behind a porous, high-carbon solid called coke. The by-products can be collected and refined for use as fuels or chemical feed-stocks, while the coke is primarily used in the iron and steel industry as a fuel and reducing agent in blast furnaces.
Chrome	Chromite is a crystalline mineral composed primarily of iron(II) oxide and chromium(III) oxide compounds. It can be represented by the chemical formula of $FeCr_2O_4$.
Climate	A measure of the long-term averages, i.e., normal, of key atmospheric variables such as temperature, precipitation and wind.
Climate Change	Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts can be natural, due to changes in the sun's activity or large volcanic eruptions. But since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil and gas.
Dip and dip direction	The dip direction is the azimuth of the direction of the dip as projected to the horizontal, which is 90° off the strike angle
Dry Quenching	Dry quenching is a process for cooling hot coke from coke ovens using an inert gas, which recovers the heat to generate steam and electricity. This method is an alternative to traditional wet quenching with water and offers benefits such as energy recovery, reduced water consumption, improved coke quality, and a better working environment due to minimal dust and emissions.
Dyke	A vertical or near vertical sheet of igneous rock, the widths of which may range from centimetres to hundreds of meters
Ecology	The study of the interrelationships between organisms and their environments.
Effluent	Effluent is an out flowing of water from a man-made structure such as a process plant or tailings facility.

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.
Environmental impact	A change resulting from the effect of an activity on the environment, whether desirable or undesirable. Impacts may be the direct consequence of an organisation's activities or may be indirectly caused by them.
Environmental Impact Assessment	An Environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of any proposed project, plan, programme or policy which requires authorisation of permission by law and which may significantly affect the environment. The EIA includes an evaluation of alternatives, as well as recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures for enhancing the positive aspects of the proposal, and environmental management and monitoring measures.
Environmental Management Plan	A legally binding working document, which stipulates environmental and socio-economic mitigation measures which must be implemented by several responsible parties throughout the duration of the proposed project.
Fault	A fracture or fracture zone, along which displacement of opposing sides has occurred
Gabbro	Belongs to a group of dark, coarse-grained, intrusive mafic igneous rocks chemically equivalent to basalt.
Groundwater	Water which occurs below the surface of the Earth, where it occupies spaces in soils or geologic strata.
Heat Recovery Plant	A heat recovery plant captures and reuses waste heat from an industrial process, such as exhaust gases, to improve overall efficiency, reduce energy costs, and lower emissions. This recovered heat is converted into useful energy, like electricity or steam, to preheat incoming air or water, or for other industrial processes. A common example is a heat recovery steam generator (HRSG) used in power plants to create steam from the hot gases of a gas turbine.
Industry	The use of land or a building for a factory, distributing depot, wholesale, storage, warehouse for the storage of wholesale merchandise, carting and transport services, laboratories, workshop and vehicle workshop and may also include offices which are normally associated with or which are reasonably essential for the main use as well as the sale of goods wholly or partially manufactured, processed or packed on the property.
Integrated environmental management	IEM provides an integrated approach for environmental assessment, management, and decision-making and to promote sustainable development and the equitable use of resources. Principles underlying IEM provide for a democratic, participatory, holistic, sustainable, equitable and accountable approach.
Interested and affected parties	Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.
Intrusion	Liquid rock (magma) which forms below the surface of earth and slowly cools into a solid rock mass
Key issue	An issue raised during the Scoping process which has not received an adequate response and which requires further investigation before it can be resolved.
Layered complex	A body of igneous rock which exhibits vertical layering or differences in composition and texture and shows evidence of fractional crystallisation. Ideally, the stratigraphic sequence of an ultramafic intrusive complex consists of ultramafic peridotites and pyroxenites toward the base with more mafic norites, gabbros and anorthosites in the upper layers
Listed activities	Development actions which are likely to result in significant environmental impacts as identified by the Minister of Environmental Affairs and Tourism in terms of Section 21 of the Environment Conservation Act.
Manganese	Manganese is a chemical element; it has symbol Mn and atomic number 25. It is a hard, brittle, silvery metal, often found in minerals in combination with iron
Mitigation	To cause to become less harsh or hostile.
Negative impact	A change which reduces the quality of the environment (for example, by reducing species diversity and the reproductive capacity of the ecosystem, by damaging health, or by causing nuisance).
Positive impact	A change which improves the quality of life of affected people or the quality of the environment.

Property	Any piece of land indicated on a diagram or general plan approved by the Surveyor-General intended for registration as a separate unit in terms of the Deeds Registries Act and shall include an erf, a site and a farm portion as well as the buildings erected thereon
Public Participation Process	A process of involving the public in order to identify needs, address concerns, choose options, plan and monitor in terms of a proposed project, programme or development
Relevant authority	The environmental authority on national, provincial or local level entrusted in terms of the Constitution and in terms of the designation of powers in Notice No. R. 1184 of 5 September 1997 with the responsibility for granting approval to a proposal or allocating resources.
Scoping	This refers to the process of determining the spatial and temporal boundaries (the extent) for the EIA and key issues to be addressed in an environmental assessment.
Scoping Report	A report describing the issues identified.
Smelting Process	Smelting, process by which a metal is obtained, either as the element or as a simple compound, from its ore by heating beyond the melting point, ordinarily in the presence of oxidizing agents, such as air, or reducing agents, such as coke.
Study area	Refers to the entire study area encompassing all the alternative routes as indicated on the study area map.
Silicon	Silicon is a chemical element; it has symbol Si and atomic number 14. It is a hard, brittle crystalline solid with a blue-grey metallic luster, and is a tetravalent metalloid and semiconductor.
Special Economic Zone/s	Special Economic Zones (SEZs), are geographically designated areas of a country set aside for specifically targeted economic activities, supported through special arrangements (that may include laws) and systems that are often different from those that apply in the rest of the country.
Surrounding Owners	The registered owners of the properties directly bordering the property or across the road / street and also such owners that the Local Authority may specify.
Wet Quenching	Wet quenching is a traditional and common process for rapidly cooling hot coke (~1000°C) after it is pushed from a coke oven, using direct water sprays to prevent combustion and stabilize its structure. The process involves transferring hot coke to a quenching tower, spraying it with water to cool it down to around 100–150°C, and collecting the cooled product for storage and handling

EXECUTIVE SUMMARY

BRIEF INTRODUCTION

This document contains the Scoping Report - which forms part of the environmental impact assessment and management programme for the Kinetic Mining Development South Africa (Pty) Ltd proposal to construct a 3 million tons per annum Coke Plant and a 390MW Heat Recovery Electricity Power Plant. The said proposed development will be done in three (03) phases of 1 million/tons/year coke plant and 130MW heat recovery electricity power plant over a period of 5-10 years. The proposed development will be on either of the farms Boas 642 MS and Martha 185 MT within Makhado Local Municipality, Vhembe District, Limpopo. This study was undertaken by Gudani Consulting in conjunction with various environmental specialists in their role independent environmental assessment practitioners (EAPs) to Kinetic Mining Development South Africa.

GENERAL PROJECT DESCRIPTION

The heat recovery coke oven (390MW) with an annual output of 3.0 million tons of coke and supporting facilities will be built in three phases, with consistent planning and step-by-step implementations. The first phase of the construction of 1.0 mtpa (million tons per annum) will be 4×25 ovens heat recovery coke ovens and supported by waste heat power generation facilities (130MW), production management, welfare facilities and laboratories, the system adopts air cooling, coke dry quenching, wet quenching as stand by. The second and third phases of the construction of 1.0 mtpa will be of 4×25 ovens of heat recovery coke ovens and supported by waste heat power generation facilities (130MW each phase), coke dry quenching, wet quenching as stand by for each phase respectively.

According to the overall plan, the total construction capacity of the first, second and third phase of the project is 3.0 million tons of coke per year, using 3×4×25 ovens heat exchange and recovery coke ovens (390MW). The main products of this project are coke and electricity.

This project will utilize waste heat from heat-recovery coke oven flue gas. The construction will be divided into three phases (Phase I, II, and III). Each phase includes the installation of two 152 t/h ultra-high temperature and ultra-high pressure single-reheat coke oven waste heat boilers, with one waste heat boiler corresponding to every two coke ovens. Additionally, within the scope of Phase I, II, and III, one set of 140 t/h dry quenching (CDQ) system paired with a 73 t/h ultra-high temperature and ultra-high pressure single-reheat CDQ waste heat boiler will be constructed in each phase to recover sensible heat from coke.

The project will involve the construction of three new turbine-generator power stations, with one station built in each phase (Phase I, II, and III). Each station is equipped with two NZK65-13.2/566/566 condensing steam turbines and one QFW-65-2 generator configured for each turbine pair. The generator has a rated power output of 65,000 kW and a rated voltage of 10,500 V – which translates to a combined capacity of 130 000 kW (130 MW) per station.

Gudani Consulting has relied on the specialist opinion of the technical experts in their field to assist with the quantification of the baseline environmental conditions within the proposed area, potential impacts of the proposed coke plant and heat recovery activities and operations, and compilation of the requisite environmental impact assessment (EIA) and management programme (EMP) reports. Gudani Consulting worked closely with interested and affected parties and the Makhado Local Municipality to obtain inputs into the EIA/EMP process.

ENVIRONMENTAL IMPACT ASSESSMENT REQUIREMENTS

The proposed project will entail several listed activities, which may not commence prior to obtaining an Environmental Authorisation, in terms of Section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). An application for Environmental Authorisation, in terms of NEMA, for activities listed in Government Notices (GNR 983, GNR 984 or GNR 985), 2014 has been submitted to Limpopo Department of Economic Development, Environment and Tourism (LEDET).

The proposed activities identified in GNR 983, GNR 984 or GNR 985 and which accordingly require Environmental Authorization in terms of NEMA, are summarized below:

Relevant Government Notice	Listing Notice and Activity No:	Description	Applicable Farms
GNR.983 December 2014	Listing Notice 1, Activity 9	Pipelines to the PCDs, Stormwater Management Structures	Boas 642 MS Martha 185 MT
GNR.983 December 2014	Listing Notice 1, Activity 10	Pipelines to the PCDs	Boas 642 MS Martha 185 MT
GNR.983 December 2014	Listing Notice 1, Activity 28	Establishment of coke plant and heat recovery plant and associated infrastructure – office and residential facilities	Boas 642 MS Martha 185 MT
GNR.983 December 2014	Listing Notice 1, Activity 56	Construction of access and haul roads	Boas 642 MS Martha 185 MT
GNR.984 December 2014	Listing Notice 2, Activity 2	The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more.	Boas 642 MS Martha 185 MT
GNR.984 December 2014	Listing Notice 2, Activity 4	Bulk Hydrocarbons Storage Facilities – 500m^3	Boas 642 MS Martha 185 MT
GNR.984 December 2014	Listing Notice 2, Activity 6	Coke and Heat Recovery Plants	Boas 642 MS Martha 185 MT

GNR.984 December 2014	Listing Notice 2, Activity 15	Vegetation Clearance for Establishment coke and heat recovery plant, and associated infrastructure, office and residential facilities, ore stockpiles and discards stockpile/dumps	Boas 642 MS Martha 185 MT
GNR.984 December 2014	Listing Notice 2, Activity 21	Coke and Heat Recovery Plants	Boas 642 MS Martha 185 MT
GNR.985 December 2014	Listing Notice 3, Activity 12	The clearance of an area of 300 m^2 or more of indigenous vegetation - for Establishment coke and heat recovery plants, and associated infrastructure, office and residential facilities, ore stockpiles and discards stockpile/dumps	Boas 642 MS Martha 185 MT

The following listed activities for waste management license and air quality license will be applied for under separate application submissions for the proposed coke and heat recovery plants and associated infrastructure project:

List of Waste Management Activities that have, or are likely to have, a detrimental effect on the environment published under Government Notice 718 in Government Gazette 32368 of 3 July 2009, in terms of section 19(2) of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008), proposed to be conducted at the proposed coke and heat recovery plants premises:

GNR.921 November 2013	Category B Activity - 7	Establishment of stockpiles and Discards stockpile/Dumps.	Boas 642 MS Martha 185 MT
GNR.921 November 2013	Category B Activity - 9	Establishment of stockpiles and Discards stockpile/Dumps.	Boas 642 MS Martha 185 MT

Listed Activities, as published in terms of Section 21 of the National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004) proposed to be conducted at the proposed coke and heat recovery plants premises:

Category of Listed Activity	Listed Activity 2:	Listed Activity Name	Listed Activity Description:
Category 2 Petroleum Industry	Sub-Category 2.2	Storage and Handling of Petroleum Products	All permanent immobile liquid storage tanks larger than 500 cubic meters cumulative tankage capacity at a site.

Category 3 Metallurgical Industry	Sub-Category 3.2	Coke production and coal gasification	Coke production
Category 5 Metallurgical Industry	Sub-Category 5.1	Storage and handling of ore and coal	Storage and handling of ore and coal

In addition, an Integrated Water Use Licence Application (IWULA) in terms of Section 21 of the National Water Act (NWA) (Act 36 of 1998) will be compiled and submitted to the Department of Water and Sanitation (DWS). In support of this IWULA, a comprehensive Integrated Water and Waste Management Plan (IWWMP) for the proposed coke and heat recovery plants operations will be compiled.

The following water uses, as defined in Section 21 of the National Water Act (Act 36 of 1998) (NWA), will be applicable for the proposed coke and heat recovery plants project, which require an integrated water use authorisation:

- Section 21 (a): Taking Water from a water resource;
- Section 21(b): Storing water;
- Section 21(c): Impeding or diverting the flow of water in a watercourse;
- Section 21 (e): Engaging in a controlled activity;
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource;
- Section 21 (h): Disposing of water which contains waste from, or has been heated in, any industrial process;
- Section 21(i): Altering the bed, banks, course or characteristics of a watercourse.

The application for landuse change from agricultural to industrial activities will be submitted with Makhado Local Municipality. The said landuse change required and environmental impact assessment to be undertaken and submitted with the application.

APPROACH TO THE PROJECT

The project is currently in the scoping phase of the Integrated Environmental Management (IEM) process as per the EIA regulations. The Scoping phase mainly pertains to the identification of anticipated impacts as a result of the proposed coke and heat recovery plants activities and operations project considering the prevailing or baseline conditions. The EIA/EMP phase will then assess and document the impacts and specialist investigations will be integrated and considered part of the impact assessment. Impacts will be evaluated on standard impact assessment criteria, which will assist with the determination of the significance of the impacts.

PUBLIC PARTICIPATION

Public participation plays an important role in the compilation of an EIA/EMP, as well as the planning, design and implementation of a project. Public participation is a process leading to informed decision-making, through joint effort by the:

- Proponent;
- Technical experts;
- Governmental authorities; and
- Interested and Affected Parties (I&APs).

Public participation is a vehicle for public input, which achieves the following:

- Facilitates negotiated outcomes;
- Creates trust and partnership;
- Minimises negative effects;
- Maximises positive effects;
- Provides an indication of issues;
- Prevents the project continuing;
- Cause costly delays later; and
- Results in enhanced and shared benefits.

The public were informed about the project by means of the following:

- Stakeholders, including adjacent landowners and the relevant authorities, were notified of the proposed HRCP activities and operations by means of consultation letters and Background Information Document (BID) pamphlets distributed during the month of August 2025.

- Advertisements were placed in the Limpopo Mirror News on the **12th September 2025** – See Appendix 5.

- Various Site Notice boards advertising the proposed industrial development and informing I&APs were placed at visible locations on the site, Mudimeli, Makushu, Mulambwane, Musholombi, Kuvele, Musekwa, Pfumembe, Nemamilwe and Makhado, as well as in close proximity to the site.

Consultation concerning the proposed coke and heat recovery plants activities and operations with the respective tribal authority/community committees/ward councillors, municipality, farmers, members of the public/community and I&APs were undertaken through a series of meetings, distribution of BIDs and site notices during August and September 2025. The comments received from I&APs thus far have been included in this Scoping Report and are captured in a Comments and Response Report accompanying this Scoping Report (Appendix 5).

The Scoping Report (SR – This Report) has been made available for public review from **09th December 2025** to **05th February 2026**. All comments received on the SR will be addressed and incorporated within the Final Scoping Report to be submitted directly to LDEDET. Any other comments received will be addressed in the EIA/EMP phase.

IDENTIFICATION OF KEY ENVIRONMENTAL ISSUES

A baseline description of the environment was gathered through visual inspections/field investigations of the site and its surroundings, desktop studies as well as preliminary specialist recommendations. This aforementioned information

was used to assess the potential areas of study which could be affected by the proposed development.

Risks and key issues were identified and addressed through the following:

- Consultation with the Interested and Affected Parties (I&APs);
- Through an internal process based on similar developments;
- Identification of environmental impacts; and
- Various site visits.

The focus of the Scoping and EIA/EMP process will be to assess the impacts on bio-physical and socio-economic site elements resultant from the project and to assign suitable management measures, where possible, to abate the identified impacts to within acceptable levels. The Scoping phase, as the name implies, has scoped/identified the more pertinent of the potential impacts on the environment as follows and that will be taken to the EIA/EMP phases for more comprehensive assessment:

- Impacts on surface and groundwater resources through the proposed coke and heat recovery plants activities and operations to be used including the related infrastructure.
- Impacts on fauna and flora due to vegetation clearance and topsoil stripping, as well as the proximity to the water channels and any possible impacts on aquatic biodiversity.
- Impacts on the air quality which may result during windy periods, and providing problems related to emissions, dust and other particulate matter.
- Impacts on the visual and aesthetic character of the region due to the establishment of new coke and heat recovery plants activities and operations within the area.
- Possibility of impacts on cultural or heritage resources, should any be within the vicinity of the proposed coke and heat recovery plants activities and development.
- New coke and heat recovery plants activities will have a definite impact on the noise levels within the area and the impacts thereof will require more detailed investigations.
- Impacts due to waste to be generated from the coke and heat recovery plants activities, and the management options thereof.

The above impacts, as well as many others, will be comprehensively interrogated in the EIA/EMP phases of the project and the impact significance assessment supplemented with specialist inputs where necessary. No environmental or socio-economic fatal flaws have been identified for the proposed project to date.

ALTERNATIVE ANALYSES

The inclusion of an alternative analysis is a specific requirement of the Integrated Environmental Management (IEM) procedure as underlined by the NEMA. The IEM procedure stipulates that the environmental investigation needs to consider feasible alternatives for any proposed development.

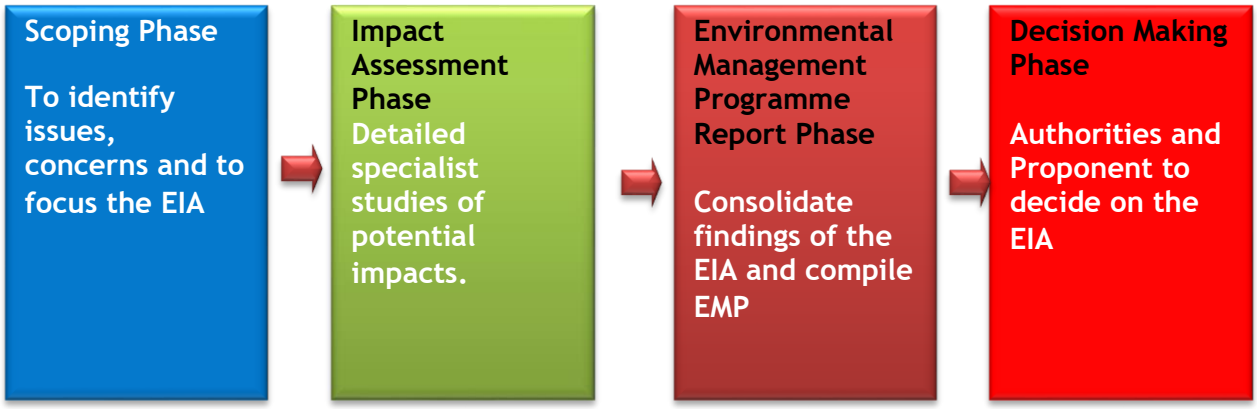
Two alternative sites – Remaining Extent of Boas 642 MS - Option 2 and Remaining Extent of Martha 185 MT (Option 1) have been considered in this assessment for the

proposed project. The No-Go option is the other alternative identified during the scoping phase, which will be discussed in detail as part of the EIA/EMP phase – including the mitigation hierarchy. During both the Scoping and EIA/EMP phases, public participation plays a key role and is a vital part of the IEM process.

CONCLUSION

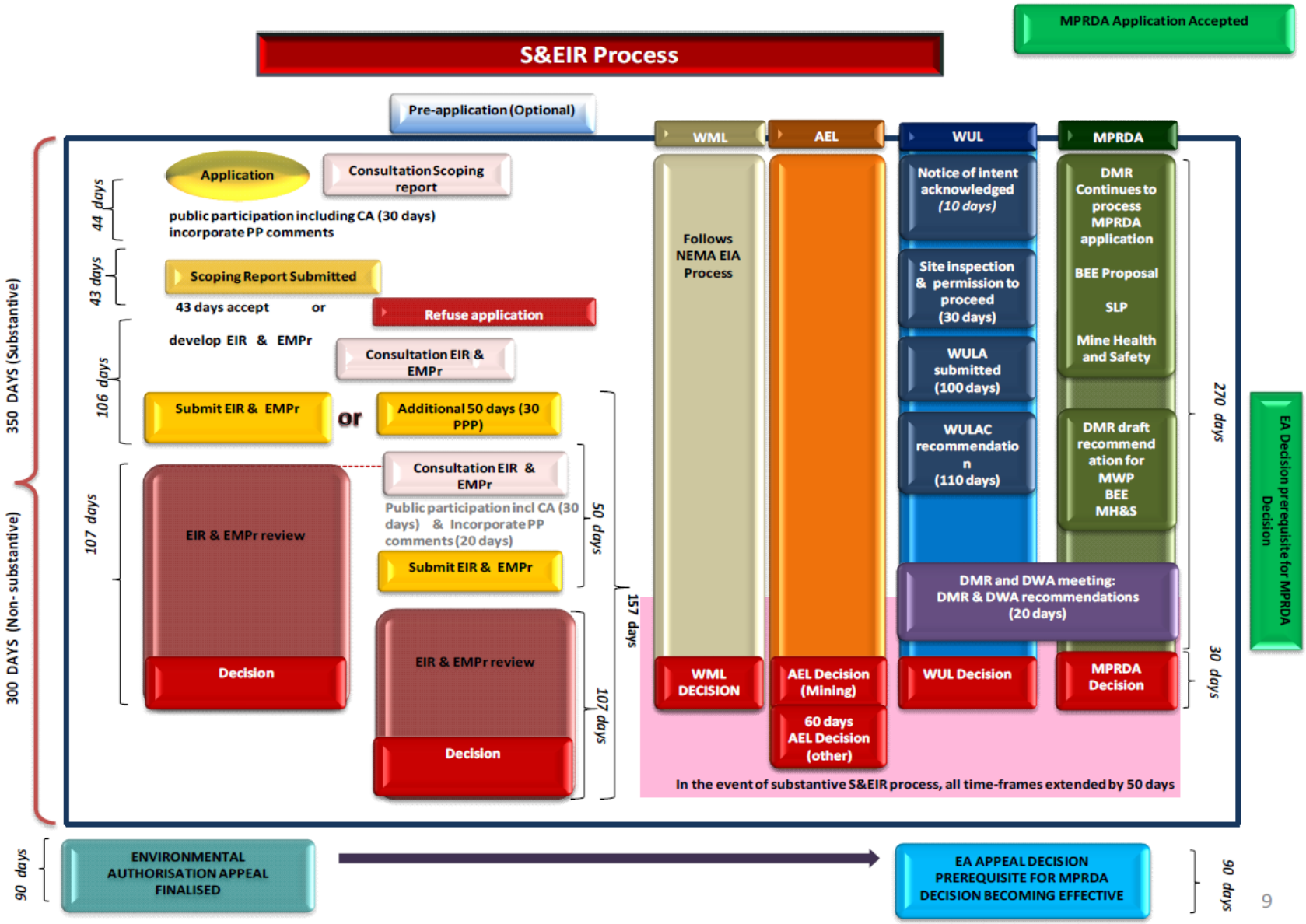
The scoping process and report provides an overview of the findings of the initial assessment and consultation with Interested and Affected Parties (I&Aps).

The EIA process consists of the following phases:



The findings are presented in this scoping report and will be investigated in detailed under the following reports:

- Environmental Impact Assessment Report, coke and heat recovery plants project.
- Environmental Management Programme Report, coke and heat recovery plants project.


S&EIR Process
MPRDA Application Accepted
Pre-application (Optional)
WML
AEL
WUL
MPRDA
350 DAYS (Substantive)
300 DAYS (Non-substantive)
44 days
43 days
106 days
107 days
Application
Consultation Scoping report
public participation including CA (30 days)
incorporate PP comments
Scoping Report Submitted
43 days accept
or
Refuse application
develop EIR & EMPr
Consultation EIR & EMPr
Submit EIR & EMPr
or
Additional 50 days (30 PPP)
Consultation EIR & EMPr
Public participation incl CA (30 days) & Incorporate PP comments (20 days)
Submit EIR & EMPr
50 days
157 days
EIR & EMPr review
Decision
EIR & EMPr review
Decision
107 days
Follows NEMA EIA Process
WML DECISION
AEL Decision (Mining)
60 days AEL Decision (other)
Notice of intent acknowledged (10 days)
Site inspection & permission to proceed (30 days)
WULA submitted (100 days)
WULAC recommendation (110 days)
DMR and DWA meeting: DMR & DWA recommendations (20 days)
WUL Decision
DMR Continues to process MPRDA application
BEE Proposal
SLP
Mine Health and Safety
DMR draft recommendation for MWP BEE MH&S
MPRDA Decision
270 days
30 days
In the event of substantive S&EIR process, all time-frames extended by 50 days
EA Decision prerequisite for MPRDA Decision
90 days
ENVIRONMENTAL AUTHORISATION APPEAL FINALISED
EA APPEAL DECISION PREREQUISITE FOR MPRDA DECISION BECOMING EFFECTIVE
90 days
9

1.0 INTRODUCTION

1.1 Details of the Applicant

Table 1: Details of the Applicant

Name of Applicant	Kinetic Mining Development South Africa (Pty) Ltd
Address	8 Braam Drive, Bendor Polokwane, 0699
Contact Person	Pan (Roger) Li
Cell	0673582208 / +86 13790358997
Email	lipan@kineticme.cn
Details of the Land	Boas 642 MS Martha 185 MT
Surface Rights Holder	MC Mining Limited

Kinetic Development Group Limited was incorporated in Cayman Island in July 2010. It has been listed on the main board of Hong Kong Stock Exchange in March 2012. The company business covers a full industry chain of coal, including coal mining and production, coal cleaning plant, coal transportation and trade.

In 2024, the Group took its first step towards international development in the coal sector by announcing the subscription of majority shares in MC Mining Limited through subscription of new shares of MC Mining. Upon completion of the subscription, the Group will develop and operate four coal mining projects in South Africa, encompassing both thermal and coking coals, with total mineable resources of 1.96 billion tonnes (based on the annual report of MC Mining for the year ended on 30th June 2023). These high-quality resources are positioned to become a key driver of the Group's future performance growth - Kinetic Mining Development South Africa (Pty) Ltd has been incorporated in this regard.

1.2 Details of the Environmental Assessment Practitioner and Specialists

Table 2: Details and Expertise of the EAP and Specialists

Name of Environmental Assessment Practitioner (EAP)	Gudani Consulting
Project Coordinator	Setenane Nkopane - SACNASP
EAPs	Mulanga Sikhitha – SACNASP/EAPASA Lorato Tigedi – SACNASP/EAPASA
Postal and Physical Address	P. O. Box 714 Faunapark Polokwane 0787 04 King Street, Bendor Polokwane 0699
Contact details	Cell: 082 828 3412 Fax: 086 235 9820 Email: setenane@gudaniconsulting.co.za Website: www.gudaniconsulting.co.za
Professional Affiliation **Professional Registration**	IAIA-SA SACNASP - 400022/13

	SACNASP – 119514 / EAPASA -2019/795 SACNASP - 400161/09 / EAPASA - 2020/2519
Qualifications of the EAPs to carry out the EIA/EMP/IWULA/AEL process	MSc. and BSc. Hons in Environmental Management and Assessments

Specialist Study	Specialist
Air Quality	Airshed Planning
Biodiversity and Ecology	Environment Research Consulting
Surface Water and IWWMP	Redkite Environmental Solutions
Noise Impact Assessment	Enviro Acoustic Research
Groundwater Assessment	Geo Equilibria (Pty) Ltd
Heritage Impact Assessment	A Pelser Archaeological Consulting
Public Participation Process	Gudani Consulting
Socio-Economic Impact Assessment	Gudani / IB Modiba
Soil, Land Capability, Land-Use and Hydropedology	Environment Research Consulting
Climate Change	Atmosfera Consulting (Pty) Ltd
Health Impact Assessment	Naira Environmental Consultants
Geotechnical Investigations	Geo Equilibria Geotechnical
Land Mapping	SurvMap Survey Mapping/KJC Consultants

1.3 Expertise of the EAP

1.3.1 Qualifications of the EAP

Attach Proof of Qualification in **Appendix 1.**

BSc. Hons – Environmental Science
BSc. Hons – Natural Science
MSc. - Environmental Management and Assessments.

1.3.2 Summary of the EAP's Past Experience

Attach CV and past experience in **Appendix 2.**

Lorato Tigedi has approximately 22 years in environmental consulting and have completed basic assessment, environmental impact assessment, waste management license and water use license applications for Limpopo, Free State, Northern Cape, North West and Eastern Cape Provinces. She joined Geo Pollution Technologies (Free State) in 2003 and partnered with a Geohydrologist to set up Bokamoso Consultants as an environmental consultant, trading as NSVT Consultants. From 2004-2005 after completion of BSc Hons (Wildlife) she continued to study Master's in Environmental Management in 2006 but only completed the modules work and still have Mini-Dissertation. She has extensive knowledge regarding the competencies required to ensure implementation and alignment of environmental policy instruments such as EIA. For Continuous Professional Development, she has completed short courses in Planning for Effective Public Participation, Social Impact Assessment and Conflict

Management, Introduction to Environmental Law, Introduction and Implementation of OHSAS 17001 and EMS 14001-2016 amongst other courses.

She has considerable public participation experience through her work in EIA and understand that an effective public participation process provides an opportunity for identifying problems during the EIA process and identifying opportunities that could be used in the decision-making process. She is a registered EAP with SACNASP (400161/09) and EAPASA (2020/2519)

Mulanga Sikhitha is a Candidate Natural Scientist with 7 years working experience in the field of Environmental management. She holds an undergraduate degree in Life and Environmental Science from the University of Johannesburg and an Honours degree in Geography from the University of Limpopo. She also holds short learning certificate in Safety Management. Currently, she is enrolled for Masters degree in Environmental Management.

Mulanga has experience in obtaining Environmental Authorizations and environmental permits and is responsible for the following duties: conducting Environmental Impact Assessments (Both Full EIA and BAR), management of EIA Unit including Public Participation Processes, compilation of Environmental Management Plans/Programmes, and undertaking Environmental Awareness Programmes. Other duties have included liaison with governmental departments, non - governmental organisations, stakeholders and clients. She is a registered EAP with SACNASP (119514) and EAPASA (2019/795).

Setenane Nkopane has BSc. Honours and MSc. Degrees in Environmental Science and Management from the University of Cape Town. He worked with the Department of Minerals and Energy, Limpopo Province from 1997 – 2005 as Deputy Director: Mine Rehabilitation, and acted as Director: Mineral Development Limpopo Province from 1999 - 2002. His responsibility included: Regulation and assessment of impacts mining operations on the environment in the Province; implementation and maintenance of environment systems in mining industry; rehabilitation of land disturbed by mining operations including prevention, control and combating pollution; administration of the EMP approval process, and compliance thereof, and controlling of mine closure. He also worked as Environmental Manager at De Beers, Venetia Mine, South Africa from 2006 - 2008. Venetia Mine was an ISO 14001 certified mine. He is currently the Managing Director of Gudani Consulting (Environmental and Social Scientists), and has undertaken various environmental assessment, socio-economic, rural development and water resource management, public participation and capacity building projects in South Africa.

Setenane is a registered environmental assessment practitioner (EAP) - (SACNASP No: 400022/13) and a members of the International Association of Impact Assessment – South Africa Affiliate (IAIA-SA – Membership No: 601).

1.4 Description and Locality of Study Area

The site will be located in the Makhado region of South Africa adjacent to MC Mining is located. The Makhado Mine is located 23 km (32 km by road) directly north of the

town of Louis Trichardt/Makhado in Limpopo Province and is accessible by road with a good road network.

The proposed HRCP project is accessible via the national road network. The N1 motorway runs north to south through the western end of the project area/site, connecting the towns of Musina, Louis Trichardt/Makhado, Polokwane and Johannesburg from north to south. The gravel-paved D745 connects with the N1 motorway past Mudimeli Village, heading east to the Nzhelele Dam and Tshipise. The D3678 gravel road runs east from the D745 to the villages of Makushu and Musekwa, as well as to the southern area of the Nzhelele Dam. The D1021 gravel road connects the N1 motorway to the proposed Huntleigh rail siding location. Several gravel tracks provide access to different locations in the project area.

Table 3: Project Locality and Property Description

Farm Name and No:														Boas 642 MS Martha 185 MT						
Application Area (Ha):														60 Hectares						
Magisterial District:														Vhembe District						
Distance and Direction from Nearest Town:														50 km South-East of Musina 32 km North of Makhado						
21 Digit Surveyor General Code for Each Farm/ERF Portion:																				
T	**O**	**M**	**S**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**4**	**2**	**0**	**0**	**0**	**0**
T	**O**	**M**	**T**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**8**	**5**	**0**	**0**	**0**	**0**
1	**2**				**3**				**4**								**5**			

Local Municipality	Makhado Local Municipality	
Communities	Mudimeli, Makushu and Farm Homesteads	
Nearest Town	Musina, Louis Trichadt/Makhado	
Coordinates:	See Figure 1a	
	Alternative Site 1 – Boas 642 MS	
	Latitude (Y)	Longitude (X)
	-22.749335 -22.748494	30.015410 30.024679
	Alternative Site 2 – Martha 185 MT	
	Latitude (Y)	Longitude (X)
	-22.774219 -22.778930	29.974224 29.976689

1.5 Project Locality

Show nearest town, scale not smaller than 1:250000 attached as **Appendix 3.**

Figure 1a: Locality Map – Proposed Heat Recovery and Coke Plant – Kinetic Mining Development - SA

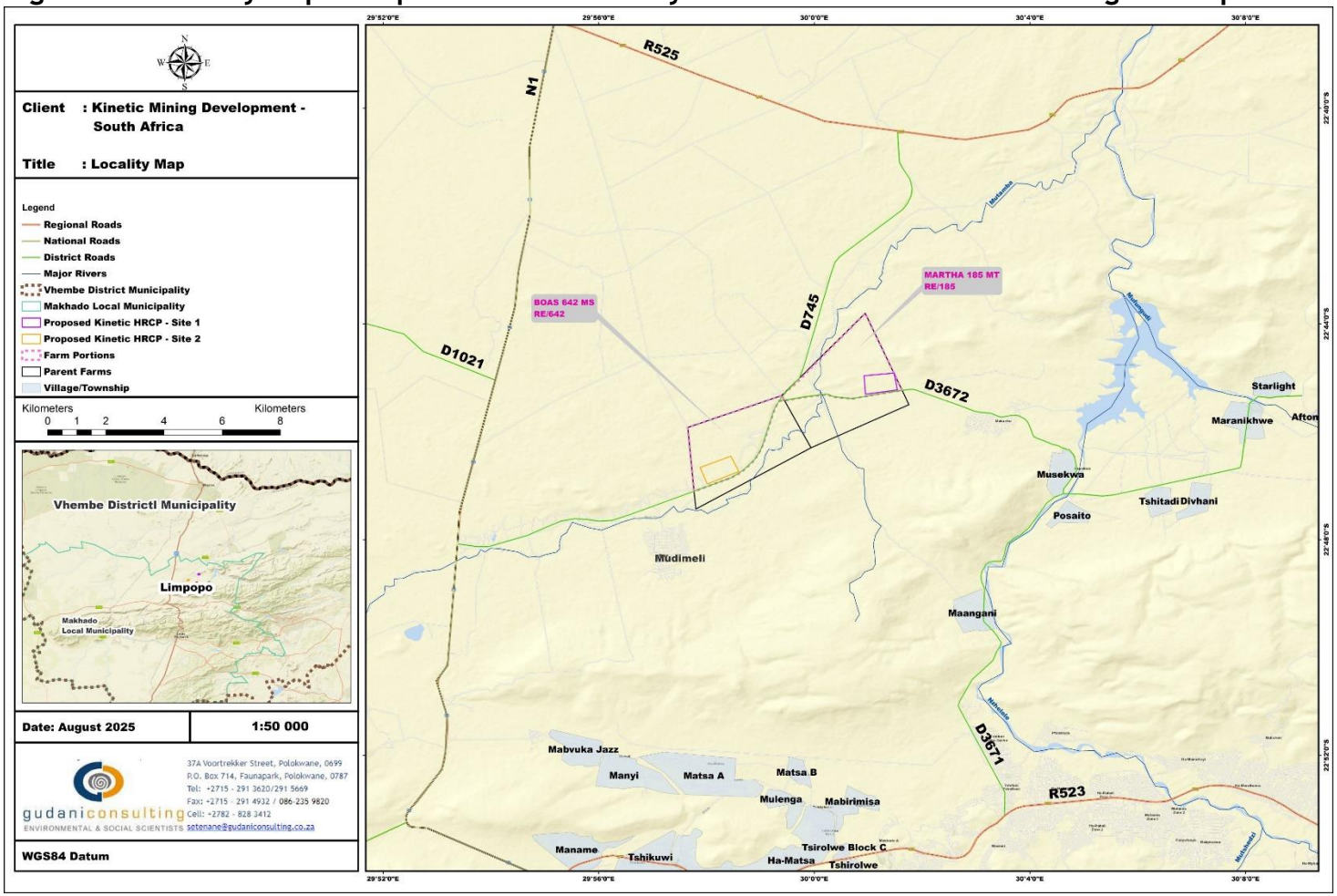


Figure 1b: Locality Map – Proposed Heat Recovery and Coke Plant – Kinetic Mining Development - SA

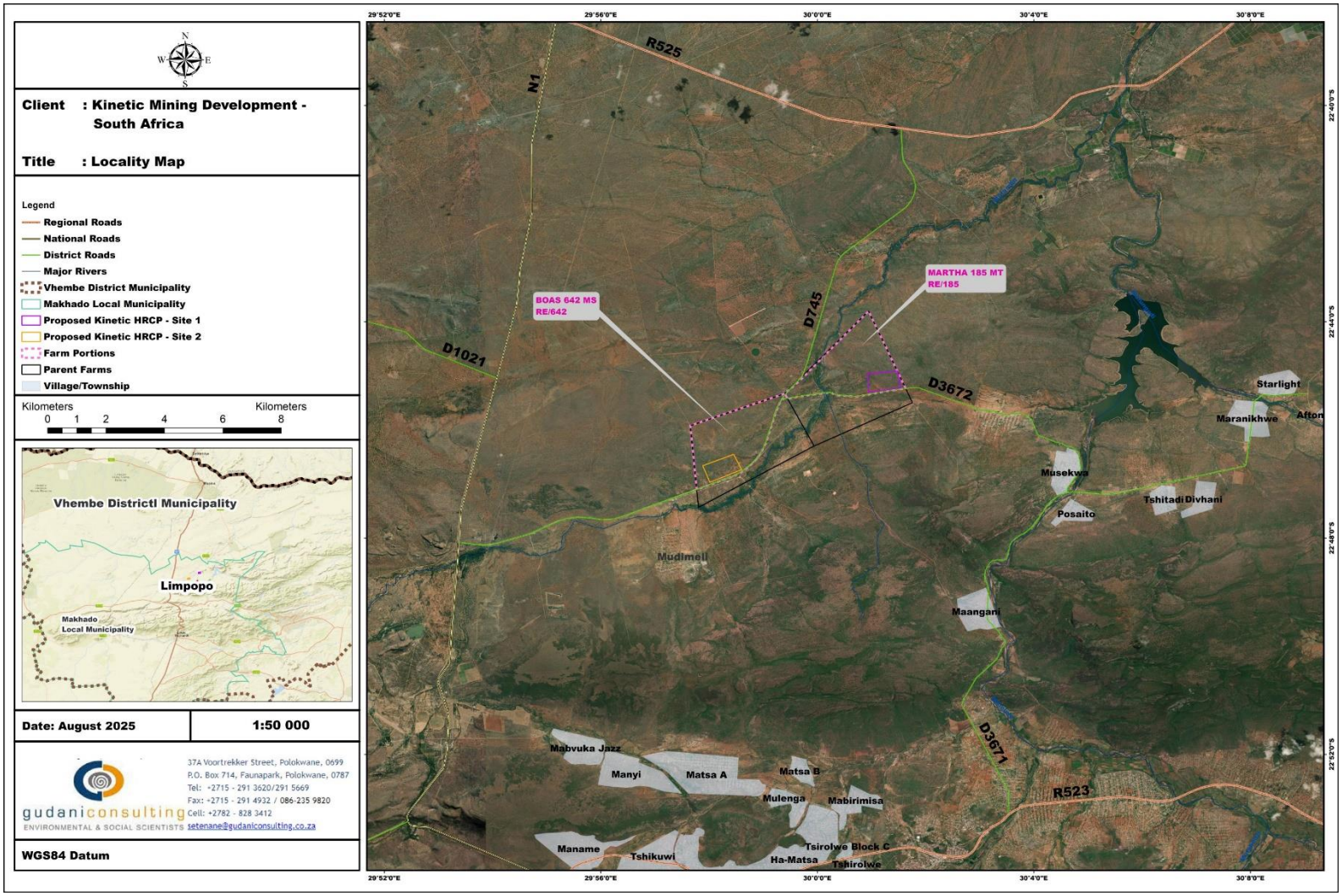
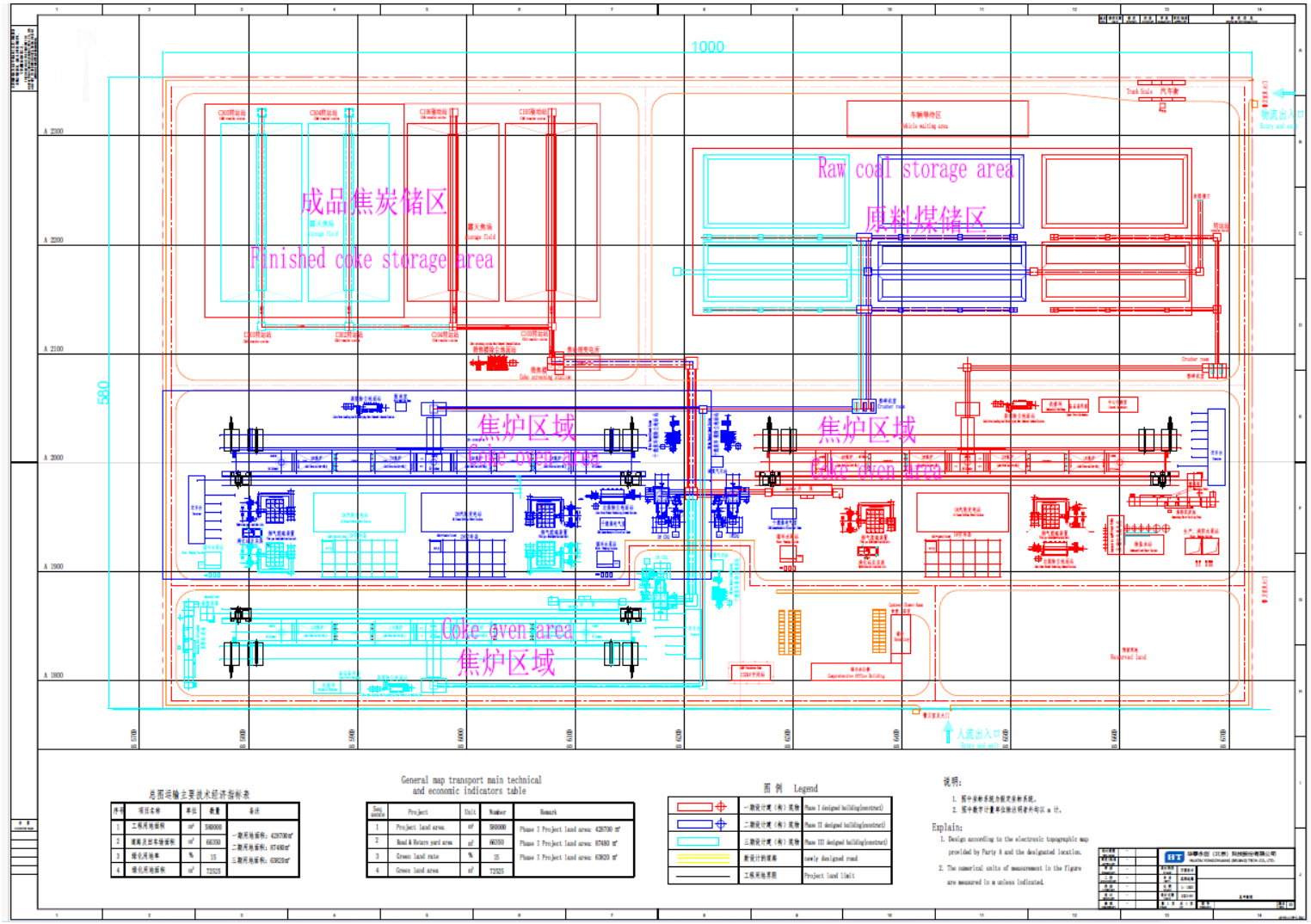


Figure 2: Layout Map – Proposed Heat Recovery and Coke Plant – Kinetic Mining Development - SA


1000
580
成品焦炭储区
Finished coke storage area
Raw coal storage area
原料煤储区
焦炉区域
Coke oven area
焦炉区域
Coke oven area
焦炉区域
Coke oven area
Truck Scale 汽车衡
Vehicle exit
Reserved land
General map transport main technical and economic indicators table
Legend
说明:
Explain:

1.6 Description of the Scope of the Proposed Overall Activity

1.6.1 Listed and Specified Activities

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and the area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site and attached as Appendix 4.

Table 4: Listed Activities Triggered by the Proposed Project

Relevant Government Notice	Listing Notice and Activity No:	Listing Activity Description:	Description	Applicability and Area Extend/Volume - Ha/m^2/m^3
GNR.983 December 2014	Listing Notice 1, Activity 9	*The development of infrastructure exceeding 1000 meters in length for the bulk transportation of water or storm water:* *(i) with an internal diameter of 0.36 meters or more; or* *(ii) with a peak throughput of 120 liters per second or more.*	Pipelines to the PCDs, Stormwater Management Structures	1800-3000m
GNR.983 December 2014	Listing Notice 1, Activity 10	*The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes.*	Pipelines to the PCDs	1800-3000m
GNR.983 December 2014	Listing Notice 1, Activity 28	*Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, where the total land to be developed is bigger than 1 Hectare.*	Establishment of coke plant and heat recovery plant and associated infrastructure – office and residential facilities	60 Hectares
GNR.983 December 2014	Listing Notice 1, Activity 56	*The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometer:* *(i) where the existing reserve wider than 13.5 meters, or* *(ii) where no reserves exists, where the road is wider than 8 meters.*	Construction of access and haul roads	1 – 5 km of access road

GNR.984 December 2014	Listing Notice 2, Activity 1	*The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.*	The development heat recovery plant (390MW)	60 Hectares
GNR.984 December 2014	Listing Notice 2, Activity 4	*The development of facilities or infrastructure for the storage, or storage and handling of dangerous goods, where such storage occurs in containers with a combined capacity of more 500 cubic meters.*	Bulk Hydrocarbons Storage Facilities – 500m^3	500m^3
GNR.984 December 2014	Listing Notice 2, Activity 6	*The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.*	Coke and Heat Recovery Plants	60 Hectares
GNR.984 December 2014	Listing Notice 2, Activity 15	*Clearance of an area 20 hectares or more of indigenous vegetation.*	Vegetation Clearance for Establishment coke and heat recovery plant, and associated infrastructure, office and residential facilities, ore stockpiles and discards stockpile/dumps	60 Hectares
GNR.984 December 2014	Listing Notice 2, Activity 21	*Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing.*	Coke and Heat Recovery Plants	60 Hectares
GNR.985 December 2014	Listing Notice 3, Activity 12	*The clearance of an area of 300 m^2 or more of indigenous vegetation - for Establishment coke and heat recovery plants, and associated infrastructure, office and residential facilities, ore stockpiles and discards stockpile/dumps*	Vegetation Clearance for Establishment coke and heat recovery plant, and associated infrastructure, office and residential facilities, ore stockpiles and discards stockpile/dumps	60 Hectares
GNR.921 November 2013	Category B Activity - 7	*The disposal of any hazardous waste on land.*	Establishment of stockpiles and Discards stockpile/Dumps.	5-10 Hectares *(waste management)*

GNR.921 November 2013	Category B Activity - 9	*Disposal of inert waste to land in excess of 25000 tons*	Establishment of stockpiles and Discards stockpile/Dumps.	5-10 Hectares *(waste management)*

Listed Activities, as published in terms of Section 21 of the National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004) proposed to be conducted at the proposed coke and heat recovery plants premises:

Category of Listed Activity	**Listed Activity 2:**	**Listed Activity Name**	**Listed Activity Description:**
Category 2 Petroleum Industry	Sub-Category 2.2	Storage and Handling of Petroleum Products	All permanent immobile liquid storage tanks larger than 500 cubic meters cumulative tankage capacity at a site.
Category 3 Metallurgical Industry	Sub-Category 3.2	Coke production and coal gasification	Coke production
Category 5 Metallurgical Industry	Sub-Category 5.1	Storage and handling of ore and coal	Storage and handling of ore and coal

1.6.2 Description of the Activities to be Undertaken

(Describe Methodology or technology to be employed, and for linear activity, a description of the route of the activity).

1.6.2.1 Proposed Heat Recovery and Coke Plant (HRCP).

Kinetic Mining Development South Africa (Pty) Ltd (KMD-sa) proposes to construct a 3 million tons per annum Coke Plant and a 390MW Heat Recovery Electricity Power Plant. The said proposed development will be done in three (03) phases of 1 million/tons/year coke plant and 130MW heat recovery electricity power plant over a period of 10-12 years. The proposed development will be on either of the farms Boas 642 MS and Martha 185 MT within Makhado Local Municipality, Vhembe District, Limpopo:

Applicant Name:	Proposed Activity Description:	Farms/Alternative Site Options
Kinetic Mining Development South Africa (Pty) Ltd (KMD-sa)	3 million tons/year coke plant; Heat recovery electricity power plant - 390 MW;	Remaining Extent of Boas 642 MS – Option 2 Remaining Extent of Martha 185 MT – Option 1

The design of the project is based on the principle of "practical, safety, reliable, advanced and low cost" so as to reduce the land area and save investment to satisfy the current production and construction demands as far as possible. According to the overall plan and considering the water and power supply of the project, the construction site of the project is located in the Makhado area of South Africa. It is proposed to adopt heat exchange and heat recovery coke oven, and the total annual output of coke will be 3.0 million tons that to be built in three phases, 1.0 million tons/130 MW in the first phase, 1.0 million tons/130 MW in the second phase and 1.0 million tons/130 MW in the third phase over a period of 5 - 10 years.

Combined with status of Kinetic Development Group Ltd, the production process selected in this project is of advanced technologies, which are matured, economically reasonable, low energy consumption, small footprints, low pollution and high reuse utilization rate of water, ensuring the various index will meet relevant emission standards while maximally utilizing the equipment so as to control the cost and maximize investment benefits.

The heat recovery coke oven with an annual output of 3.0 million tons of coke and supporting facilities will be built in three phases, with consistent planning and step-by-step implementations. The first phase of the construction of 1.0MTPA will be 4×25 ovens heat recovery coke ovens and supported by waste heat power generation facilities, production management, welfare facilities and laboratories, the system adopts air cooling, coke dry quenching, wet quenching as stand by. The second and third phases of the construction of 1.0 MTPA will be of 4×25 ovens of heat recovery coke ovens and supported by waste heat power generation facilities, coke dry quenching, wet quenching as stand by for each phase respectively.

According to the overall plan, the total construction capacity of the first, second and third phase of the project is 3.0 million tons of coke per year, using 3×4×25

ovens heat exchange and recovery coke oven. The main products of this project are coke and electricity. The main economic and technical indicators for the proposed HRCP are outlined in Table 5 below:

Table 5: Main Economic and Technical Indicators for HRCP

No:	Name	Units			Indicators			Remarks
		Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3	
1	**Unit Capacity**							
1.1	Coke Production	10^4 t/a	10^4 t/a	10^4 t/a	100	100	100	
1.2	Coke Oven Type				Heat Recovery Coke Oven	Heat Recovery Coke Oven	Heat Recovery Coke Oven	
1.3	No: of Coke Oven Holes	Holes	Holes	Holes	4 x 25	4 x 25	4 x 25	
1.4	Capacity of Dry Quenching Device	t/h	t/h	t/h	1 x 140	1 x 140	1 x 140	
1.5	(P=13.8MPa, t=570°C)	t/h	t/h	t/h	1 x 63	1 x 63	1 x 63	Maximum 73
1.6	Coke Oven Flue Gas Coke Oven Waste Heat Recovery Boiler (P=13.8MPa, t=570°C)	t/h	t/h	t/h	2 x 152	2 x 152	2 x 152	
1.7	Steam Turbine Power Station (P=13.2MPa, t1=566°C)	MW	MW	MW	2 x 65	2 x 65	2 x 65	
2	**Product Output**							
2.1	Dry Total Focus	t/a	t/a	t/a	1065742	1065742	1065742	
2.2	Coke (Dry Basis)	t/a	t/a	t/a	1030724	1030724	1030724	
	>30mm	t/a	t/a	t/a	979188	979188	979188	
	<30mm	t/a	t/a	t/a	51536	51536	51536	
2.3	Sedimentation Tank Powder Coke (Dry Basis)	t/a	t/a	t/a	745	745	745	
2.4	Dry Quenching Powder Coke	t/a	t/a	t/a	24024	24024	24024	
2.5	Power Generation	10^3kWh/a	10^3kWh/a	10^3kWh/a	1027600	1027600	1027600	
	Among Them:	10^3kWh/a	10^3kWh/a	10^3kWh/a	929300	929300	929300	

	External Supply							
3	**Raw Material Consumption**							
3.1	Clean Coal for Coking (Dry)	t/a	t/a	t/a	1440144	1440144	1440144	
3.2	Trisodium Phosphate	t/a	t/a	t/a	7.763	7.763	7.763	
3.3	pH Regulator	t/a	t/a	t/a	48.26	48.26	48.26	
3.5	Complex Reagent	t/a	t/a	t/a	5.28	5.28	5.28	
3.6	Oxidative Fungicide and Algaecide	t/a	t/a	t/a	0.17	0.17	0.17	
3.7	Non Oxidizing Bactericidal and Algaecidal Agents	t/a	t/a	t/a	0.05	0.05	0.05	
3.8a	Bactericide	t/a	t/a	t/a	6.716	6.716	6.716	
3.8b	Caustic Soda NaOH (40%)	t/a	t/a	t/a	2.025	2.025	2.025	
3.9	Reducing Agent	t/a	t/a	t/a	1.113	1.113	1.113	
3.10	Scale Inhibitor	t/a	t/a	t/a	1.113	1.113	1.113	
3.11	Hydrochloric Acid (HCl) (30%)	t/a	t/a	t/a	0.208	0.208	0.208	
3.11b	Flocculent	t/a	t/a	t/a	3.67	3.67	3.67	
3.12	Reverse Osmosis Membrane	10000 Yuan/a	10000 Yuan/a	10000 Yuan/a	14	14	14	
3.13	Ultrafiltration Membrane	10000 Yuan/a	10000 Yuan/a	10000 Yuan/a	6	6	6	
3.14	Reverse Osmosis Security Filter Membrane	10000 Yuan/a	10000 Yuan/a	10000 Yuan/a	1.2	1.2	1.2	
3.15	Ultrafiltration Security Filter Membrane	10000 Yuan/a	10000 Yuan/a	10000 Yuan/a	0.6	0.6	0.6	
3.16	Burning Loss	t/a	t/a	t/a	10248	10248	10248	
3.17	Quicklime	t/a	t/a	t/a	7464	7464	7464	
4	**Power and Water Consumption**							
4.1	**Water**							
	Production Water	$10^3m^3/a$	$10^3m^3/a$	$10^3m^3/a$	1237.74	1237.74	1237.74	

	Coke Oven Recirculating Colling Water	M^3/h	M^3/h	M^3/h	39	39	39	Self Supply
	Recirculating Cooling Water for Steam Turbine Power Generation	M^3/h	M^3/h	M^3/h	45	45	45	Self Supply
	Compressed Air Nitrogen Station Circulating Water				2374	2374	2374	Self Supply
	Domestic Water	M^3/d	M^3/d	M^3/d	19.58	19.58	19.58	
4.2	**Electric Power**							
	Active Power	kW	kW	kW	17874	13007	12038	
	Apparent Power	kVA	kVA	kVA	19428	14138	13084	
	Annual Power Consumption	$10^3kWh/a$	$10^3kWh/a$	$10^3kWh/a$	98300	71539	66207	Self Supply
4.3	**Steam**							
	0.6 MPa Saturated Steam	t/h	t/h	t/h	4	4	4	Starting Work
	0.6 MPa Saturated Steam	t/h	t/h	t/h	0.2	0.2	0.2	Used for Coke Oven
	0.6 MPa Saturated Steam	t/h	t/h	t/h	8	8	8	For Desulfurization Purposes
4.5	Compressed Air	M^3/min	M^3/min	M^3/min	15.33	15.33	15.33	New Air Compressor Station for Supply
4.6	Purifying Compressed Air	M^3/min	M^3/min	M^3/min	77.1	54.1	48.1	
4.7	Use for Dust Remove	M^3/min	M^3/min	M^3/min	13.5	13	12	
4.8	Purified Air for Instruments	M^3/min	M^3/min	M^3/min	3.5	3.5	3.5	
4.8b	Natural Gas for Dry Quenching Oven	$10^3m^3/a$	$10^3m^3/a$	$10^3m^3/a$	132	132	132	10 Days/Year (Calculated on Calorific value +/- 36420 kJ/Nm^3
4.9	Demineralized Water	t/h	t/h	t/h	26.55	26.55	26.55	Newly Built Desalination

								Water Station for Supply
7	**Other Indicators**							
7.1	**Employees Quota**	**Person**			**358**	**256**	**260**	
	Production Personnel	Person	Person	Person	315	225	229	
	Management and Service Personnel	Person	Person	Person	43	31	31	
7.2	**Overall Plan and Transportation**							
7.2.1	Engineering Land Area	M^2	M^2	M^2	428700	87480	63820	All Phases Land Area
7.2.2	Road Engineering	M^2			66350			All Three Phases of Roads
7.2.3	Green Land Utilization Rate	%			15			
7.2.4	Green Land Area	M^2			64305			All Three Phases of Greening

The proposed HRCP will comprise of the following:

Coal preparation workshop: coal storage yard, pre-pulverizer room, coal blending bunker, pulverizer room, top of coal tower and the corresponding belt conveyor corridor and transfer station.

Coke workshop: The heat recovery and recuperative stamping coke ovens, coal tower, coke quenching tower, powder coke sedimentation tank, dry quenching coke device, transfer platform, coke bucket overhauling station, coke platform, transfer station, coke belt machine corridor, coke screening building, storage field etc.

Auxiliary production facilities: Steam turbine power station (including deoxygenated water supply pump station and power generation electrical room), air cooling island, desalination station, compressed air nitrogen station, liquid nitrogen gasification station, fire water supply pump station, 132kV switching station, workshop substation, coke oven loading and discharging dust removal ground Station, coke oven pusher de-dusting ground station, Flue gas desulphurization unit, dry quenching integrated electric room, coke oven discharge dust removal ground station, flue gas dust removal ground station, coke oven loading and pushing coke dust removal ground station, dry quenching environmental dust removal ground station, Circulating water pumping station, machine repair room, spare parts warehouse, and truck scale.

Production management and living welfare facilities: comprehensive office building, bathroom, shift dormitory, central laboratory.

The main product of the project is metallurgical coke, which will be sold domestically in South Africa as the fuel for iron making.

1.6.2.2 Raw Material Sources

The daily demand of coking coal for the production of this project is about 13152t (containing moisture ~10%), and the annual coal treated is about 4.8 million tons (containing moisture ~10%). The coking coal is mainly produced in South Africa (MC Mining – adjacent to the proposed HRCP sites) and transported by trucks to the coke plant.

The project will be constructed in three phases, with an overall annual capacity of 3.0 million tons of coke. The main raw material is washed coal, and the annual demand for washed coal is about 4.8 million tons (containing 10% moisture).

The quality requirements of coal loading for metallurgical coke production are as follows:

Table 6: Coal Quality Requirements for Metallurgical Coke Production

Mt	~10%
Ad	8% ~ 10%
St.d	0.6% ~ 1.2%
V_d	24% ~ 30%
Particle Size (<3mm)	~90%

G	55 ~ 72
Y(mm)	12 ~ 15

1.6.2.3 Process Scheme and Flow - HRCP

The coal preparation system is designed to grind and process single coal into coal charge that meet the specific production requirements for coke ovens. This system is a supporting construction for the new stamp-charging heat exchange and recovery coke oven plant. The coal preparation system will be constructed in two phases, and the completion of the second phase can meet the requirements of loading 3 million tons of coke oven coal. The coal used in the coal preparation system will be coming from the coal washing plant (MC Mining) and supplied by trucks.

The project consists of coal preparation, coke making, coke treatment, waste heat power generation and supporting public auxiliary facilities.

Coal preparation system: Coal blending will be adopted for coking process, which is simple with less equipment, convenient operation. The coking coal in the coal yard will be crushed and sent to the coal tower of the coke ovens by belt.

Coking system: The 3×4×25 ovens heat recovery coke oven battery will be built in three phases, with an annual output of 3.0 million tons of dry total coke, with 3 coal towers, 2 sets of wet quenching coke systems, 2 sets of coke tables and 3 sets of coke dry quenching systems.

Coke treatment system: The coke treatment system will be used for transporting the coke after dry quenching or wet quenching, and screening it into different grain grades according to the requirements, and sending it to the coke field by belt.

Waste heat power generation: The high temperature flue gas produced by coke oven will be discharged into the atmosphere after heat exchange by the waste heat boiler; The steam produced by the boiler goes into the turbo-generator to generate electricity.

Electricity and power supply: Except for the self-consumption of the plant, the rest of the electricity generated by the high temperature flue gas in the waste heat power generation system will be transmitted to the outside grid and supplied to neighbourhood – subject to the acquisition of the necessary power distribution permits and authorizations.

The raw coal transported by trucks is piled up in the coal storage yard. When coking coal is needed, it will be pushed into the coal pit by the loader and then unloaded onto the belt conveyor through the electro-hydraulic jaw gate under the coal pit. Hard coal such as gas coal and lean coal are transported by belt conveyors to the pre -crusher room for preliminary crushing treatment, and then stored in the coal blending bin. Coal that is easily crushed, such as coke and fat coal, can be directly transported to the coal blending bin for storage without the need for pre-crushing through belt conveyors. After each type of coal in the coal blending bin is mixed in a specific proportion, it is transported by a belt conveyor to the crusher for mixing and crushing to the required fineness. It is directly transported to the coal tower

and discharged into the tower through a fixed electric plow unloader installed on the belt conveyor for use in coke oven production.

Figure 3a: Coal Preparation Process Flow

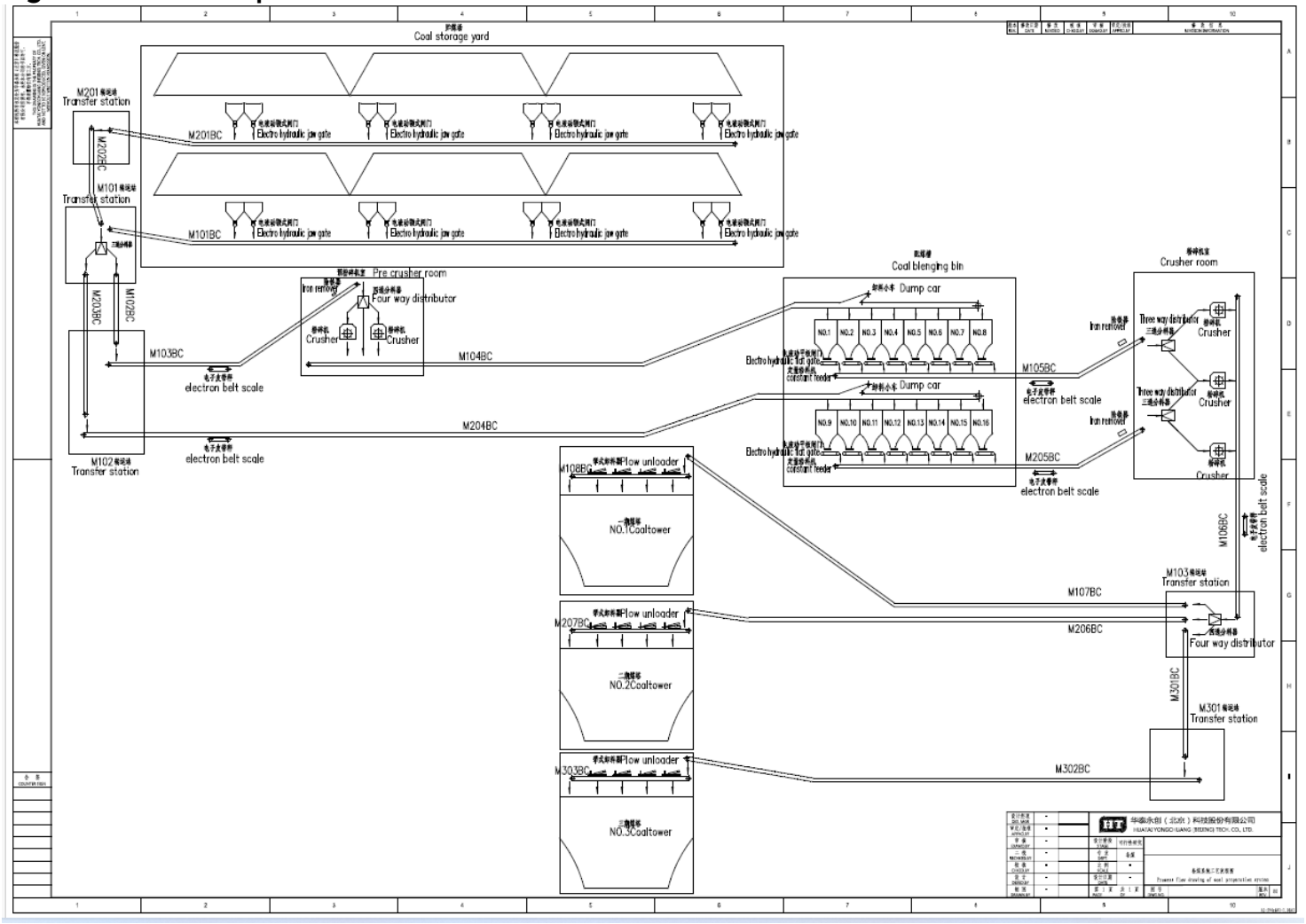
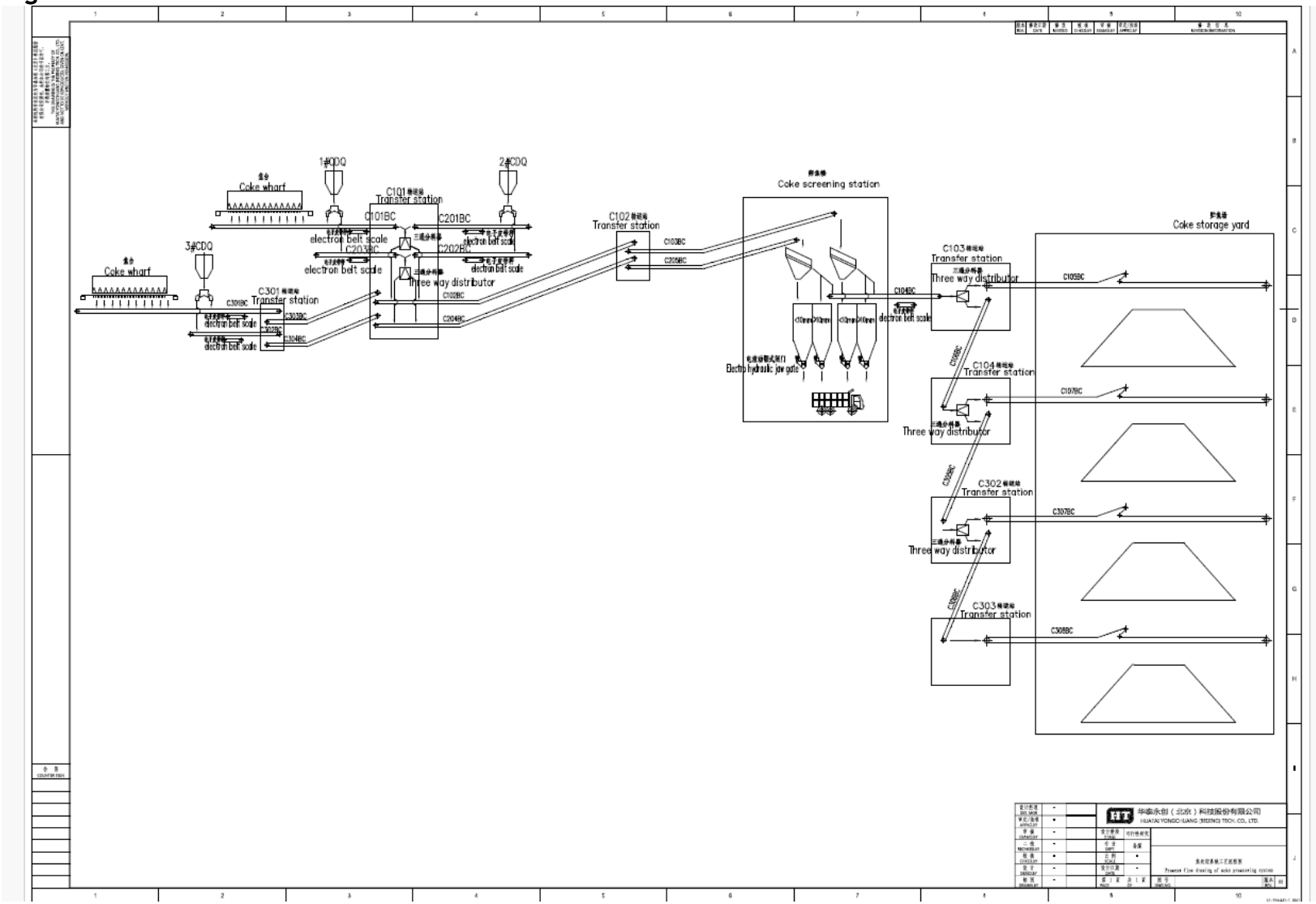


Figure 3b: Coke Production Process Flow



1.6.2.4 Process Facilities and Key Equipment

The entire system comprises coal storage yard, coal pit, pre crusher room, coal blending bin, crusher room, coal tower top, as well as the corresponding belt conveyor corridor and transfer stations.

Coal Storage Yard

The raw coal will be transported by trucks and stacked in different areas of the coal storage yard. Auxiliary operations for coal stacking and bottom cleaning in the coal yard are carried out by loaders.

After the coking coal is stored in the coal yard, it can achieve the purpose of coal quality homogenization and dehydration, and also ensure the continuous and balanced production of coke oven, and stabilize the coke quality.

The total storage capacity of the coal storage yard is about 140,000 tons, which will be constructed in two phases. The first phase will have a storage capacity of about 70,000 tons, and the second phase will have a storage capacity of about 70,000 tons.

The coal pit will be arranged in the coal storage yard. The coal receiving trough is a reinforced concrete structure with deep and square conical groove, lined with rolled microcrystal plate, and a grate is arranged above the trough.

When coking coal is needed, a single type of coal is pushed into the coal pit by the loader, then to be transported to crushing room for crushing by the conveyor belt installed under the trough.

Pre-Crusher Room

In order to better control the crushing fineness and particle size distribution of the coal loaded into the furnace, hard coal such as gas coal and lean coal that are difficult to crush are first crushed before coal blending, so that the particle size distribution of the blended coal after secondary crushing is more uniform, achieving the goal of improving the quality of coke.

The pre crusher room is equipped with two reversible impact hammer crushers, which are used simultaneously.

The difficult to crush coal such as gas and lean coal transported from the coal yard will be absorbed by the iron removal device and enters the pre pulverizer room for pulverization. The pulverized coal will be sent to the coal blending bin by belt conveyor; Coking coal, fat coal and other coal that do not require pre-crushing can be adjusted by the electro-hydraulic flap in the primary crusher room and directly sent to the coal blending bin through belt conveyor.

There will also a facility for inspecting the fineness of pulverization at the bottom of the crusher room, sampling and inspecting the coal according to the prescribed system, and replacing the hammer head in time according to the test results to ensure that the fineness of the coal in the oven meets the specified requirements.

Coal Blending Bin

The coal blending bin is used to mix various grades of coking coal according to the proportion determined by coal blending experiments, so that the mixed coal can be refined into coke that meets quality requirements, while achieving the goal of reasonable utilization of coal resources and reducing production costs. The coal blending tank is used to mix various grades of coal according to the ratio determined by coal blending tests, so that the blended coal can be refined into coke that meets quality requirements, while achieving the goal of reasonable utilization of coal resources and reducing production costs.

The single coal transported from the coal yard or pre-crusher room is distributed into 20 coal bin with a diameter of φ 10m hyperbolic nozzles by the top unloading trolley. 20 coal bins are arranged in double rows, with each bin storing approximately 850 tons and a total storage capacity of 17 000 tons.

The coal blending slot adopts a hyperbolic bucket with equal cross-sectional shrinkage rate, which has good adaptability to coal with high moisture content and large mud coal content. The operation is stable, which can prevent coal from being trapped in the warehouse and improve the accuracy of coal blending.

The hyperbolic nozzle of the coal blending bin is made of rolled microcrystalline board, and the inner lining board surface must not have any reverse or obvious forward or reverse alignment.

The lower part of the coal blending bin is equipped with an automatic coal blending device, mainly composed of an electro-hydraulic flat gate, a quantitative feeding belt conveyor, and an electronic batching scale control system, automatically control the blending ratio of each individual coal according to the given value during production to ensure continuous and stable blending ratio. The use of automatic coal blending equipment can greatly improve the accuracy and automation level of coal blending, reduce the labour intensity of workers, and improve the quality of coke. The hyperbolic section of the coal blending tank is equipped with a high-energy arch breaking flow aid, which uses the energy released instantly by compressed air to clear blockages and break arches.

Crusher Room

In order to better control the crushing fineness and particle size distribution of the coal loaded into the furnace, hard coal such as gas coal and lean coal that are difficult to crush are first crushed before coal blending, so that the particle size distribution of the blended coal after secondary crushing is more uniform, achieving the goal of improving the quality of coke.

The pre crusher room is equipped with two reversible impact hammer crushers, which are used simultaneously.

The difficult to crush coal such as gas and lean coal transported from the coal yard is absorbed by the iron removal device and enters the pre pulverizer room for pulverization. The pulverized coal is sent to the coal blending bin by belt conveyor; Coking coal, fat coal and other coal that do not require pre crushing can be adjusted

by the electro-hydraulic flap in the primary crusher room and directly sent to the coal blending bin through belt conveyor.

There is also a facility for inspecting the fineness of pulverization at the bottom of the crusher room, sampling and inspecting the coal according to the prescribed system, and replacing the hammer head in time according to the test results to ensure that the fineness of the coal in the oven meets the specified requirements.

The function of the crusher room is to crush the blended coal, so that its crushing fineness (less than 3mm coal content reaches 90% or more) meets the requirements of coking production.

Three reversible impact hammer crushers will be installed in the crusher room; supplied by 2 phases, with two units (1 on and 1 standby) in the first phase; One more unit will be installed in Phase II (2 on and 1 standby).

The blended coal transported from the coal blending bin will have the iron contained removed by the iron removal device, and then enters the reversible impact hammer crusher for mixing and crushing; The pulverized coal loaded into the furnace is transported to the top of the coal tower by belt conveyor.

Coal Tower Top
The coal to be charged from the crusher room is sent to the inside of coal tower by power-driven plough type discharger mounted on belt conveyor for the coke oven production.

1.6.3 Coking System

This project is planned to build coke ovens with annual output of 3 million tons of coke divided into three phases in South Africa. The coke oven uses heat recovery coke oven and coke chamber with coordinated waste heat power generation system and coke quenching system, dry quenching (wet quenching as a backup) is used for quenching coke.

The phase I of this project includes number 1~4 heat recovery coke ovens with annual output of 1 million tons (4×25 ovens), waste heat utilization facilities (with power generation), 1 wet coke quenching system and other supporting facilities, and number 1 - CDQ is reserved.

The phase II of this project includes number 5~8 heat recovery coke ovens with an annual output of another 1 million tons (4×25 ovens), waste heat utilization facilities (with power generation), number 1 and 2 - CDQ.

The phase III of this project includes number 9~12 heat recovery coke oven with an annual output of another 1 million tons (4×25 ovens), waste heat utilization facilities (with power generation), number 3 - CDQ and 2 wet coke quenching system.

Table 7: Basic Process Parameters for Coke-Making (Per/1 million tons/a) – Per Phase

No:	Project	Unit	Parameter
1	Type of Oven		Coke Oven with Heat Transfer
2	No: of Oven	Site x Oven	4 x 25
3	Bulk Density of Charging Coal (Dry)	T	41.1
4	Gross Coking Time of Coke Oven	H	25
5	Annual Operating Days of Coke Oven	D	365
6	Volatilization of Coal Charge (Dry)	%	28
7	Moisture of Coal Charge	%	10
8	Coke Rate	%	74

1.6.3.1 Coke Oven

The heat-exchange and recovery coke oven includes flues, heat-exchange chambers, connecting ducts, heating walls (coking chambers), and oven top; Combusting characterized as a top-down inverted-flame segmented combustion method; Equipped with air preheating unit.

The main structural features are as follows:

- The recovery coke oven preheats air in heat-exchange chambers. In heat-exchange chambers, the air preheating duct and smoke exhaust duct are arranged in layers and the air exchanges heat with adjacent flue gas separately;
- The coke oven has complete flue heating, which is continuous and stable;
- The air ducts of the coke oven are located in partition wall of flues, supplying gas in high section, ensuring uniform high directional heating of the coke oven and reducing NOx emissions;
- The top space of the coking chambers is equipped with raw gas balance ducts, which fully ensures uniform heating of the entire coke oven;
- The flues are located at the bottom of the heat-exchange chambers, above base plate of the coke oven foundation, and adopts a four-part flue form to reduce the system resistance of the flue gas, which facilitates the emissions of flue gas;
- The main parts of the coke oven, such as heating walls, connecting ducts, heat-exchange chambers, flues, are all built with silica bricks, while other parts are built with fire clay bricks, clinker bricks, and insulating bricks.

1.6.3.2 Process Flow for Coke Making

The qualified coal sent by the coal preparation workshop will be charged into the coal tower, and loaded by vibrating feeder before being rammed into the stamped cake. The charging car sends the stamped cake into the coke chamber from the pusher side according to the operation plan. The stamped cake made into coke (the central temperature of the stamped cake is 1000 ± 50°C) by high temperature distillation in a coke chamber. The coke in the coke chamber is rolled out by a coke pusher after matured.

When dry quenching is used, after the coke in the coke chamber is fully matured, it is pushed out by the pusher machine, and the coke is discharged into the coke bucket car through the coke guide machine. The electric locomotive is hauled to the bottom of the lifting derrick at the dry quenching station. The hoist lifts the coke bucket and sends it to the top of the CDQ chamber, and the coke is loaded into the CDQ chamber through the charging device with the distributing bell. In the CDQ chamber, direct heat exchange occurs between the coke and the inert gas. The coke is cooled to less than 200℃, and discharged on the belt conveyor by the coke discharging device, and then sent to coke screening and storage station.

When the CDQ is under maintenance or in case of an accident, the backup wet quenching system is utilized, the mature coke in the coke chamber is then directed into the quenching car by the coke guide machine, the electric locomotive hauls the quenching car with coke into quenching tower for quenching by spraying water at a stationary place, quenched coke is discharged onto coke wharf, after a certain cooling time, the coke is sent to coke screening and storage station.

Crude gas produced in the coke chamber during the process of high temperature carbonization enters the combustion chamber fire flue through the crossing holes at the top, and the waste gas between the coke chambers at different coking times is distributed through the gas balancing passages, making each coke chamber of waste gas evenly distributed. After being preheated by the heat exchange chamber, the air enters the combustion chamber and combusts with the waste gas in stages. The high-temperature flue gas generated drops into the heat exchange chamber, and has indirect heat exchange with air. After heat exchange, flue gas through the flue into the waste gas heat recovery boiler for heat recovery. When the waste gas heat boiler is under maintenance or has failure, the gas will be discharged by the stack through flues.

1.6.3.3 Process Arrangement for Coking

The Phase I and Phase II (2×4×25 ovens heat recovery coke ovens) will be arranged along the same central axis, sequentially designated as 1# to 8# Coke Oven. Each set of 4×25 ovens coke ovens forms one battery, with every two coke ovens sharing one waste heat boiler. A double-curve hopper coal tower is installed on the pusher side of the intermediate platform between the central coke ovens (between numbers 2 and 3, between 6 and 7) of each battery.

The Phase III will construct 4×25 ovens heat recovery coke ovens are located downstream of the Phase II coke ovens, sequentially designated as numbers 9 to 12 Coke Ovens. Every two coke ovens share one waste heat boiler, and a double-curve hopper coal tower is set up on the pusher side of the intermediate platform between the central coke ovens (between numbers 9 and 10) of the battery.

A waste heat boiler is installed between each two coke ovens. The end platforms and are arranged at the left side of numbers 1, 5 and 9 Coke Ovens and the right side of numbers 4, 8 and 12 Coke Ovens. Both the pusher side and coke side of the coke ovens are equipped with operating platforms.

The top floor of coke oven end platform is equipped with a rotary crane. The second floor is arranged some facilities such as a coke oven door repair station, accident coal hopper, a push rod and coal ram testing and replacement station, a guide bar maintenance station, and an electric hoist. A stamping machine replacement station is installed at the end of the coal tower, with a binder preparation room located on its ground floor.

Each set of wet quenching system is installed outside the end platform of number 1 and 12 Coke Ovens, while each set of dry quenching device is arranged outside the end platform of number 4, 5 and 9 Coke Ovens. Transfer cars and coke bucket maintenance stations are provided at three locations: adjacent to the wet quenching system of number 1 Coke Oven, and outside the end platforms of numbers 8 and 9 Coke Ovens.

1.6.3.4 Passenger and Cargo Elevator

For the convenience of inspection and maintenance personnel, a passenger and cargo elevator will be installed outside the structure of CDQ chamber.

1.6.3.5 Traverser and Coke Bucket Maintenance

This project will construct a traverser on the outer side of the newly built number 4 coke oven, number 5 coke oven and number 9 coke oven for storing, replacing, and electrical locomotives, coke bucket cars, and wet quenching coke cars.

Three newly built coke bucket maintenance stations are respectively arranged in the outer area of the traverser for the maintenance of coke buckets. When the coke tank needs maintenance, a car crane will be used to lift the coke bucket to the coke bucket maintenance for maintenance. The repaired coke bucket is still lifted back onto the transport vehicle using a carriage.

1.6.3.6 Water, Solid Waste and Emission Control

One of the characteristics of stamping heat exchange and recovery coke oven is that the heating system will be operated under negative pressure. Therefore, the ovens, covers, doors, and bodies of the coke oven do not leak smoke to the outside.

Because the coke oven adopts segmented air combustion and internal combustion control technologies, the temperature of flue is effectively lowered and no denitrification treatment is required.

Crude gas of the coke oven is burned in the coking process without a chemical recovery and purification system, cannot produce coking water waste.

1.6.4 Wet Quenching System

The Phase I and Phase III will construct a new wet quenching system, located outside the end platforms of number 1 and 12 Coke Oven, responsible for cooling and extinguishing the red-hot coke transported by the quenching car.

Wet quenching is a traditional and common process for rapidly cooling hot coke (~1000°C) after it is pushed from a coke oven, using direct water sprays to prevent combustion and stabilize its structure. The process involves transferring hot coke to

a quenching tower, spraying it with water to cool it down to around 100–150°C, and collecting the cooled product for storage and handling.

Wet quenching will adopt a fixed-point coke quenching car and a new type of coke quenching tower. The wet coke quenching system includes a coke quenching pump room, coke quenching tower, coke quenching spray pipe, water mist capture device, baffle dust removal device, powder coke sedimentation tank and clean water tank, powder coke dewatering platform and double beam grab crane, high-level tank and automatic control system.

The quenching tower is equipped with a rapid quenching device, a water mist capture device, and a baffle dust removal device. The quenching tower is also equipped with a coke splash proof cover. After the quenching car arrives at the fixed position of the quenching tower, the quenching system begins to extinguish the red hot coke for 70-90 seconds, the moisture content of quenched coke is low and stable, while making the particle size of coke more uniform, which can greatly improve the quality of coke.

When the quenching system starts working, the water mist capture system is activated in advance and forms a layer of water mist inside the quenching tower. The large amount of quenching emissions generated during quenching rise sharply under the action of thermal buoyancy and are cooled when passing through the water mist layer formed by the water mist capture system. Part of the dust particles in the steam are washed away, and the rest form condensed droplets with dust particles as the core, which continue to rise with the steam.

There are two layers of baffle plate dust removal devices at the top of the quenching tower. The baffle dust removal device consists of a wooden frame and a dust removal plate. The steam that has been washed and cooled by the water mist capture system continues to rise in the quenching tower, and the velocity of the cooled gas decreases. When passing through the gaps of the baffle dust grid, the condensed liquid droplets with dust particles as the core are electrostatically adsorbed and deposited on the grid through mechanical collision. Finally, the purified steam is discharged into the atmosphere from the outlet of the quenching tower. The coke powder particles attached to the dust removal blades of the dust removal device are regularly sprayed and washed with water.

The steam generated by coke quenching, which contains a large amount of pollutants, is greatly reduced in dust content after being washed with water mist, cooled, gravity settled, and purified by baffle plates.

1.6.5 Coke Dry Quenching Technology (CDQ)

The first phase of this project will involve the construction of the number 1 wet quenching system, with reserved position for the number 1 CDQ. The second phase includes the construction of two sets of number 1 and 2 CDQ units. During normal production, the number 1 CDQ will be paired with the newly built number 1~4 coke ovens in the first phase, while the number 2 CDQ will be paired with the newly built number 5~8 coke ovens in the second phase.

Dry quenching is a process for cooling hot coke from coke ovens using an inert gas, which recovers the heat to generate steam and electricity. This method is an alternative to traditional wet quenching with water and offers benefits such as energy recovery, reduced water consumption, improved coke quality, and a better working environment due to minimal dust and emissions.

In the event of annual maintenance or failure of the number 1 CDQ, number 1~4 coke ovens will utilize the number 1 wet quenching system for quenching. If the number 2 CDQ undergoes annual maintenance or fails, number 1~4 coke ovens will use the number 1 wet quenching system, while number 5~8 coke ovens will switch to the number 1 CDQ for quenching. The third phase involves the construction of the number 2 wet quenching system and the number 3 CDQ, which will be paired with the newly built number 9~12 coke ovens in the third phase. Under normal production conditions, the number 3 CDQ will be used. However, in cases of annual maintenance or failure of the number 3 CDQ, the number 2 wet quenching system will be employed.

Table 9: Basic Process Parameters of CDQ

Item Name		Parameters
Maximum Capacity of CDQ Device		3 x 140t/h CDQ Unit
Rated capacity of each CDQ Device		121.66 t/h
Coke Temperature	Before CDQ	950~1050°C
	After CDQ	≤200°C (Guarantee Value, Water Equivalent Method)
Dry Quenching Time		~2h
Coke Burning Loss Rate		≤1%
Gas/Coke Ration in the Chamber		1280m^3/t Coke
Maximum Flow Capacity of Circulating Gas		200200m^3/h
Rated Flow Capacity of Circulating Gas		173975m^3/h
Temperature of Circulating Gas	Entering CDQ Chamber	~130°C
	Outing CDQ Chamber	880~1000°C
Permitted Maximum Breaking Time of Coke Charging		1h
Intensified Operating Coefficient of CDQ Device		1.1
Operation System of CDQ		350 days/annum, 24 h/day Continuous Operation 15 day/annum annual maintenance No: 1 and 2 CDQ are not inspected at the same time, and the inspection time is staggered

1.6.5.1 Process of CDQ Technology

Coke bucket carriage full of red coke is pulled to the bottom of lifter derrick by the electric locomotive. The crane lift coke bucket to the top of CDQ chamber, and coke will be sent into the CDQ chamber by charging device with distributor. Heat exchange between hot coke and circulating gas will proceed in the CDQ chamber. The coke is cooled to below 200℃, and discharging to belt conveyor by discharging device, then coke will be transported to coke treatment system.

CDQ device is arranged in the outer area of the end of numbers 1, 8 and 9 coke ovens, and the centre line of the coke oven -boiler is perpendicular to the centre line of the coke oven. The hoisting derrick of the coke dry quenching device spans over the track of the coke quenching car, and the crane directly lifts the coke bucket.

The coke dry quenching furnace, primary dust collector, coke dry quenching boiler, secondary dust collector, recirculating fan, heat pipe heat exchanger, etc. of CDQ unit are all closed connected by the circulating gas pipeline, with a short process and compact and reasonable equipment layout.

Table 10: Main Equipment of CDQ (1×140t/h)

No:	Name	Unit	Quantity	Remarks
1	Bucket Carriage	Set	3	2 - Operation 1 - Standby
2	Coke Bucket	Set	3	2 - Operation 1 - Standby
3	Automatic Alignment Device	Set	1	
4	Crane	Set	1	
5	Charging Device	Set	1	
6	Electric Cylinder for Charging Device	Set	1	
7	Blasting Device	Set	1	
8	Pushing Device	Set	1	Including Bulkhead Gate Magnetic Vibration Feeder Rotating Seal Valve Double-Fork Chute
9	Second De-Duster	Set	1	
10	Heat Pipe Exchanger	Set	1	
11	Circulating Fan	Set	1	
12	Motor for Circulating Fan	Set	1	
13	High Temperature Rectangular Compensator	Set	1	
14	Elevator	Set	1	

1.6.5.2 Dry Quenching Process Equipment

The hot coke transportation system will transport the hot coke from the coke chamber to the top of the CDQ chamber, and cooperate with the charging device to charge the red coke into the CDQ chamber. The main equipment includes electrical locomotive, coke bucket car (carriage and coke bucket), automatic positioning system and crane. Coke bucket adopts the method of fixed point coke connection. In order to shorten the operational cycle of electrical locomotive, one electrical locomotive tows two coke bucket cars. The electric locomotive is a traction locomotive, which can meet the operation requirements of dry quenching and wet quenching. In order to ensure the accurate alignment and safe operation of coke truck in lifting derrick, a set of hydraulically driven automatic alignment device is set on the outside of the quenching car track at the CDQ unit. The crane carries out operations such as emptying coke bucket, filling coke bucket, shifting coke bucket in the lifting derrick, and charging hot coke into the CDQ unit.

Coke Bucket and Carriage
The carriage runs on the quenching car track on the coke side of the coke oven and is used to transport hot coke and coke bucket between the coke oven area and the drying quenching station. It is mainly composed of truck frame, wheel group, brake and coke bucket lifting guide track.

The coke bucket is mainly composed of a coke bucket body, a swinging bottom gate and a boom. The coke bucket is composed of a steel frame and cast iron lining. Both sides of the coke bucket are provided with a guide roller for lifting and guiding, and a derrick for lifting the can body is also provided with a link with the bottom brake.

Automatic Positioning System
In order to ensure the accurate alignment and safe operation of coke bucket car in dry quenching station, a set of automatic positioning system driven by hydraulic force is set outside the track of coke quenching car.

Automatic positioning system is mainly composed of alignment device (including clamping device, cylinder and base), hydraulic system (including hydraulic station, pipeline and accessories).

Crane
The crane operates between the ground and the top of the CDQ chamber and is responsible for lifting and transporting coke bucket.

The crane will be a two-storey structure of the bridge crane, with lifting, running, automatic operation and automatic alignment and other functions, by mechanical and electrical parts. The mechanical part is mainly composed of steel structure, lifting mechanism, running mechanism, lifting gear and coke can cover, lubrication device, maintenance electric hoist and manual hoist, safety protection device, cable drag chain, etc. The steel structure mainly includes the main frame of the hoist (frame), the coke can guide frame, the operation room, the mechanical room and the platform, and the ladder. The electrical part of the hoist is mainly composed of the transmission system, the detection system and the control system. Its transmission system usually adopts full digital vector frequency conversion transmission system. For continuous, safe and stable production, the hoist is equipped with a perfect detection and interlock control system. Both ends of the running track are provided with over travel limit switches and windproof anchor chains. The power supply and signal transmission cables are delivered to the elevator through cable drag chains located on the side of the elevator. In order to ensure the safety of the hoisting system to a greater extent, the safety brake for the rope drum of the hoisting machine is added. The brake of the hoisting mechanism of the hoisting machine has the function of automatic brake gap compensation and automatic compensation failure alarm.

The crane is controlled by Programmable Logic Controller (PLC) and monitored in the coke quenching control room. Crane by PLC and other equipment linkage, normal operation, hoist by PLC and other equipment linkage, no driver on the car operation.

CDQ Chamber and CDQ Shell

The CDQ chamber is a tank with circular section, the shell is made of steel plate, and the inner lining is wear-resistant clay brick and heat-insulating brick. In the CDQ chamber, the red hot coke charged from the top exchanges heat in reverse with the cold circulation gas pumped in from the bottom, and the coke temperature reduces from 1000±50℃ to 200℃ below.

The upper part of the CDQ chamber is pre-storing chamber, the middle is a chute, and the lower part is cooling chamber. The top of the CDQ chamber is equipped with a seal tank of chamber roof. The seal tank of chamber roof is made of stamping production process products, and the inner ring is equipped with refractory castable. The annular air duct arranged outside the pre-storing chamber is communicated with the cooling chamber through each ramp, and the outlet of the annular air duct is connected with the inlet of the primary dust collector. The pre-storing chamber is provided with a material level detection device, a pressure measuring device and a release device; Annular air duct is provided with an air inlet device; The cooling chamber is equipped with temperature, pressure measurement and coke oven ovens.

Gas Feeder
The gas feeder will be installed at the bottom of the CDQ chamber, and the cold circulating gas is uniformly supplied to the cooling chamber, and the coke in the feeder can be uniformly dropped.

Charging Device
The charging device adopts a split type and is installed on the platform at the top of the CDQ chamber. It mainly consists of a fixed hopper, dust cover plate, furnace cover, movable hopper, hopper trolley, coke oven cover trolley, transmission mechanism, track frame, fixed coke tank support, guide template and safety railing.

Coke Discharge Equipment
The coke discharge device is located at the bottom of the CDQ chamber, continuously and tightly discharging the coke that has been cooled to below 200℃ in the lower part of the CDQ chamber. It is composed of bulkhead gate, vibration feeder, compensator, intermediate connecting chute, rotary sealing valve, and double-chute hopper and other equipment.

Bulkhead Gate
The bulkhead gate is installed at the bottom outlet of the CDQ chamber. During normal production, the bulkhead gate is fully opened; When the annual maintenance or coke discharge device needs maintenance, close the bulkhead gate to cut off the coke falling from the bottom of the CDQ chamber. The electric head of the bulkhead gate is equipped with travel limit and over torque protection devices. When there is a power outage, the conversion wrench of the electric head of the bulkhead gate is switched from the electric position to the manual position, and manual operation is used.

Vibration Feeder
The vibration feeder is a quantitative discharge device for coke, and the discharge amount of coke can be changed by changing the excitation current. The vibration feeder is composed of a material tank, electromagnetic vibration body, shock absorber, controller, etc. The electromagnetic vibration feeder is equipped with

three operation modes: machine side operation, manual operation in the central control room, and PLC automatic control.

Rotary Sealing Valve
The rotary sealing valve continuously discharges the coke quantitatively discharged from the vibration feeder in a sealed state. The rotary sealing valve normally rotates in the forward direction during production, but when dealing with material jamming accidents, the on-site operation panel is equipped with a reverse rotation function (jog operation). The rotary sealing valve has three operation modes: on-site independent operation, central control room independent operation, and central control room control system linkage operation.

Double-Chute Hopper
The double-chute hopper is a device that sends the coke discharged by the rotating sealing valve to the belt conveyor.

1.6.6 Circulating Gas Transportation System

The equipment of circulating gas transportation system will be arranged between the gas feeder (cold circulation gas inlet) and the circular duct (hot circulation gas outlet) of the CDQ chamber. The main equipment includes a primary de-duster, a secondary de-duster, a circulating fan, and a heat pipe exchanger.

Primary De-Duster
The primary de-duster will be a gravity settling tank type dust removal device used to remove coarse coke powder contained in the circulating gas, in order to reduce wear on the furnace tubes of the dry quenching boiler. A primary de-duster is mainly composed of a shell, a metal support frame, and internal masonry. The shell is welded with steel plates and equipped with brick support plates. The dust collector adopts a gravity settling method with a retaining wall.

Secondary De-Duster
The secondary de-duster adopts a specialized multi tube cyclone separation dust collector suitable for the dry quenching process to further separate the fine coke powder in the circulating gas, reducing the dust content in the gas entering the circulating fan and reducing the wear of coke powder on the blades of the circulating fan, thereby extending the service life of the circulating fan.

The multi tube cyclone secondary de-duster mainly consists of a single cyclone, a cyclone sub (outer sleeve) fixing plate, a guide pipe (inner sleeve) fixing plate, an outer shell, a lower ash hopper, and inlet and outlet variable diameter pipes.

Circulating Fan
The circulating fan installed between the secondary de-duster and the heat pipe exchanger pressurizes the closed-loop circulating gas and continuously sends it into the CDQ chamber for circulation. The circulating fan is mainly composed of the fan body, motor, inlet electric baffle, and detection components. The fan body is composed of an outer shell, lining plate, rotor, and bearings.

Heat Pipe Exchanger
The heat pipe exchanger is installed on the circulating gas pipeline between the outlet of the circulating fan and the inlet of the CDQ chamber. It uses boiler feeding water to exchange heat with the circulating gas, reducing the temperature of the circulating gas entering the CDQ chamber and enhancing its heat transfer effect.

1.6.7 Coke Treatment System

The coke processing system transports the coke after dry or wet quenching, and screens it into different particle sizes according to requirements for storage and transportation.

The coke processing system will be constructed in three phases, and the completion of the third phase can meet the coke production capacity of 3 million tons of coke oven per year.

Process Flow

The coke discharged from the coke table or dry quenching coke oven is transported by a belt conveyor to the coke screening building, which is divided into two stages: <10mm coke powder and ≥ 10mm coke. Among them, <10mm is stored in the coke storage bunker and transported by truck to the designated area. ≥ 10mm coke can be stored and transported out of the coke storage bunker, or transported to the coke yard for outdoor coke yard by an elevated belt conveyor.

The entire system mainly consists of coke platforms, coke screening station, coke storage yard, corresponding belt conveyor corridor, and various transfer stations.

Coke Wharf

The function of the coke table is to cool the mixed coke after wet quenching, drain water, evaporate water, and supplement the remaining red coke quenching. There is one focal table with a length of 54m, an inclination of 28°, and a cooling focal time of ~0.5h. The scraper focusing machine is used to realize the remote control of mechanical focusing. The scraper can evenly scrape the mixed coke sliding off the coke platform to the coke belt conveyor in the coke platform pit and send it to the coke screening building for screening treatment.

Coke Screening Station

The coke screening building is arranged in a double row, and the total storage capacity is about 800t.

The mixed coke transported from the coke wharf or the CDQ is divided into three levels of ≥10mm, and <10mm by the vibrating screen (a total of 2 sets, 1 open 1 spare).

<10mm coke powder is stored in the warehouse and directly transported by car to the designated area through the electro-hydraulic jaw gate at the warehouse entrance ; ≥10mm can be stored in the warehouse or transported to the coke yard by elevated belt conveyor.

Coke Storage Yard

The coke transported by the elevated belt conveyor is stacked orderly in the coke storage yard open coke field, and the auxiliary work of coke stacking and bottom clearing is carried out by the bulldozer.

The total storage capacity of the coke storage yard is about 120000 tons, which will be constructed in two phases. The first phase will have a storage capacity of about 60000 tons, and the second phase will have a storage capacity of about 60000 tons.

Conveyor Belt Corridor

The new belt conveyor will be selected according to the DTⅡ (A) belt conveyor manual. Capacity of the conveyor belt: B=1400mm and Q=400t/h. DT II conveyors are a series of fixed, general-purpose belt conveyors widely used in industries like mining, metallurgy, and construction to transport bulk materials. They are known for high production efficiency, long-distance continuous transportation, and reliability, with components that can be configured for various terrains and delivery requirements. Special versions are available for harsh environments such as extreme temperatures or corrosive conditions.

According to the different use conditions of conveyor belts, two-way rope switch, deviation switch, slip detector, longitudinal tear detector, chute blockage detector and other protection devices will be provided to ensure the safe operation of the system. One electronic weighing scale will be installed on each of the two conveyor belts for CDQ to measure the amount of coke conveyed.

1.6.8 Waste Heat Utilization Facilities

This project utilizes waste heat from heat-recovery coke oven flue gas. The construction will be divided into three phases (Phase I, II, and III). Each phase includes the installation of two 152 t/h ultra-high temperature and ultra-high pressure single-reheat coke oven waste heat boilers, with one waste heat boiler corresponding to every two coke ovens. Additionally, within the scope of Phase I, II, and III, one set of 140 t/h dry quenching (CDQ) system paired with a 73 t/h ultra-high temperature and ultra-high pressure single-reheat CDQ waste heat boiler will be constructed in each phase to recover sensible heat from coke.

The project will involve the construction of three new turbine-generator power stations, with one station built in each phase (Phase I, II, and III). Each station is equipped with two NZK65-13.2/566/566 condensing steam turbines and one QFW-65-2 generator configured for each turbine pair. The generator has a rated power output of 65,000 kW and a rated voltage of 10,500 V – which translates to a combined capacity of 130 000 kW (130 MW) per station.

The main technical parameters of the primary equipment are as follows:

- Coke oven waste heat boiler;
- Dry quenching boiler;
- Steam turbine;
- Generators

Table 11: Technical Parameters of the Primary Equipment

Coke Oven Waste Heat Boiler		**Dry Quenching Boiler**	
Type	Ultra High Temperature, Ultra High Pressure, natural Circulation, Intermediate Reheating, Drum Boiler	Type	Ultra High Temperature, Ultra High Pressure, natural Circulation, Intermediate Reheating, Drum Boiler
Quantity	2 Units – Phase I 2 Units – Phase II 2 Units – Phase III	Quantity	3 Units – One Unit Each for Phase I, Phase II and Phase III
Rated Evaporation of Boiler	152 t/h	Normal Evaporation Capacity of Boiler	63/h

Superheated Steam Pressure	13.8 MPa	Rated Evaporation of Boiler	73/t
Superheated Steam Temperature	570°C	Superheated Steam Pressure	13.8 MPa
Feed Water Temperature	133°C	Superheated Steam Temperature	570°C
Reheat Steam Flow Rate	146.8 t/h	Feed Water Temperature	133°C
Reheat Inlet Steam Pressure	~2.7 MPa	Reheat Steam Flow Rate	70 t/h
Reheat Inlet Steam Temperature	~355°C	Reheat Inlet Steam Pressure	~2.7 MPa
Reheat Outlet Steam Pressure	~2.5 MPa	Reheat Inlet Steam Temperature	~355°C
Reheat Outlet Steam Temperature	570°C	Reheat Outlet Steam Pressure	~2.5 MPa
Normal Boiler Discharge Rate	≤2%	Reheat Outlet Steam	570°C
Overheated Steam Temperature Regulation Method	Feeding Water Spray Cooling	Normal Boiler Discharge Rate	≤2%
Layout Method	Outdoor Layout (with rain shelter)	Overheated Steam Temperature	Feeding Water Spray Cooling
		Layout Method	Outdoor Layout (with rain shelter)

Table 12: Technical Parameters of the Primary Equipment

Steam Turbine		Generators	
Type	Ultra High Temperature, Ultra High Pressure, Intermediate Reheating	Quantity	6 Units – Two Units Each for Phase I, Phase II and Phase III
Quantity	2 Units – Phase I 2 Units – Phase II 2 Units – Phase III	Rated Power	65 MW Per Unit
Rated Power	65 MW Per Unit	Cooling Method	Internal Air Cooling
Rated Steam Temperature	566°C	Power Factor	0.8
Rated Steam Pressure	13.2 MPa	Rated Voltage	10kV
Normal Steam Intake	183.5 t/h	Rated Speed	3000 r/min
Maximum Steam Intake	188.5 t/h	Rated Frequency	50Hz
High Pressure Cylinder Exhaust Low-Temperature Reheat Steam Pressure	~3.0 MPa (a)	Insulation Level	F Level
High Pressure Cylinder Exhaust Low-Temperature Reheat Steam Temperature	~355°C	Excitation Method	Brushless Excitation
High Temperature Reheat Steam Pressure	~2.2 MPa (a)		
High Temperature Reheat Steam Temperature	566°C		

Rated Exhaust Pressure	15 kPa 9a)		
Rated Speed	5000 r/min		
Regenerative System	1 -Deoxygenation 2 - Low-Pressure Heater		
Exhaust Steam Cooling Method	Direct Air Cooling		

1.6.8.1 Design Conditions

The design basis of the coke oven waste heat boiler is the coke oven flue gas parameters. The coke oven flue gas parameters and the boiler outlet flue gas parameters after complete combustion are shown in the table below (the following data is the flue gas volume of a **single boiler**):

Table 13: Coke Oven Flue Gas Parameters

No:	Gas Parameters	Unit	Value
1	H_2	Vol%	~2.97
2	CO	Vol%	~7.05
3	C_nH_m	Vol%	~0.72
4	H_2O	Vol%	~26.66
5	CO_2	Vol%	~3.48
6	N_2	Vol%	~59.095
7	H_2S	Vol%	~0.025
8	Inlet Flue Gas Temperature of Waste Heat Boiler	^oC	1200 $\pm$ 50
9	Inlet Flue Gas Volume of Waste Heat Boiler	Nm^3/h	~180000
10	Dust	Mg/Nm^3	~1500
11	SO_2	Mg/Nm^3	~1200
12	NO_x	Mg/Nm^3	~300

Table 13: Boiler Outlet Flue Gas Parameters

No:	Gas Parameters	Unit	Value
1	O_2	Vol%	~5.2
2	H_2O	Vol%	~19.5
3	CO_2	Vol%	~6.6
4	N_2	Vol%	~68.7
5	Outlet Flue Gas Temperature of Waste Heat Boiler	^oC	180
6	Outlet Gas Volume of Waste Heat Boiler	Nm^3/h	~300000
7	Dust	Mg/Nm^3	~1000
8	SO_2	Mg/Nm^3	~1000
9	NO_x	Mg/Nm^3	$\leq$150

The circulating gas parameters of a single dry quenching boiler are as follows:

Table 15: Circulating Gas Parameters of Dry Quenching Boiler

No:	Gas Parameters	Unit	Value
1	H_2	%	0~2
2	CO	%	3~5
3	O_2	%	0~1
4	H_2O	%	5~7
5	CO_2	%	12~18
6	N_2	%	~67

7	SO_2	Mg/Nm^3	1500
8	Normal Circulating Gas Volume	M^3/h	173974
9	Maximum Circulating Gas Volume	M^3/h	201000
10	Circulating Gas Inlet Temperature	^oC	880~1000
11	Circulating Gas Outlet Temperature	^oC	160~180
12	Circulating Gas Pressure	Pa	1100~1250
13	Dust Concentration in Circulating Gas	g/m^3	$\leq$20

1.6.8.2 Thermal System

The thermal system is based on safe and reliable system operation, high system efficiency, convenient operation and management, and reasonable connection. It is formulated according to the design principles of ultra-high temperature and ultra-high pressure units, and takes into account the operation and regulation characteristics of condensing units.

The main steam pipeline is connected from the outlet of the boiler super-heater header through the regional comprehensive pipe gallery to the main steam valve of the turbine, and then to the high-pressure cylinder of the turbine. The low-temperature reheat steam pipeline is led out from the exhaust port of the high-pressure cylinder of the steam turbine, passes through the high discharge check valve, and then connects to the inlet header of the boiler re-heater through the regional comprehensive pipe gallery. The high-temperature reheat steam pipeline is connected from the outlet header of the boiler re-heater, through the regional comprehensive pipe gallery, to the intermediate pressure cylinder of the steam turbine through the intermediate pressure combined steam valve.

Phase I Main Steam Piping System: The main steam pipelines from the waste heat boilers serving Coke Ovens number 1 and 2 are conveyed through the regional utility corridor to the Phase I turbine-generator station. The main steam pipelines from waste heat boilers for Coke Ovens number 3 and 4 merge with the main steam pipeline from the number 1 CDQ waste heat boiler into a common header within the utility corridor before being delivered to the Phase I station. These two steam lines converge within the power station and are subsequently distributed to the two turbine-generator sets.

Phase II Main Steam Piping System: The main steam pipelines from waste heat boilers serving Coke Ovens number 5 and 6 combine with the pipeline from the number 2 CDQ waste heat boiler into a common header in the utility corridor, then proceed to the Phase II turbine-generator station. The main steam pipelines from Coke Ovens number 7 and 8 are directly routed through the utility corridor to the Phase II station. Both steam lines merge within the station before being divided to feed the two turbine units.

Phase III Main Steam Piping System: The main steam pipelines from waste heat boilers serving Coke Ovens numbers 9-10 and 11-12, along with the pipeline from the number 3 CDQ waste heat boiler, combine into a common header within the utility corridor and are delivered to the Phase III turbine-generator station, where they are distributed to the two turbine sets.

Phase I High-Temperature Reheat Steam Piping System: The high-temperature reheat steam pipelines from the waste heat boilers serving Coke Ovens number 1 and 2 are conveyed through the regional utility corridor to the Phase I turbine-generator

station. The pipelines from waste heat boilers for Coke Ovens number 3 and 4 merge with the high-temperature reheat steam pipeline from the number 1 CDQ waste heat boiler into a common header within the utility corridor before delivery to the Phase I station. These two reheat steam lines converge within the power station and are subsequently distributed to the two turbine-generator sets.

Phase II High-Temperature Reheat Steam Piping System: The high-temperature reheat steam pipelines from waste heat boilers serving Coke Ovens number 5 and 6 combine with the pipeline from the number 2 CDQ waste heat boiler into a common header in the utility corridor, then proceed to the Phase II turbine-generator station. The high-temperature reheat steam pipelines from Coke Ovens number 7 and 8 are directly routed through the utility corridor to the Phase II station. Both reheat steam lines merge within the station before being divided to feed the two turbine units.

Phase III High-Temperature Reheat Steam Piping System: The high-temperature reheat steam pipelines from waste heat boilers serving Coke Ovens number 9-10 and 11-12, along with the pipeline from the number 3 CDQ waste heat boiler, combine into a common header within the utility corridor and are delivered to the Phase III turbine-generator station, where they are distributed to the two turbine sets.

1.6.8.3 Extraction System

The steam turbine is equipped with three stages of non-adjustable extraction steam, which are respectively supplied to the deaerator, No. 2 low-pressure heater, and No. 1 low-pressure heater. Check valves and isolation valves are installed on each section of the extraction pipeline as protective measures to prevent water ingress and over-speed of the turbine.

If no low-pressure steam is available within the plant area, non-regulated extraction steam from the steam turbine shall be utilized. The required low-pressure steam shall be provided by non-regulated extraction steam from the steam turbine.

1.6.8.4 Water Supply System

The water supply system is designed to meet the continuous evaporation demand of both coke oven waste heat boilers and coke dry quenching (CDQ) waste heat boilers. Each turbine-generator power station is equipped with three (3) electric variable-speed water feeding pumps, each with 110% capacity redundancy. The electric water feeding pumps employ variable frequency drive (VFD) speed control, ensuring adaptability to load fluctuations and operational flexibility.

A pump protection valve is installed on the discharge recirculation line of each water feeding pump to ensure the flow rate through the pump always exceeds its minimum allowable flow during. The main water supply pipe adopts a single-header system, with the boiler feed water control station comprising three parallel flow paths : Main Automatic Control Path (100% capacity), Bypass Control Path (50% capacity), Manual Bypass Path (100% capacity).

The main water supply system also provides cooling water spray for the attemperators[1] of the coke oven waste heat boiler and the dry quenching boiler super-heater. The middle tap of the water feeding pump provides cooling water for the boiler re-heater and high-pressure bypass. The low-pressure bypass cooling water is supplied by the condensate pump.

1.6.8.5 Condensate System

The condensate system is designed according to the fully open valve condition (VWO condition) of the steam turbine generator set. Each unit is equipped with two 110% capacity multi-stage condensate water pumps, one in operation and one as backup. Vacuum gate valves and filter screens are installed on the inlet pipeline of the condensate pump, and check valves and globe valves are installed on the outlet pipeline.

1.6.8.6 Heater Drainage System

During normal operation, the low-pressure heater (LPH) drain system operates as a cascading gravity flow system: the drain water from No. 2 LPH flows into No. 1 LPH, while the drain water from No. 1 LPH flows by gravity into the condenser.

1.6.8.7 Colling Water System

The generator air cooler, turbine oil cooler, boiler feed pump, and water-ring vacuum pump are all cooled by circulating cooling water.

1.6.8.8 Air Cooling System

This project adopts a direct air cooling system, with an A-type air cooling island. The design parameters of the air cooling island are determined in accordance with the Hydraulic Design Specification for Thermal Power Plants (DL/T 5339-2018). The design temperature of the air-cooled island is calculated based on typical annual dry bulb temperature statistics, using the weighted average method for years above 5 ℃ and rounding upwards. For temperatures below 5 ℃, it is calculated as 5 ℃; The summer temperature calculation for air-cooled islands is based on the typical annual dry bulb temperature statistical table, and the temperature value for 200 hours is taken. The typical annual dry bulb temperature should be issued by the local meteorological bureau. Due to the inability of the owner to provide local typical annual hourly temperature data (issued by the local meteorological bureau) during the design phase, the estimation will be based on the meteorological data of the surrounding area temporarily. After the owner provides the data, the design will be carried out according to the above principles.

1.6.8.9 Vacuum Pumping System

Each unit is equipped with two 110% capacity water ring vacuum pumps, one in operation and one as backup. When the unit is operating normally, one vacuum pump is in operation and one is standby; When the unit is started, in order to establish vacuum as soon as possible, two vacuum pumps can be started simultaneously. There is a vacuum breaking valve installed on the vacuum pumping pipeline, which is used to quickly break the vacuum and shorten the rotor coasting time in case of unit accidents.

[1] An attemperator is a device used in industrial systems to control steam temperature by injecting water into the steam flow to cool it down.

1.6.8.10 Drainage System

The drainage of the pipeline system enters the drainage expansion tank of the turbine body.

Each boiler will be equipped with continuous discharge flash tanks and regular discharge flash tanks. The continuous sewage is discharged into the continuous sewage expansion tank, and the steam produced by the continuous sewage expansion tank enters the deaerator. The expanded water enters the regular sewage expansion tank, which is equipped with a drainage well. The cooled water is discharged into the factory sewage pipeline network.

1.6.9 Main Plant Layout Design

The main powerhouse layout shall be optimally designed with rational space allocation and smooth process flow. It shall include restroom facilities, necessary maintenance equipment and designated work areas, along with proper ventilation, lighting and drainage systems to ensure safe unit operation and maintenance while providing a favourable working environment. External fire escape staircases shall be installed for the main powerhouse.

1.6.9.1 Turbine-Generator Power Station Layout

The turbine bay is designed with a 26m span and two-level layout. All turbine-generator units are installed on independent island platforms, with the operating level at +8.00m elevation. An auxiliary platform is provided at the steam inlet end, featuring two levels at +8.00m and +4.00m elevations respectively, to support equipment installation and maintenance access. The design ensures structural independence while providing comprehensive operational accessibility.

1.6.9.2 Deoxygenation Span Layout

The deoxygenation span is 10m and arranged in 5 layers. An indoor enclosed staircase will be installed at the fixed end, which can reach the various floors and roofs of the deoxygenation span. The deoxygenation layer is arranged outdoors.

1.6.9.3 Boiler Layout

The project will be constructed in three phases, with each phase comprising 4×25 heat recovery coke ovens and correspondingly equipped with 2 waste heat boilers. The waste heat boilers are arranged adjacent to the heat recovery coke ovens, specifically positioned between two coke ovens on the intermediate platform. Each phase includes a set of coke dry quenching (CDQ) equipment with a processing capacity of 140 t/h, along with an associated CDQ waste heat boiler located at the end platform of the coke oven battery.

1.6.10 De-Sulfurization System

This system will be designed to desulfurize and de-dust the coke oven flue gas that has already utilized the waste heat in the waste heat boiler, so as to meet the emission standards required by national environmental protection regulations. The system will be constructed in three phases. In each phase, 2 sets of flue gas desulfurization devices will be built. Each set of desulfurization device is corresponding to treating the flue gas from 1 waste heat boiler for exhaust gas and 1 set of coke dry quenching device. One digestion station will be built in the first phase, and one digestion station will be built in the second phase and shared with the third phase.

Table 16: Design Parameters of Flue Gas Desulfurization System

Item	Parameter	Remarks
Flue Gas Processing Capacity	625500Nm^3/h - (standard state)	Phase I
	625500Nm^3/h - (standard state)	Phase II
	625500Nm^3/h - (standard state)	Phase III
Flue Gas Inlet Temperature	180 ℃	
Flue Gas Inlet Pressure	~2500 Pa	
Flue Gas Inlet SO_2 Concentration	1000mg/m^3 (standard state)	
Flue Gas Inlet Particulate Matter Concentration	1100mg/m^3 (standard state)	
SO_2 Emission Concentration	≤ 200 mg/m^3 (standard state)	
Particulate Matter Emission Concentration	≤ 30 mg/m^3 (standard state)	
Raw Material CaO	Content＞80% Moisture Content≤1.5% Activity T60≤4min	

Regular flue gas desulfurization schemes include wet desulfurization, semi - dry desulfurization and dry desulfurization.

1.6.10.1 Wet Desulfurization

Wet desulfurization mainly uses limestone - gypsum slurry to wash the flue gas, making it react with sulfur elements. Its process is usually more complex. Wet desulfurization usually has a high desulfurization efficiency, which can be as high as 95% - 99%. It can well adapt to the large - scale changes in working conditions such as flue gas volume, sulfur dioxide concentration and temperature. However, it has large initial investment, high operation cost, serious equipment corrosion, and there is a problem of wastewater treatment.

Wet desulfurization is suitable for occasions with large flue gas volume and high requirements for desulfurization efficiency.

1.6.10.2 Dry Desulfurization

Dry desulfurization is a process in which the flue gas remains in a dry state throughout the desulfurization process. In dry desulfurization, lime and other substances are usually used as desulfurization absorbents, and the desulfurization treatment is carried out in the form of spraying, and its equipment is relatively simple. The cost of dry desulfurization is relatively low, and it has little environmental pollution and will not produce wastewater discharge. However, its desulfurization efficiency is relatively low, often around 80%. Dry desulfurization is suitable for occasions with small flue gas volume and low requirements for desulfurization efficiency.

1.6.10.3 Semi-Dry Desulfurization

Semi-dry desulfurization technology is a highly efficient desulfurization process developed on the basis of dry and wet desulfurization technologies. Desulfurizing agents such as lime powder are made into slurry and sprayed into the absorption tower. At the same time, an appropriate amount of water is sprayed into the tower

to keep the slurry in a semi - dry state. The desulfurizing agent reacts chemically with sulfur dioxide in the flue gas to form substances such as calcium sulfite and calcium sulfate, so as to achieve the purpose of desulfurization. The desulfurization efficiency can reach 90% - 95%, which can effectively reduce the emission concentration of sulfur dioxide in the flue gas and meet the strict environmental protection requirements. The system is relatively simple, and the equipment investment cost is between that of the wet method and the dry method.

1.6.11 Laboratory

The engineering laboratory is divided into central laboratory and waste heat utilization system laboratory, which are located in the same independent building. The main task of the central laboratory will be to conduct quality inspection of various materials, semi-finished products and finished products in the coal preparation workshop, coking workshop facilities and auxiliary production facilities, and conduct intermediate control analysis with the production equipment. Physical methods, chemical analysis and other means to identify various raw materials, products of various indicators.

The main task of the laboratory of the waste heat utilization system of this project will be to analyze and test the water, steam and lubricating oil of the turbine power station of the waste heat utilization system.

1.6.12 Access Roads and Transportation

The transportation of raw materials coal, chemicals, spare parts and spare parts as well as the transportation of product coke, dust dust and industrial waste are all carried by road. Spare parts, chemical reagents, industrial waste and daily office supplies will also be transported by road.

Bulk materials (raw coal, coke) in the plant will be mainly transported by conveyor belts, and liquid and gaseous materials will be transported by pipeline.

Taking into account the needs of production, fire protection, and maintenance, the road in the factory will be arranged in two forms of ring and end, and the road is set up according to the road use and the size of the traffic flow. The road yard is 12.0m, 9.0m, and the return yard is set up in the ash bin where the material is loaded and unloaded.

1.6.13 Water Supply and Drainage

The water supply and drainage system shall be equipped with the production water supply system, fire-fighting water supply system, domestic water supply system, circulating water system, production drainage system, domestic drainage system.

The water required for the project comprise of groundwater, reservoir water and treated industrial water sources.

1.6.13.1 Water Source

The domestic water will be mainly supplied from ground water sources on the farms Boas and/or Martha. The production water and fire water supply water sources will be provided by the plant's water source system. Plant water and fire-fighting water will be supplied by new construction of process and fire water pump station.

Circulating water will be supplied by new construction of circulating water pumping station.

1.6.13.2 Water Quality

The quality of production water should meet the South African water quality indicators and standards for agriculture/industrial use, and the quality of domestic water should also meet the water quality indicators and standards in South Africa and outlined by the Department of Water and Sanitation (DWS).

Table 17: Baseline DWS Chemical Water Quality Guidelines: Agriculture and Domestic Use Water Quality Limits

Water Parameters	Units	Domestic Limits	Agricultural Limits
pH	pH unit	6.0 - 9.0	6.5 - 8.4
Temperature	^{o}C	6 - 25	10 - 30
Alkalinity ($CaCO_3$)	Mg/L	20 - 200	20 - 200
Aluminium (Al)	Mg/L	0 - >0.5	≤5.0 – 20>
Ammonia (NH_4)	Mg/L	0 - ≤ 1.5	0 - 5
Antimony (Sb)	Mg/L	-	-
Arsenic (As)	Mg/L	0 - 10	<0.1 - >2
Barium (Ba)	Mg/L	-	-
Boron (B)	Mg/L	-	<0.5 - >15
Cadmium (Cd)	Mg/L	0 - 10	≤0.01 – >0.05
Calcium (Ca)	Mg/L	0 - 80	-
Calcium Hardness	Mg/L	-	-
Chloride (Cl)	Mg/L	0 - 200	≤100 - 175
Chromium (Cr)	Mg/L	0 – 0.05	≤ 0.10 – >1.0
Copper (Cu)	Mg/L	0 - 30	≤ 0.2 - > 5.0
Dissolved Oxygen (DO)	Mg/L	-	-
Electrical Conductivity(EC)	mS/m	<450	<75 - <150
Fluoride (F)	Mg/L	0 – 1.5	≤ 2.0 - > 15.0
Iron (Fe)	Mg/L	0 - 1	≤ 5.0 - > 20.0
Lead (Pb)	Mg/L	0 - 10	≤ 0.2 - > 2.0
Magnesium (Mg)	Mg/L	0 - 50	-
Magnesium Hardness	Mg/L	-	-
Manganese (Mn)	Mg/L	0 – 0.15	≤ 0.02 - > 10.0
Mercury (Hg)	Mg/L	0 - 0.006	0 – 0.01
Nickel (Ni)	Mg/L	-	≤ 0.20 - > 2.0
Nitrate (NO_3)	Mg/L	0 - 6	-
Nitrites (NO_2)	Mg/L	0 – 0.9	0 - 40
Phosphate (PO_4)	Mg/L	0 - 1	<0.05 – 0.03
Potassium (K)	Mg/L	0 - 50	-
Selenium (Se)	Mg/L	0 - 20	≤ 0.02 - > 0.05
Sodium (Na)	Mg/L	0 - 100	≤ 70
Sulphate (SO_4)	Mg/L	0 - 200	-
Total Dissolved Solids (TDS)	Mg/L	0 - 450	≤ 40 - 90

Total Hardness ($CaCO_3$)	Mg/L	0 - 100	-
Uranium (U)	Mg/L	-	≤ 0.01 - > 0.10
Total Suspended Solids (TSS)	Mg/L	0 - 30	0 - 150
Turbidity (NTU)	NTU		
Zinc (Zn)	Mg/L	0 - 3	≤ 1.0 - > 5.0

Table 18: Baseline DWS Biological Water Quality Guidelines: Agriculture and Domestic Use Water Quality Limits

		Water Parameters		
		Heterotrophic Plate Count	Total Coliform	E.coli
Units		**Cfu/ml**	**MPN/100ml**	**MPN/100ml**
Agricultural Limit		**-**	**<1000**	**1 - 1000**
Domestic Limit		**1 - 100**	**0 - 5**	**0**

1.6.14 Plant Water System

Production water will be mainly used for wet quenching coke water, blowdown pit cooling water for waste heat boiler, water for desulfurization and dust removal system, demineralized water station process water, circulating water replenishment, and steam turbine power station circulating water accident.

Construction of 1000,000 ton/annum heat recovery coke oven (Phase I), using dry quenching as primary method with wet quenching as backup for coke cooling. The total new water consumption: 136.70m^3/h (CDQ operation). Waste heat recovery boiler feeding water: 4.0 m^3/h; demineralized water (DM) plant consumption: 41.7 m^3/h; circulating water system make-up: 42.0 m^3/h; CDQ boiler feeding water: 1.0 m^3/h; flue gas treatment system water: 48.0 m^3/h. This water consumption translates to approximately 1 181 088 m^3/annum.

The total new water consumption: 248.50m^3/h (wet quenching). Waste heat recovery boiler feeding water: 4.0 m^3/h; demineralized water (DM) plant consumption: 41.7 m^3/h; circulating water system make-up: 41.50 m^3/h; flue gas treatment system water: 48.0 m3/h; wet quenching water:113.3 m^3/h.

Construction of 2000,000 tons/annum heat recovery coke oven (Phase II), using full dry quenching. When the CDQ is maintenance, use wet coke quenching in reserve. The total new water consumption: 273.4m^3/h (CDQ operation). Waste heat recovery boiler feeding water: 8.0 m^3/h; demineralized water (DM) plant consumption: 83.4 m^3/h; CDQ boiler feeding water: 2.0 m^3/h; circulating water system make-up: 84.0 m^3/h; flue gas treatment system water: 96.0 m^3/h. This water consumption translates to approximately 2 352 176 m^3/annum.

The total new water consumption: 342.7m^3/h (wet quenching). wet quenching water:113.3 m^3/h; waste heat recovery boiler feeding water: 8.0 m^3/h; demineralized water (DM) plant consumption: 83.4 m^3/h; circulating water system make-up: 42.0 m^3/h; flue gas treatment system water: 96.0 m^3/h.

1.6.15 Fire Fighting Water System

The firefighting system serves outdoor fire hydrants and indoor fire hydrants, with a total fire water flow rate of 30 L/s. Fire hydrants will be installed outdoors, and indoor fire hydrants will be provided inside the turbine-generator building. The fire water supply pipeline will be connected to the newly constructed fire pump station.

Above-ground fire hydrants will be installed outdoors, and the fire hydrants should be laid along the edge of the road no more than 5 meters. The distance between outdoor fire hydrants should not exceed 120 m. On the premise of ensuring that the protection radius will be no more than 120 m.

All buildings will be equipped with fire extinguishers meeting RSA regulatory requirements.

1.6.16 Drinking Water System

The domestic water will be supplied from ground water sources on the farm Boas and/or Martha and connected to a domestic water supply network. The domestic water will be mainly used for auxiliary production and the users of toilets and laboratories in the administrative welfare facilities. The daily water consumption will be 38.31 m^3/d, and the maximum is 11.39 m^3/h. The water supply pressure is 0.35MPa.

1.6.17 Recirculating Water System

During the operation of the circulating water system, the salt in the circulating water will continue to concentrate. In order to maintain the normal operation of the system, the system needs to carry blowdown. The concentration ratio of circulating cooling water will be designed according to 5. The circulating cooling water system shall be designed with water reuse rate ≥ 98%. In order to ensure the quality of circulating water and prevent scaling and corrosion of equipment and pipelines, the system is also equipped with a side filter system, and the backwash water of the side filter equipment is discharged into the production drainage network of the plant.

The total circulating water for the construction of 1000,000 tons/annum heat recovery coke oven (Phase I) will be 2458m^3/h, when the coke uses dry quenching. The steam turbine power station: 2374m^3/h, coal loading de-dusting ground station: 3 m^3/h coke oven side dust removal ground station: 3 m^3/h, coke screening de-dusting ground station: 3m^3/h; flue gas treatment system water: 96.0 m^3/h; CDQ 25 m^3/h; online steam-water monitoring 20 m^3/h.

The total circulating water for the construction of 2000,000 t/a heat recovery coke oven (Phase II) will be 4916m^3/h, when the coke uses dry quenching. The steam turbine power station: 4748m^3/h, coal loading de-dusting ground station: 6 m^3/h coke oven side dust removal ground station: 6 m^3/h, coke screening de-dusting ground station: 6m^3/h; flue gas treatment system water: 60.0 m^3/h; CDQ 50 m^3/h; online steam-water monitoring 40 m^3/h.

The total circulating water for the construction of 3000,000 t/a heat recovery coke oven (Phase III) will be 7374m^3/h, when the coke uses dry quenching. The steam turbine power station: 7122m^3/h, coal loading de-dusting ground station: 9 m^3/h

coke oven side dust removal ground station: 9 m^3/h, coke screening de-dusting ground station: 9m^3/h; flue gas treatment system water: 90.0 m^3/h; CDQ 75 m^3/h; online steam-water monitoring 60 m^3/h.

The project's three phases (I - III) will include identical configurations: ground-level pump stations, 2,500 m^3/h mechanical draft cooling towers (counter-flow, reinforced concrete), and outdoor pump/filter arrays protected by rain shelters. Chemical dosing systems are enclosed within indoor facilities.

The water lost by evaporation, wind blowing and leakage in the system is automatically replenished according to the water level of the circulating pool. The replenishment water of 1000,000 t/a heat recovery coke oven is 42m^3/h, when the coke uses dry quenching. When the coke uses wet quenching, the make-up water is 41.5 m^3/h. The water supply of 2000,000 t/a heat recovery coke oven is 83m^3/h during dry quenching and 84m^3/h during wet quenching. The water supply of 3000,000 t/a heat recovery coke oven is 124.5m^3/h during dry quenching and 126m^3/h during wet quenching.

1.6.18 Ventilation and Dust Removal

To eliminate heat dissipation in the production workshop and ensure air circulation, measures such as natural ventilation and mechanical ventilation are designed; For some production workshops containing explosive gases and dust, accident ventilation will be designed to reduce the concentration of harmful gases indoors and improve the environment in the operating area through ventilation and air exchange.

Coal emits a large amount of coal dust during the process of crushing and crushing; Coke ovens emit a large amount of smoke and dust during the process of coal loading and discharging; A large amount of smoke and dust is emitted during the coke loading and discharging process of the dry quenching furnace; Dust removal and purification are carried out on the main dust producing points, and the purified flue gas is discharged into the atmosphere through the chimney.

Table 19: Emission Allowance（mg/m^3）

Station	Particulate Matter Mg/m^3	SO_2 Mg/m^3
Coal loading and dust removal ground station	≤30	
Coke and dust removal ground station	≤30	
CDQ dust removal ground station	≤30	≤200
Pre-Crushing Room Dust Removal Ground Station	≤30	
Coke Screening Building Dust Removal Ground Station (including C103 & C104 Transfer Stations)	≤30	
Coke Transfer Station Dust Removal Ground Station	≤30	

The dust removal design of this project is divided into multiple sets of dust removal systems in the following table according to different process sections, materials and production processes to control dust escape at various dust producing points.

Table 20: Design Parameters of the Dust Removal Systems

Station	Air Volume (m^3/h)	Filter Area (m^2)	Main Motor Power (kW)	Diameter of Discharge (mm)	Height of Discharge Outlet (m)	Dust Process and Quantity
Coal loading and dust removal ground station	120000 (80°C)	2316	315	1700	30	Wetting & Stirring (3)
Coke and dust removal ground station	385000 (80°C)	7720	1000	2800	30	Wetting & Stirring (3)
CDQ dust removal ground station	14000 (110°C)	3088	355	1700	30	Wetting & Stirring (3)
Pre-Crushing Room Dust Removal Ground Station	73600	1544	185	1200	30	Return to Process Belt (1)
Crushing Room Dust Removal Ground Station	78000	1544	185	1200	30	Return to Process Belt (1)
Coke Screening Building Dust Removal Ground Station (including C103 & C104 Transfer Stations)	255200	6176	630	2200	30	Wetting & Stirring (3)
C101/C102/C301 Coke Transfer Station Dust Removal Ground Station	26400	579	55	720	25	3
（C302 & C303 Coke Transfer Station Dust Removal Ground Station）	52800	1158	132	1200	30	Wetting & Stirring (1)
Primary and secondary dust powder collecting storage and transportation system	-	-	-	-	-	Wetting & Stirring (3)

1.6.19 Electrical Designs

The electrical design of this project includes power supply and distribution, power generation, electrical transmission, electrical lighting, lightning protection and grounding of production and auxiliary facilities within the scope of the project.

The main load classification of this project is as follows:

The particularly important load (emergency load) in the first grade load: 0.38kV fire pumps, PLC / DCS computer control system, automatic fire alarm system, emergency illumination.

First grade load: coal coke pushing car, coke blocking car, coal loading car, coke quenching car, hoist, boiler feed water pump, combustion fan, power generation circulating water pump, water ring vacuum pump, power generation condensate pump.

Second grade load: coal preparation, coke screening, coke oven, coke quenching, compressed air station, dust removal system, power station, and demineralized water station.

Third grade load: auxiliary production equipment and office and living auxiliary facilities in addition to the above-mentioned first and second-level loads.

A new 132 kV step-up station is built in this project, built in three phases. Two 132kV power sources are provided by the superior substation, and the owner is responsible for delivering them to the booster station.

This project will construct a new 132 kV switching station in three phases, ultimately meeting the power supply and distribution requirements for a 3.0 million tons/annum coke ovens and the entire industrial park. The public electrical equipment and facilities for the first, second, and third phases of the 132 kV switching station will be built in one go during the construction of the first phase.

1.6.20 Power Generation

The waste heat boilers of the first, the second, the third coke oven systems will each equipped with a steam turbine power station, each steam turbine power station and two 10kV and 65MW steam turbine generator sets will be installed. Each generator will be converted to 132kV through the boost voltage, and each132kV cable connection line is connected to the grid to the different 132kV bus of the boost station.

Table 21: Electric Energy Balance

Item	Electricity Quantity ($x10^6$kW h)		
	Phase I	Phase II	Phase III
Annual Electricity Consumption	98.3	71.539	66.207
Annual Electricity Generation	1027.6	1027.6	1027.6
Annual Electricity Transmission	929.3	956.061	961.393

It is concluded from the electric energy balance table that the electric energy generated by the project in this period still needs to be transmitted after the power consumption of the HRCP.

1.6.21 Noise

The noise generated in this project will be caused by mechanical impact, friction, rotation and other movements, as well as aerodynamic noise caused by the

fluctuation of airflow or aerodynamic forces. The main sources of noise include: crusher, vibrating screen, axial flow ventilation unit, air compressor, CDQ circulating fan and circulating gas outlet, dust removal fan, desulfurization induced draft fans, fluidized fans, waste gas and waste heat boiler, safety valve outlet pipe and turbine body of CDQ boiler, steam outlet and various pumps. In general, before taking noise control measures, the intensity of each major noise source is greater than 85dB (A).

The control of noise in this project mainly adopts a combination of controlling the noise source and isolating the transmission path of noise. Low noise equipment will be selected as much as possible, and noise will be controlled from the sound source through methods such as noise reduction, vibration isolation, and vibration reduction; Adopting measures such as sound insulation, absorption, and greening to reduce noise in the transmission path, in order to control the impact of noise on the surrounding area of the factory boundary. The control measures taken are as follows:

- On the premise of meeting the process design requirements, try to choose low-noise models of equipment.
- Silencers are installed on the exhaust pipes of dust removal fans, circulating fans, desulfurization induced draft fans, fluidized fans, waste heat boilers, and CDQ boilers.
- Soundproof doors and Windows are used in the operation room near the sound source for the production plant with large noise.
- In order to prevent noise pollution caused by vibration, independent foundations will be set up for the crusher, circulating fan, each dust removal fan, desulfurization induced draft fans, fluidized fans and pump to achieve vibration reduction; Flexible connection method will be adopted between the strong vibration equipment and the pipeline.

1.6.22 Waste Management, Pollution Control and Compliance Standards

Pollutants control will be started from the source of the process. Coke Oven operation will be negative pressure so that the coking process can achieve no smoke leakage.

There are no complicated gas purification processes, and no waste water with chemical pollution components, which solves the problem of waste water pollution control to achieve real clean production. The use of advanced stamp-charging technology will increase density of coal, the intensity of produced coke. It is a wide carbonizing chamber coke oven, which is not only easy to push coke, improve coke quality, extend the life of coke oven, but also reduce the number of coke oven pushing, reduce mechanical wear and pollution.

Most of gas generated in the coking production is burned, except for being used for the coke oven heating, the rest of the heat is recovered for power generation, realizing the comprehensive utilization of resources. The proposed HRCP project will use advanced, reliable and environmentally friendly process technology to produce high-quality metallurgical coke, and the generated high temperature flue gas is used for power generation. The project has strong profitability and solvency, and has good environmental and social benefits.

1.6.22.1 Waste Gas

The pollutants emitted into the atmosphere by the coking system will mainly including particulate matter, SO_2 and Nitrogen oxides.

In order to control pollution in the coke oven system, main measures to be taken are as follows:

1.6.22.2 Coke Ovens

The coking process does not emit unorganized exhaust gas, and the stamping heat exchange heat recovery coke oven is a negative pressure production operation to avoid smoke leakage from the furnace ovens, covers, doors, and body of the coke oven.

The heat exchange heat recovery coke oven adopts air segmented combustion and furnace combustion control technology, which has good temperature uniformity in the furnace, low flue temperature, and reduces the NOx content in the flue gas.

The coke oven flue gas after waste heat recovery by the boiler passes through a CFB semi-dry desulfurization tower and a rotary blowing bag filter to remove SO_2 and particulate matter in the flue gas. After being purified, the waste gas will be discharged into the atmosphere.

After taking the above pollution control measures, the total dust concentration emitted from the coke oven chimney will be ≤80mg/m^3, carbon monoxide concentration is ≤ 50mg/m^3. The concentration of SO_2 is ≤ 200mg/m^3, and the concentration of particulate matter is ≤ 30mg/m^3.

After the coal charging car is located in the carbonization chamber where coal is to be loaded, the flue gas hood of the coal charging car will be used to collect the dust escaping above the push-side coke oven door and guide it to the sealed filters main pipeline of the coal loading belt. At the same time, the signal will be sent to the ground dust removal system. The fan runs from low speed to high speed, and the flue gas from the stove head will be inhaled from the flue gas removal hood. After being purified by the pulse bag filter at the ground station through the dust removal connection pipeline, it is discharged into the atmosphere through the chimney by the ventilation fan.

After the second alignment of the coke pusher, a signal will be sent to the ground dust removal system 30 seconds before the coke pusher rod is moved, and the fan runs from low speed to high speed. Then push the coke pusher rod to push the coke, and a large number of intermittent dust generated during coke discharge will be collected into the large suction hood of the coke stopper under the action of the thermal buoyancy of the flue gas and dust and the fan. Through the interface valve, the dust is introduced into the dust removal main pipeline, sent into the regenerative heat exchanger for cooling and primary separation, and then finally purified into the atmosphere by the bag filters. After the coke is discharged, the ground dust removal system receives the signal, and the fan is switched to low speed operation.

After implementing the aforementioned pollution control measures, the total dust emission concentrations from the Coal Charging Dust Removal Ground Station, Coke Discharging Dust Removal Ground Station, and Dry Coke Quenching Environmental Dust Removal Ground Station are ≤30mg/m^3.

1.6.22.3 Quenching System

The main air pollutants emitted from the dry quenching coke system are particulate matter. The main pollution sources generating these pollutants, which are the coke charging port of the dry quenching furnace, the vent of the top pre-storage chamber of the dry quenching furnace, the vent of the circulating fan, the ash discharge port of the flat gate, the bottom double-slope chute of the dry quenching furnace, and the coke discharging drop point.

The high-temperature flue gas containing flammable and explosive gases, as well as sparks, generated at the coke charging port of the dry quenching furnace top cover, the pre-venting port, and the post-circulating fan vent port (standby bypass) will be directed to the upper section of a regenerative cooler for temperature reduction. The gas containing high-concentration coke dust from the coke discharge chute and discharge drop points at the bottom of the dry quenching furnace will be introduced to the lower section of the regenerative cooler, where it will be mixed with the cooled flue gas. Subsequently, the flue gas with a temperature below 110°C is sent to a pulse bag filter for purification. The purified gas will then be discharged into the atmosphere via a fan and chimney, with the dust concentration at the chimney outlet not exceeding 30 mg/Nm^3. The flue gas generated at the post-circulating fan vent port, classified as high-sulfur flue gas, is routed to the coke oven desulfurization system for desulfurization and dust removal treatment before being emitted through the coke oven chimney.

1.6.22.4 Waste Water

The wastewater from this project can be divided into two categories, namely production drainage and domestic sewage.

Production drainage: sourced from circulating water system wastewater and filter backwash water, desalination water station wastewater, and boiler wastewater. The water quality contains less of other pollutants except for a slight increase in water temperature and a small amount of suspended solids.

Domestic sewage: mainly comes from the drainage of toilets in the factory. The amount of domestic sewage is relatively small and generally contains CODCr BOD5[2], Pollutants such as ammonia nitrogen and suspended solids.

This project will be equipped with a diversion drainage system, which is divided into production drainage system and domestic drainage system. In order to prevent water pollution, the process and facilities used in the project are of non-polluting or light polluting process, and corresponding treatment measures are taken for the wastewater inevitably discharged from the process. The principle of separating clean and dirty water will be adopted for the discharged production wastewater,

[2] The BOD5/COD ratio indicates the biodegradability of a water sample, where BOD5 is the 5-day biological oxygen demand and COD is the chemical oxygen demand

aiming to improve the reuse rate of water as much as possible and reduce the external discharge of sewage.

A new sewage treatment plant (STP) or various package treatment plants will be constructed that will accommodate the peak sewer flow that would be generated from the proposed development. The desired STP storage volume will be calculated once the peak sewerage discharge has been determined and confirmed.

1.6.22.5 Solid Waste

The solid waste generated in this project is mainly waste residue, which includes the following types:

The coal dust and coke dust recovered by each dust removal system; The desulfurization waste ash recovered by the flue gas desulfurization system; Domestic waste generated within the factory.

In order to prevent pollution caused by solid waste, comprehensive utilization of solid waste is carried out to turn waste into treasure. The measures taken are as follows:

The dust collected by the dry coke quenching environmental dust removal ground station will be transported via scraper conveyors to ash storage silos for temporary storage, and then periodically removed off-site after treatment by dust humidifying mixers.

The dust collected by the first and second dust collectors in the CDQ process will be collected and falls into the heat-resistant scraper conveyor. It then enters the bucket elevator and will be sent to a dedicated dust storage bin. After being humidified by a humidification mixer, it is regularly transported by car.

The dust collected by the dust collectors of the coke oven charging de-dusting system and coke pushing de-dusting system will be transported by a scraper conveyor to an ash silo for storage, and then periodically removed and transported externally after being humidified and mixed in a mixer.
The desulfurization waste ash generated by the flue gas desulfurization system will be collected in the waste ash storage. It can be used as raw materials for making bricks, concrete, etc. and is transported out regularly.

Each household waste will first be dumped into the designated garbage bin, and then regularly transported by garbage trucks to the garbage factory for unified treatment.

1.6.23 Capital Investment and Labour Estimates

The staffing quota for this project will be formulated in accordance with the relevant provisions of the Labour and Labour Safety Industry Standard of the Republic of South Africa. The scope of staffing includes production personnel, management and service personnel in coal preparation unit, coking unit, Screening and coke transportation system, CDQ system, and auxiliary production facilities.

Table 22: Proposed Staffing Quota

Project Phase	Management Personnel	Production Personnel	Total Staff Compliment
Phase I	43	315	358
Phase II	31	225	256
Phase III	31	229	260
TOTAL	**105**	**769**	**874**

Management personnel will be required to have a college degree or above and a technical title of assistant engineer or above. Management personnel from departments such as production, technology, equipment, operation, and automatic control will be sent to similar domestic enterprises that have already been put into operation for on-site training.

Production personnel will be required to have a high school education level. Training for production, maintenance, automatic control and other production technology backbone to similar domestic enterprises that have already been put into operation requires specialized training for 2-6 months. The personnel will be required to undergo technical assessment before taking up their positions with a certificate of qualification.

The main contents of technical training include production management training, application training of key technologies, operation and maintenance training of key equipment, quality control training, and safety training. The training objects include production workers, technicians and management personnel. Specific training measures:

- Organize theoretical knowledge learning to improve the level of cultural knowledge of the staff.

- Organize all kinds of new personnel for local training before the project is put into operation, and organize the assessment before taking-up the post, and select the best ones.

- Invite experts with practical experience to teach technology on site. Arrange technical personnel with practical experience to give lessons to workers in different positions to improve the professional quality of all staff.

- Equipment providers need to be responsible for the training for key positions.

Table 23: Capital Investment Estimates

Project Phase	Construction Investment	Working Capital	Operating Income
Phase I	R3. 729 Billion	R276.78 Million	R7.221 Billion
Phase II	R3.079 Billion	R261.46 Million	R7.255 Billion
Phase III	R3.175 Billion	R262.65 Million	R7.262 Billion

1.6.24 Energy Saving Options

- Reasonable layout, optimize the connection between the production process and process, adopt advanced energy saving and emission reduction, clean production technology, and minimize energy consumption.

- According to the load capacity, power supply distance and distribution, and electrical equipment characteristics, rationally design the power supply and distribution system and select the power supply voltage; the substation shall be as close to the load centre as possible to shorten the distribution radius and reduce the line loss.

- According to the different requirements of the production process for water quantity, water pressure, water quality and water temperature, design a more reasonable water use process, stabilize the water quality of circulating water, use water-saving equipment as far as possible, reasonably control the concentration ratio of circulating water, and improve the reuse rate.

- The use of new water transmission pipe, eliminate the traditional cast iron pipe and galvanized pipe, in order to better achieve the pipeline does not leak, easy to operate and monitoring.

1.6.25 Stormwater Drainage

The stormwater drainage of the site will be designed in accordance with the the Stormwater Management Best Practice Guideline by the Department of Water and sanitation (DWS). It is anticipated that stormwater from road carriageways and other impervious areas will be attenuated so that the post development flows do not exceed the pre-development flows for both 1 in 5-year and 1 in 25-year return periods. Therefore, on-site attenuation needs to be provided and the outflow from the required structures will discharge to the surface.

Plate 2: Kinetic Mining Development – SA Coke and Heat Recovery Plants Sites

1.7 Policy and Legislative Framework

The following laws, regulations and documents in the table below have relevance to this coke and heat recovery plants project:

Table 25: Legislative Framework

Name	Overview	Permits/Licenses	Compliance	Administering Authority
Minerals and Petroleum Resources Development Act, (Act 28 of 2002)	This Act regulates the prospecting for and optimal exploitation, processing and utilization of minerals. The Act provides for the safety and health of persons concerned in mines and works. The Act also regulates the orderly utilization and the rehabilitation of the surface of land during and after prospecting and mining operations.	Mining Right, Mining Permit Prospecting Right	No authorisation is required	National and Provincial
National Environmental Management Act: (Act No. 107 of 1998)	The primary environmental framework Act. The purpose of the Act is to provide for effective protection and controlled utilisation of the environment.	Environmental Authorization for the proposed coke and heat recovery plants and activities.	Complied with in terms of this EIA/EMP submission	National and Provincial
National Environmental Management: Biodiversity Act (Act 10 of 2004)	This Act controls the management and conservation of South African biodiversity within the framework of NEMA. The Act lists species that are threatened or require protection to ensure their survival in the wild, while requesting the activities, which may involve such listed threatened or protected species and activities which may have a potential impact on their long-term survival. The Act has listed flora and Fauna species.	A list has been published under Section 56 (1) of critically endangered, vulnerable and protected species and as such a permit is required prior to undertaking restricted activities in areas with the species.	Complied with in terms of this EIA/EMP submission	National and Provincial

Name	Overview	Permits/Licenses	Compliance	Administering Authority
National Spatial Biodiversity Assessment, 2004	The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.		Complied with in terms of this EIA/EMP submission	National and Provincial
National Forest Act	This provides for the management, utilisation and protection of forests through the enforcement of permitting requirements associated with the removal of protected tree species, as indicated in a list of protected trees.	Removal and/or translocation of endangered trees and plants	Complied with in terms of this EIA/EMP submission	National and Provincial
National Environmental Management: Protected Area Act (Act No.57 of 2003)	The Act makes provision for the protection and conservation of ecologically viable areas that show the country's biodiversity, natural landscapes. It also takes into account the declaration of the various categories of protected areas and envisages a national register of protected areas, with a simplified classification system of Special Nature Reserves, National Parks, Nature Reserves and Protected Environments. In addition, the Act brings in the concept of biological diversity protection and ecosystem management.		Complied with in terms of this EIA/EMP submission	National and Provincial
National Water Act (Act No 36 of 1998)	This Act aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. Section 21 states the water uses that require a license or authorisation.	Water use requirements for the proposed coke and heat recovery plants and activities.	Complied with in terms of this EIA and IWULA submissions	National and Provincial

Name	Overview	Permits/Licenses	Compliance	Administering Authority
The National Environmental Management: Waste Act (Act No.59 of 2008)	In terms of the Waste Act, no person may commence, undertake or conduct a waste management activity except in accordance with: • The requirements or standards determined in terms of the Waste Act for that activity; and • A waste management license issued in respect of the activity, if a license is required.	The waste produced during the construction and handled during operations and storage thereof is within the minimum threshold specified in the listed activities Category B.	Complied with in terms of this EIA/EMP submission	National and Provincial
The National Environmental Management: Air Quality Act (Act No.39 of 2004)	The main objective of the Air Quality Act (NEMAQA) is the protection of the environment and human health, in a sustainable (economic, social and ecological) development framework, through reasonable measures of air pollution control.	Schedule of activities that require and atmospheric emission license has been published. The proposed activity is listed as having possible detrimental impact on air quality.	Complied with in terms of this EIA/EMP submission	National and Provincial
The hazardous Substance Act (Act No. 15 of 1973)	It was promulgated to provide for the control of substances which may cause injury, ill-health or death. Substances are defined as hazardous if their inherent nature is: toxic, corrosive, irritant, strongly sensitising, flammable and pressure generating (under certain circumstances) which may injure cause ill-health, or death in humans.	Minimum requirements of dealing with hazardous wastes should be followed when dealing with hazardous substances	Complied with in terms of this EIA/EMP submission	National and Provincial

Name	Overview	Permits/Licenses	Compliance	Administering Authority
The National Heritage Act (Act No. 25 of 1999)	Section 34 (1): No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the South African Heritage Resources Agency (SAHRA), or the responsible provincial resources authority. Sections 35 (4): No person may, without a permit issued by the SAHRA or the responsible heritage resources authority, destroy or damage, excavate, alter or remove from its original position, or collect, any archaeological material or object. Section 36 (3) No person may, without a permit issued SAHRA or a provincial heritage authority, destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years, which is situated outside a formal area administered by a local authority.	Permits are required for any development that may affect heritage resources such as graves and old buildings.	Complied with in terms of this EIA/EMP submission	National and Provincial
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	The Conservation of Agricultural Resources Act (CARA) Act 43, 1983) provides for the: • Protection of wetlands; and • Requires the removal of listed alien invasive species This Act also requires that any declared invader species must be controlled according to their declared invader status.	Removal of alien vegetation	Complied with in terms of this EIA/EMP submission	National and Provincial

Name	Overview	Permits/Licenses	Compliance	Administering Authority
Mine Health and Safety Act 29 of 1996	The act aims to provide for the health and safety of persons at work and for the health and safety of persons about the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or about the activities of persons at work.		Complied with in terms if this EIA/EMP submission	National and Provincial
National Energy Act of 2008 and Electricity Regulation Act.	The purpose of the act is to ensure that diverse energy resources are available, in sustainable quantities and at an affordable price and to provides for integrated energy planning, increased generation and consumption of renewable energies, contingency energy planning, holding of strategic fuel stocks and carriers, provide appropriate energy infrastructure, data on energy, demand, supply and generation and establish institutions responsible for energy search.		No authorisation is required. Green energy will be proposed and implemented in terms of building designs and energy options at the detailed design stage.	National

1.8 Need and Desirability of the Proposed Activities

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

South Africa is one of Africa's richest countries in coal resources, with about 9.8 billion tonnes of proven deposit, mainly in the provinces of Mpumalanga, Limpopo, KwaZulu-Natal and Free State. The main coking plants of South Africa are owned by ArcelorMittal South Africa (AMSA), with a total capacity of about 2.3 million tons; another one is a supporting coking plant near the Grootegeluk coal mine in Limpopo Province, with a capacity of about 600,000 tons/year, and the last one is SASOL Secunda coal-to-oil project, the capacity of by-product coke is 1million tons per year. The proposed Kinetic Mining Development – SA coking plant will add another 3 million tons per annum to the coking industry in South Africa.

South Africa's total annual coke production capacity is approximately 4 million tons, while the current demand is about 5 million tons, resulting in a gap. Moreover, environmental protection regulations in South Africa are becoming increasingly strict, requiring coking plants to reduce emissions of sulphides and nitrogen oxides, and promoting enterprises to upgrade desulfurization equipment or shift to clean coking technologies.

South Africa is rich in mineral resources, and is one of the world's five largest mineral resource countries. At present, the South African government is taking measures to strengthen the attraction of international capital investment in mineral development and deep processing, restricting the export of raw ore, etc., to develop the national economy.

Electricity production in South Africa is mainly the responsibility of the South African State Electricity Company (Eskom), which supplies more than 90% of South Africa's electricity. Due to aging generation equipment, frequent failures and inadequate operation and maintenance, Eskom is struggling to meet the growing demand for electricity in the country.

The two alternative sites for the proposed HRCP are located adjacent to the existing MC Mining Coal Mine. Both these sites are conducive for proximity to the coal resources at MC Mining Coal Mine. In this regard the adjacent land use is already transformed into mining and industrial activities. The preliminary and initial site visit identified no fatal-flaws to the proposed HRCP development. However, this will be further investigated and verified during the specialist studies and EIA/EMP Phase.

1.9 Description of the Process Followed to Reach the Proposed Preferred Site

1.9.1 Details of All Alternatives Considered

With reference to the site plan provided as per Appendix 4 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

a) the property on which the location or where it is proposed to undertake activity

Kinetic Mining Development South Africa (Pty) Ltd proposal to construct a 3 million tons per annum Coke Plant and a 390MW Heat Recovery Electricity Power Plant. The said proposed development will be done in three (03) phases of 1 million/tons/year coke plant and 130MW heat recovery electricity power plant over a period of 10-12 years. The proposed development will be on either of the farms Boas 642 MS and Martha 185 MT within Makhado Local Municipality, Vhembe District, Limpopo.

Proposed Activity Description:	Farms/Alternative Site Options
3 million tons/year coke plant; Heat recovery electricity power plant - 390 MW;	Remaining Extent of Boas 642 MS – Option 1 Remaining Extent of Martha 185 MT – Option 2

b) the type of activity to be undertaken

The heat recovery coke oven (390MW) with an annual output of 3.0 million tons of coke and supporting facilities will be built in three phases, with consistent planning and step-by-step implementations. The first phase of the construction of 1.0 mtpa (million tons per annum) will be 4×25 ovens heat recovery coke ovens and supported by waste heat power generation facilities (130MW), production management, welfare facilities and laboratories, the system adopts air cooling, coke dry quenching, wet quenching as stand by. The second and third phases of the construction of 1.0 mtpa will be of 4×25 ovens of heat recovery coke ovens and supported by waste heat power generation facilities (130MW each phase), coke dry quenching, wet quenching as stand by for each phase respectively.

c) the design or layout of the activity

The proposed heat recovery and coke plant and associated activities will be on either the farms Boas 642 MS or Martha 185 MT and cover an area of 60 hectares.

d) the technology to be used in the activity

This project is planned to build coke ovens with annual output of 3 million tons of coke divided into three phases in South Africa. The coke oven uses heat recovery coke oven of meters high coke chamber with coordinated waste heat power generation system and coke quenching system, dry quenching (wet quenching as a backup) is used for quenching coke.

The phase I of this project includes number 1~4 heat recovery coke ovens with annual output of 1 million tons (4×25 ovens), waste heat utilization facilities (with power generation), 1 wet coke quenching system and other supporting facilities, and number 1 - CDQ is reserved.

The phase II of this project includes number 5~8 heat recovery coke ovens with an annual output of another 1 million tons (4×25 ovens), waste heat utilization facilities (with power generation), number 1 and 2 - CDQ.

The phase III of this project includes number 9~12 heat recovery coke oven with an annual output of another 1 million tons (4×25 ovens), waste heat utilization facilities (with power generation), number 3 - CDQ and 2 wet coke quenching system.

This project will utilize waste heat from heat-recovery coke oven flue gas. The construction will be divided into three phases (Phase I, II, and III). Each phase includes the installation of two 152 t/h ultra-high temperature and ultra-high pressure single-reheat coke oven waste heat boilers, with one waste heat boiler corresponding to every two coke ovens. Additionally, within the scope of Phase I, II, and III, one set of 140 t/h dry quenching (CDQ) system paired with a 73 t/h ultra-high temperature and ultra-high pressure single-reheat CDQ waste heat boiler will be constructed in each phase to recover sensible heat from coke.

The project will involve the construction of three new turbine-generator power stations, with one station built in each phase (Phase I, II, and III). Each station is equipped with two NZK65-13.2/566/566 condensing steam turbines and one QFW-65-2 generator configured for each turbine pair. The generator has a rated power output of 65,000 kW and a rated voltage of 10,500 V – which translates to a combined capacity of 130 000 kW (130 MW) per station

e) the option of not implementing the activity

The inclusion of an alternative analysis is a specific requirement of the Integrated Environmental Management (IEM) procedure as underlined by the NEMA. The IEM procedure stipulates that the environmental investigation needs to consider feasible alternatives for any proposed development.

The proposed coke and heat recovery plants project is adjacent to an area already approved for mining and industrial activities. The surrounding environment is therefore not pristine. The No-Go option is the other alternative identified during the scoping phase, which will be discussed in detail as part of the EIA/EMP phase – including the mitigation hierarchy. During both the Scoping and EIA/EMP phases, public participation plays a key role and is a vital part of the IEM process.

1.10 Details of the Public Participation Process Followed

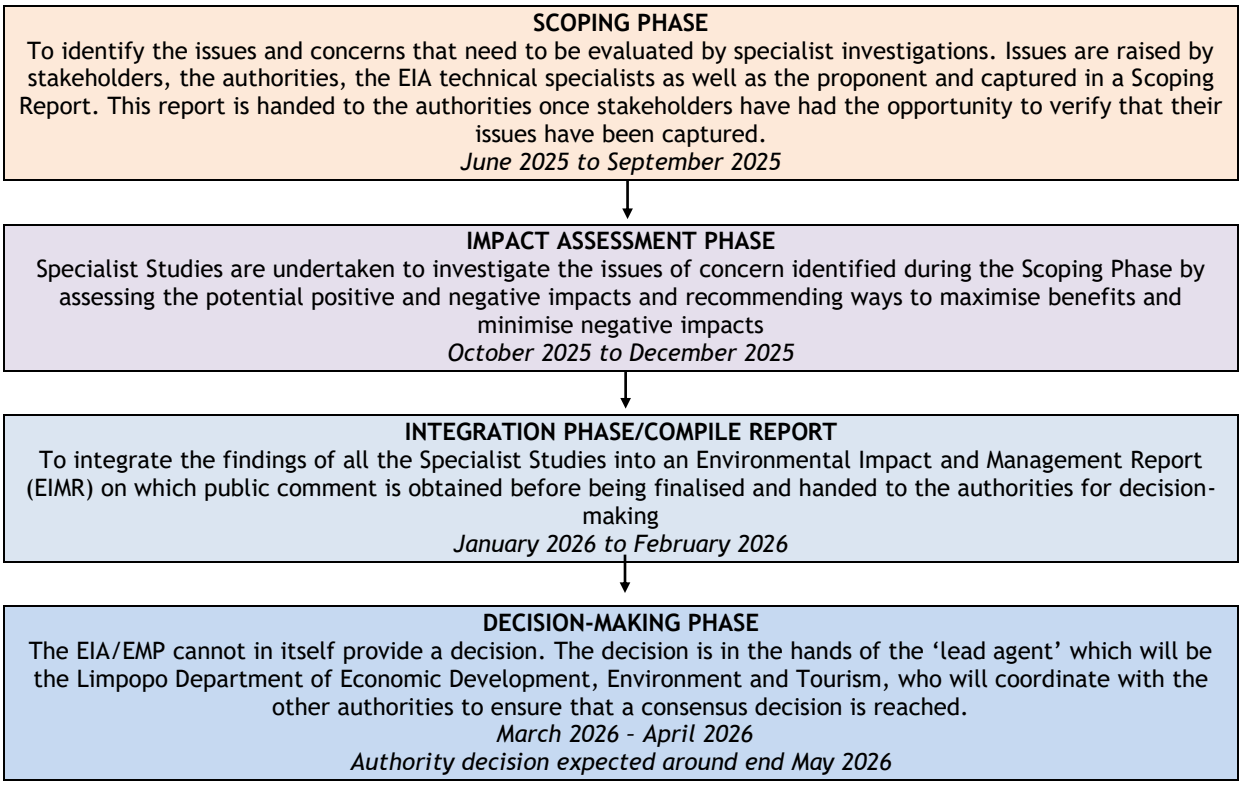
Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or the use of their land.

Public participation is a continuous two-way communication process aimed at promoting full public understanding of the processes and mechanisms through which environmental problems and needs are investigated and solved by the responsible agency. It is aimed at keeping the public informed about the status and progress of the studies conducted and the implications of the proposed project thereof as well as to document all issues, comments and concerns voiced by the public and their preferences regarding resource use and alternative development or management

strategies and any other information and assistance relative to the operations decisions.

The Stakeholder Engagement Process as it is referred to by the Department of Forestry, Fisheries and Environment (DFFE) is a *"process leading to a joint effort by stakeholders, technical specialists, the authorities and the proponent who work together to produce better decisions than if they had acted independently"*. The process aims at improving *"communication between stakeholders – including the proponent – in the interest of facilitating better decision-making and or sustainable development"*.

The following public participation process for the coke and heat recovery plants project will be undertaken:



Sustainable development requires some level of trade-off between economic growth, social equity and ecological integrity. The stakeholder engagement process provides an opportunity for Interested and Affected Parties (I&APs) to participate in an informed bases and ensure their needs and requirements are considered and allows the decision-making authority/entity to understand to what degree stakeholders are willing to accept and live with the trade-offs involved.

1.10.1 Approach to Stakeholder Engagement

Our approach to stakeholder engagement was based on the following principles outlined by the Department of Forestry, Fisheries and Environment (DFFE):

- undertake meaningful and timely participation of l&APs;
- focus on important issues during the scoping and stakeholder engagement phases;

- due consideration of alternatives (where applicable) undertaken;
- accountability for information used for decision-making should be provided;
- encouragement of co-regulation, shared responsibility and a sense of ownership should be developed over the project lifecycle;
- application of "due process" particularly with regard to public participation in environmental governance as provided for in the Constitution is essential; and
- the needs, interests and values of I&APs must be considered in the decision-making process.

1.10.2 Identification of Stakeholders (I&Aps)

Stakeholder engagement varies given the technical nature of the proposed activity, the geographical location, extent, duration, intensity and frequency of potential impacts associated with the activity in question, as well as the capacity of the receptive community to participate in the proposed project. The processes outlined below are specific to the proposed HRCP project. I&APs were identified through several mechanisms. These include:

- Meetings with non-governmental agencies, community-based organisations, local council representatives, and municipality;
- Placement of community notices, and distribution of background information documents (discussed separately).

All I&AP identified were registered on the stakeholder database. The public participation process endeavoured to ensure that individuals / organisations from referrals and networking were notified of the proposed HRCP project, in addition to efforts to notify and identify stakeholders at a geographical level.

1.10.3 Advertisements and Background Information Document (BID)

The newspaper advert was placed on the following newspaper informing and inviting members of the public and any other interested and affected parties (I&APs) about the environmental impact assessment process underway and to comment on the proposed HRCP project:

a) **Limpopo Mirror issue of Friday 12th September 2025.**

In addition, pamphlet notices and background information documents (BID) were distributed for various stakeholders and I&APs adjacent to the proposed HRCP project site at Makhado and Mphephu Tribal Area/Villages. Distribution was during **August and September 2025**.

The purpose of a BID was to provide stakeholders and I&APs with introductory information on the proposed HRCP development, the environmental impact assessment and management programme (EIA/EMP) being compiled and the stakeholder engagement process. The BID also provided stakeholders who are interested in the proposed HRCP development with the opportunity to register as stakeholders by way of requesting and completing the registration sheet distributed with the BID. Information on the registration sheet has been used to register stakeholders on a database to receive all project-related information and invitations to any meetings (if required). The registration sheet included a section for

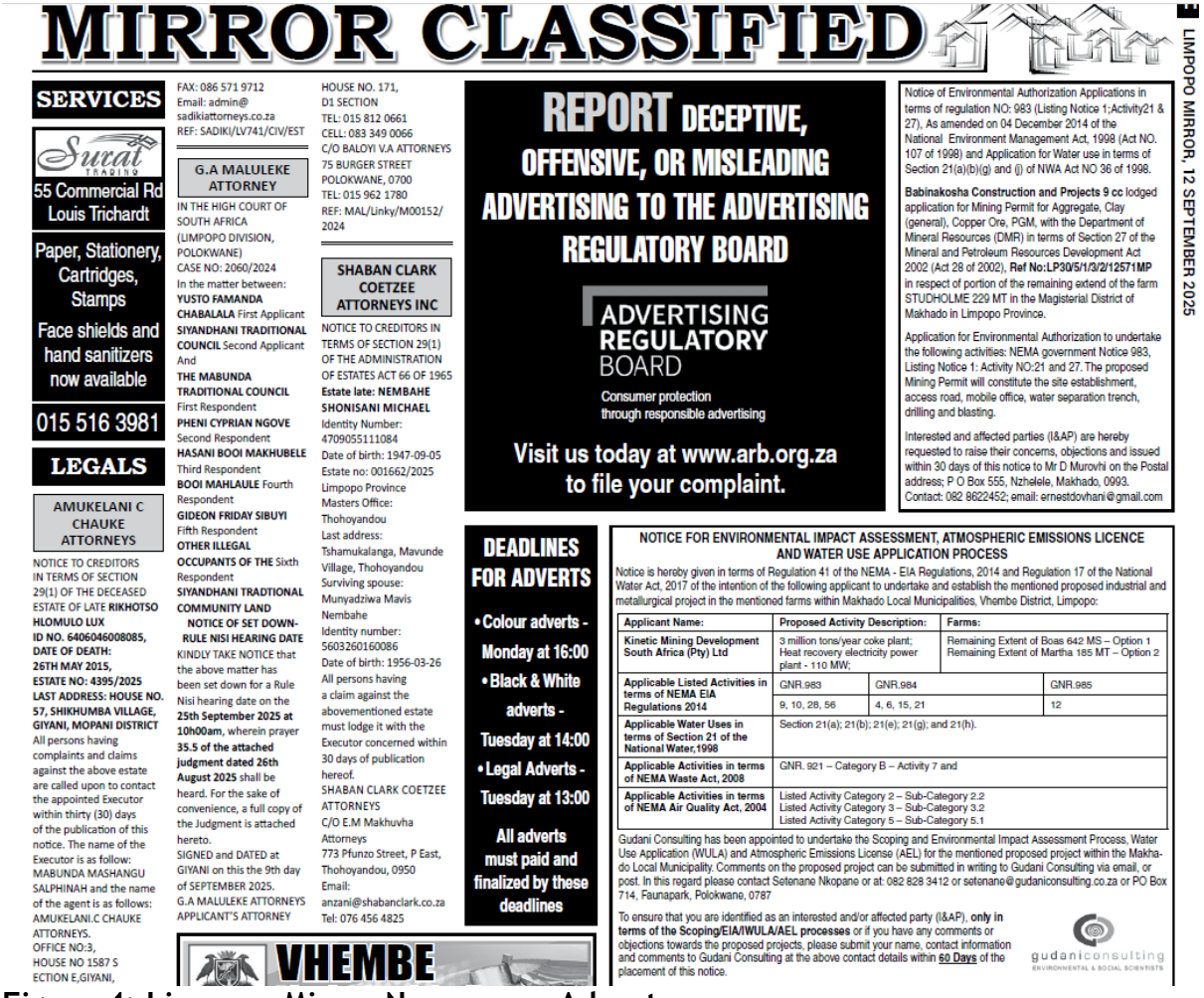
comments and raising issues, which allows stakeholders an opportunity to provide the consultants with written comments and feedback.

Pamphlets, consultation letters and BIDs were distributed at the following sites notifying/informing interested and affected parties about the EIA/EMP process.

- Makhado and Mphephu Tribal Area/Villages and;
- BIDs were also handed over to adjacent residents and commercial entities;
- Ward Councillors and Committees;
- Mphephu Tribal Authority.

1.10.4 Content of the Advertisements and Site Notices

Advertisements and notices indicated the public participation (PP) process being undertaken, the proposed HRCP development, explanation of the EIA/EMP process,



MIRROR CLASSIFIED

LIMPOPO MIRROR, 12 SEPTEMBER 2025

SERVICES

Surat TRADING
55 Commercial Rd
Louis Trichardt
Paper, Stationery, Cartridges, Stamps
Face shields and hand sanitizers now available
015 516 3981

LEGALS

AMUKELANI C CHAUKE ATTORNEYS

NOTICE TO CREDITORS IN TERMS OF SECTION 29(1) OF THE DECEASED ESTATE OF LATE **RIKHOTSO HLOMULO LUX**
ID NO. 6406046008085, DATE OF DEATH: 26TH MAY 2015, ESTATE NO: 4395/2025
LAST ADDRESS: HOUSE NO. 57, SHIKHUMBA VILLAGE, GIYANI, MOPANI DISTRICT
All persons having complaints and claims against the above estate are called upon to contact the appointed Executor within thirty (30) days of the publication of this notice. The name of the Executor is as follow: MABUNDA MASHANGU SALPHINAH and the name of the agent is as follows: AMUKELANI.C CHAUKE ATTORNEYS.
OFFICE NO:3,
HOUSE NO 1587 S ECTION E,GIYANI,
FAX: 086 571 9712
Email: admin@sadikiattorneys.co.za
REF: SADIKI/LV741/CIV/EST

G.A MALULEKE ATTORNEY

IN THE HIGH COURT OF SOUTH AFRICA (LIMPOPO DIVISION, POLOKWANE)
CASE NO: 2060/2024
In the matter between:
YUSTO FAMANDA CHABALALA First Applicant
SIYANDHANI TRADITIONAL COUNCIL Second Applicant
And
THE MABUNDA TRADITIONAL COUNCIL First Respondent
PHENI CYPRIAN NGOVE Second Respondent
HASANI BOOI MAKHUBELE Third Respondent
BOOI MAHLAULE Fourth Respondent
GIDEON FRIDAY SIBUYI Fifth Respondent
OTHER ILLEGAL OCCUPANTS OF THE Sixth Respondent
SIYANDHANI TRADTIONAL COMMUNITY LAND
NOTICE OF SET DOWN-RULE NISI HEARING DATE
KINDLY TAKE NOTICE that the above matter has been set down for a Rule Nisi hearing date on the **25th September 2025 at 10h00am**, wherein prayer **35.5 of the attached judgment dated 26th August 2025** shall be heard. For the sake of convenience, a full copy of the Judgment is attached hereto.
SIGNED and DATED at GIYANI on this the 9th day of SEPTEMBER 2025.
G.A MALULEKE ATTORNEYS
APPLICANT'S ATTORNEY
HOUSE NO. 171,
D1 SECTION
TEL: 015 812 0661
CELL: 083 349 0066
C/O BALOYI V.A ATTORNEYS
75 BURGER STREET
POLOKWANE, 0700
TEL: 015 962 1780
REF: MAL/Linky/M00152/2024

SHABAN CLARK COETZEE ATTORNEYS INC

NOTICE TO CREDITORS IN TERMS OF SECTION 29(1) OF THE ADMINISTRATION OF ESTATES ACT 66 OF 1965
Estate late: NEMBAHE SHONISANI MICHAEL
Identity Number: 4709055111084
Date of birth: 1947-09-05
Estate no: 001662/2025
Limpopo Province
Masters Office:
Thohoyandou
Last address:
Tshamukalanga, Mavunde Village, Thohoyandou
Surviving spouse:
Munyadziwa Mavis Nembahe
Identity number: 5603260160086
Date of birth: 1956-03-26
All persons having a claim against the abovementioned estate must lodge it with the Executor concerned within 30 days of publication hereof.
SHABAN CLARK COETZEE ATTORNEYS
C/O E.M Makhuvha Attorneys
773 Pfunzo Street, P East, Thohoyandou, 0950
Email: anzani@shabanclark.co.za
Tel: 076 456 4825

REPORT DECEPTIVE, OFFENSIVE, OR MISLEADING ADVERTISING TO THE ADVERTISING REGULATORY BOARD

ADVERTISING REGULATORY BOARD
Consumer protection through responsible advertising

Visit us today at www.arb.org.za to file your complaint.

Notice of Environmental Authorization Applications in terms of regulation NO: 983 (Listing Notice 1;Activity21 & 27), As amended on 04 December 2014 of the National Environment Management Act, 1998 (Act NO. 107 of 1998) and Application for Water use in terms of Section 21(a)(b)(g) and (j) of NWA Act NO 36 of 1998.

Babinakosha Construction and Projects 9 cc lodged application for Mining Permit for Aggregate, Clay (general), Copper Ore, PGM, with the Department of Mineral Resources (DMR) in terms of Section 27 of the Mineral and Petroleum Resources Development Act 2002 (Act 28 of 2002), **Ref No:LP30/5/1/3/2/12571MP** in respect of portion of the remaining extend of the farm STUDHOLME 229 MT in the Magisterial District of Makhado in Limpopo Province.

Application for Environmental Authorization to undertake the following activities: NEMA government Notice 983, Listing Notice 1: Activity NO:21 and 27. The proposed Mining Permit will constitute the site establishment, access road, mobile office, water separation trench, drilling and blasting.

Interested and affected parties (I&AP) are hereby requested to raise their concerns, objections and issued within 30 days of this notice to Mr D Murovhi on the Postal address; P O Box 555, Nzhelele, Makhado, 0993. Contact: 082 8622452; email: ernestdovhani@gmail.com

DEADLINES FOR ADVERTS

- Colour adverts - Monday at 16:00
- Black & White adverts - Tuesday at 14:00
- Legal Adverts - Tuesday at 13:00

All adverts must paid and finalized by these deadlines

NOTICE FOR ENVIRONMENTAL IMPACT ASSESSMENT, ATMOSPHERIC EMISSIONS LICENCE AND WATER USE APPLICATION PROCESS

Notice is hereby given in terms of Regulation 41 of the NEMA - EIA Regulations, 2014 and Regulation 17 of the National Water Act, 2017 of the intention of the following applicant to undertake and establish the mentioned proposed industrial and metallurgical project in the mentioned farms within Makhado Local Municipalities, Vhembe District, Limpopo:

Applicant Name:	Proposed Activity Description:		Farms:
Kinetic Mining Development South Africa (Pty) Ltd	3 million tons/year coke plant; Heat recovery electricity power plant - 110 MW;		Remaining Extent of Boas 642 MS – Option 1 Remaining Extent of Martha 185 MT – Option 2
Applicable Listed Activities in terms of NEMA EIA Regulations 2014	GNR.983	GNR.984	GNR.985
	9, 10, 28, 56	4, 6, 15, 21	12
Applicable Water Uses in terms of Section 21 of the National Water,1998	Section 21(a); 21(b); 21(e); 21(g); and 21(h).		
Applicable Activities in terms of NEMA Waste Act, 2008	GNR. 921 – Category B – Activity 7 and		
Applicable Activities in terms of NEMA Air Quality Act, 2004	Listed Activity Category 2 – Sub-Category 2.2 Listed Activity Category 3 – Sub-Category 3.2 Listed Activity Category 5 – Sub-Category 5.1		

Gudani Consulting has been appointed to undertake the Scoping and Environmental Impact Assessment Process, Water Use Application (WULA) and Atmospheric Emissions License (AEL) for the mentioned proposed project within the Makhado Local Municipality. Comments on the proposed project can be submitted in writing to Gudani Consulting via email, or post. In this regard please contact Setenane Nkopane or at: 082 828 3412 or setenane@gudaniconsulting.co.za or PO Box 714, Faunapark, Polokwane, 0787

To ensure that you are identified as an interested and/or affected party (I&AP), **only in terms of the Scoping/EIA/IWULA/AEL processes** or if you have any comments or objections towards the proposed projects, please submit your name, contact information and comments to Gudani Consulting at the above contact details within **60 Days** of the placement of this notice.

gudaniconsulting
ENVIRONMENTAL & SOCIAL SCIENTISTS

VHEMBE

Figure 4: Limpopo Mirror Newspaper Advert

where further information on the project could be obtained and the manner in which representations in respect of the project can be made:

See the following sub-appendices of the Public Participation Report (Appendix 5 in this Report) for the contents of adverts and site notices:

a) Sub-Appendix 1 – Site Notices

b) Sub-Appendix 3 – Newspaper Adverts
c) Sub-Appendix 4 – Background Information Document (BID)

1.10.5 Placement of the Advertisements and Site Notices

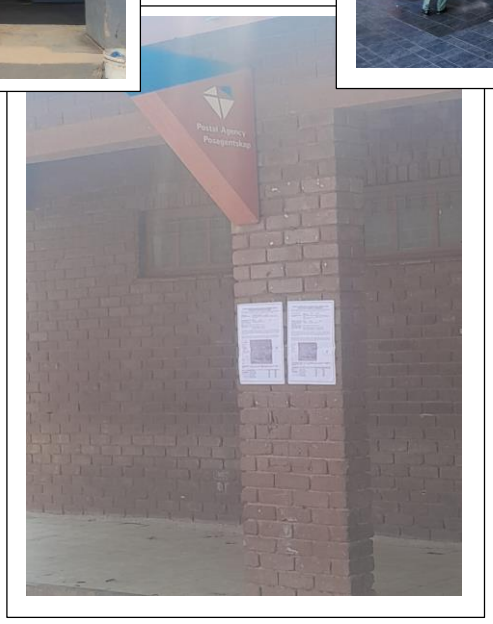
To inform the surrounding public, I&APs, communities and immediately adjacent landowners to the proposed project site about the EIA/EMP process, site notices were placed at various places and locations which are visible and accessible within project site and business premises on the **20th – 21st September 2025.** Site notices were placed at the following points/sites:

Table 24: Site Notice Placements

	Town/Villages	Strategic Places
A3 Posters placed within the Makhado/Mphephu Traditional Area/Villages	Mudimeli, Makushu, Mulambwane, Musholombi, Kuvele, Musekwa, Pfumembe, Nemamilwe and Makhado 20th-21st September 2025	▪ Makhado Municipal Offices ▪ Makhado Post Office ▪ Fripp Village ▪ Mudimeli Post Office ▪ Mafikaduvha Spaza Shop ▪ Khakhu Shop ▪ Makushu Bar Lounge ▪ Makushu Bottle ▪ Makushu Spaza Shop ▪ Musholombi Restaurant ▪ Nepfumembe Eating House ▪ Musekwa Thusong Centre ▪ Musekwa General Dealer ▪ Musekwa Restaurant ▪ HK Patel - N1 Blue Bottle Liquors ▪ Makhado Centre of Learning Gate ▪ MC Mining Main Gate.

Plate 2a: Site Notices Placed at Various Site Around the Project Area

Plate 2a: Site Notices Placed at Various Site Around the Project Area



1.10.6 Consultation Meetings

Consultation concerning the proposed HRCP project with the respective community committees, tribal authority, municipality, members of the public/communities and I&APs were undertaken through a series of meetings, distribution of BIDs and site notices during August and September 2025. The comments received from I&APs thus far have been included in this Scoping Report and are captured in a Comments and Response Report accompanying this Scoping Report (Appendix 5).

Mphephu Traditional Council

The public participation meetings with the Mphephu Traditional Council (MTC), Mphephu Traditional Council Villages – Local Chiefs, and I&APs was undertaken on the following dates:

a) Mphephu Traditional Council – 09th July 2025 – 10h00, MTC Offices
b) Mphephu Traditional Council – 06th August 2025 – 12h30, MTC Offices
c) MTC – Local Chiefs – 22nd August 2025 – 11h00, MTC Offices
d) MTC Villages and I&APs – 27th September 2025 – 13h00, Makhado Multi-Purpose Centre

The public meeting held on the 27th September 2025 was disrupted by members of the Makhado Community Business Forum (MCBF) through intimidation and man-handling of Gudani Consulting personnel. Other members of various communities who had been invited and transported to the meeting venue were also intimidated and prevented from entering the meeting venue. The police had to be called to meeting venue diffuse the risky situation. In order to avoid possible harm or injury to the project personnel and community members the meeting was adjourned.

The printed meeting presentation was distributed to all meeting participants.

The concept of open meetings is normally adopted to allow more interaction between project proponent and members of the public and entail one to one discussions and small group discussions, pictures and map illustrations about the proposed project and the EIA/EMP process in pursuit of full comprehension by I&APs about the proposed project. The meeting minutes and comments from the councillor meetings are attached in Appendix 5.

Salient and key points raised from I&Aps meetings include the following:

a) The proposed HRCP project is an industrial project, and does not involve MC Mining.
b) The proposed HRCP project is being done independently by Kinetic Mining Development-SA.
c) Mining legislation in the HRCP is not applicable.
d) There have been some unpleasant experiences with MC Mining, and Kinetic Mining Development-SA must avoid such mistakes – including recruitment of local labour and local procurement for services.
e) Proposed projects welcome in the area due to high employment – particularly to the youth;
f) The community needs are important and must be addressed.
g) The community (through Mphephu Traditional Council) proposes shareholding in the proposed HRCP.

h) MTC welcomes development projects in their area, and supports the HRCP project, however, it will be important that the issue of shareholding and community benefits be discussed.
i) Water supply to the proposed metallurgical projects.
j) Kinetic Mining Development – SA is permitted to conduct the public participation meeting with all villages under Mphephu Traditional Council.
k) One public meeting is proposed and the various community members must be transported to the meeting.
l) Due to safety concerns follow-up meetings will be undertaken during the EIA/EMP phase and the police must be notified on time to be present at the meeting venue/s.

Plate 3: Public Participation Meeting – 27th September 2025

1.10.7 Summary of Issues raised by I&APs

(Complete the table summarising comments and issues raised, and reaction to those responses)

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those must be consulted were in fact consulted		Date Comments Received	Comments and Issues Raised	EAPs response to the applicant
AFFECTED PARTIES				
Landowner/s				
Mphephu Traditional Council		09/07/2025 06/08/2025 22/08/2025	We welcome the proposed industrial projects in our area. Please advise on possible supply chain and procurement opportunities, employment options and economic development. Please undertake skills audit of the various communities in the area to compile a database of employable people within the affected areas. Where training is required, this must be undertaken well in advance before commencement of operations to assist the youth with possible employment.	Comments noted and will be addressed in the EIA/EMP phase.
			Kinetic Mining Development has shareholding of MC Mining and must first address all the issues that the community has with MC Mining.	While Kinetic Mining Development has shareholding in MC Mining the proposed HRCP is being done by Kinetic – SA alone. The proposed project does not involve MC Mining. All the issues being raised happened before Kinetic can acquire shareholding in MC Mining.
			There have been some unpleasant experiences with MC Mining, and Kinetic Mining Development-SA must avoid such mistakes – including recruitment of local labour and local procurement for services.	Comment noted. The main reason why Kinetic is consulting with MTC is to make sure that proper

				procedures are followed for the proposed HRCP.
			The proposed project is welcome in the area due to high employment – particularly to the youth.	Comment noted.
			The community needs are important and must be addressed. The community (through Mphephu Traditional Council) proposes shareholding in the proposed HRCP. MTC welcomes development projects in their area, and supports the HRCP project, however, it will be important that the issue of shareholding and community benefits be discussed.	Comment noted. This aspect must first be discussed with Kinetic Management.
			Kinetic Mining Development – SA is permitted to conduct the public participation meeting with all villages under Mphephu Traditional Council. One public meeting is proposed and the various community members must be transported to the meeting.	Comment noted. The public meeting will be arranged for 27 September 2025.
Lawful occupier/s of the land				
Landowner or lawful occupiers on adjacent properties				
Municipality Councillor:				
Municipality				
Organs of State (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, Transnet, SANRAL, RAL				

Communities				
Makhado Community Business Forum (MCBF)		27/09/2025	We cannot allow the meeting to proceed since Kinetic Mining Development – SA is part of MC Mining and must first address the issues of MC Mining.	MCBF was present in all the meetings with MTC and was part of the decision to allow Kinetic to proceed with public participation in various villages. MCBF is the one that suggested that one consolidated meeting be undertaken and community members be transported to the meeting venue. MCBF is welcome not to participate in the public meeting, but cannot prevent or intimidate any community member who wishes to attend.
Community Member		27/09/2025	It will be best to adjourn the meeting to avoid possible harm or injuries to community members and Gudani personnel. The police must be called to diffuse the volatile situation.	Comment noted. Presentation distributed to all participants in the meeting and meeting adjourned.
Dept. Land Affairs				
Traditional Leaders				
Dept. Environmental Affairs (LEDET)				
Dept. of Water and Sanitation (DWS)				
Other Competent Authorities affected				

Other Interested and Affected Parties				

1.10.8 Authority Participation

Authorities consultation was undertaken during **October – December 2025** as part of the consultation process with I&APs. EIA/EMP will be drafted once the Scoping Report (this report is accepted and approved by LDEDET. The following authorities were consulted:

a) Limpopo Department of Economic Development, Environment and Tourism (LDEDET)
b) Department of Water and Sanitation(DWS)
c) Department of Agriculture and Rural Development - LDARD
d) South African Heritage Resource Agency (SAHRA)
e) Makhado Local Municipality (MaLM)
f) Mphephu Traditional Council (MTC)

The site inspection will be undertaken with the LDEDET and any other Authority at a date to be determined by the Department/s.

1.10.9 Document Review

The Scoping Report (this report) was made available at public places for public review prior to finalisation. Stakeholders on the database were notified of the availability of the report via any of the following methods: telephone, email, what's up messaging. The report was also made available at the LDEDET, Makhado Local Municipalities, Mphephu Traditional Council and other relevant authorities. The report can also be accessed as an electronic copy on Gudani Consulting website.

The document review period for the Scoping Report was from **09th December 2025** to **05th February 2026**.

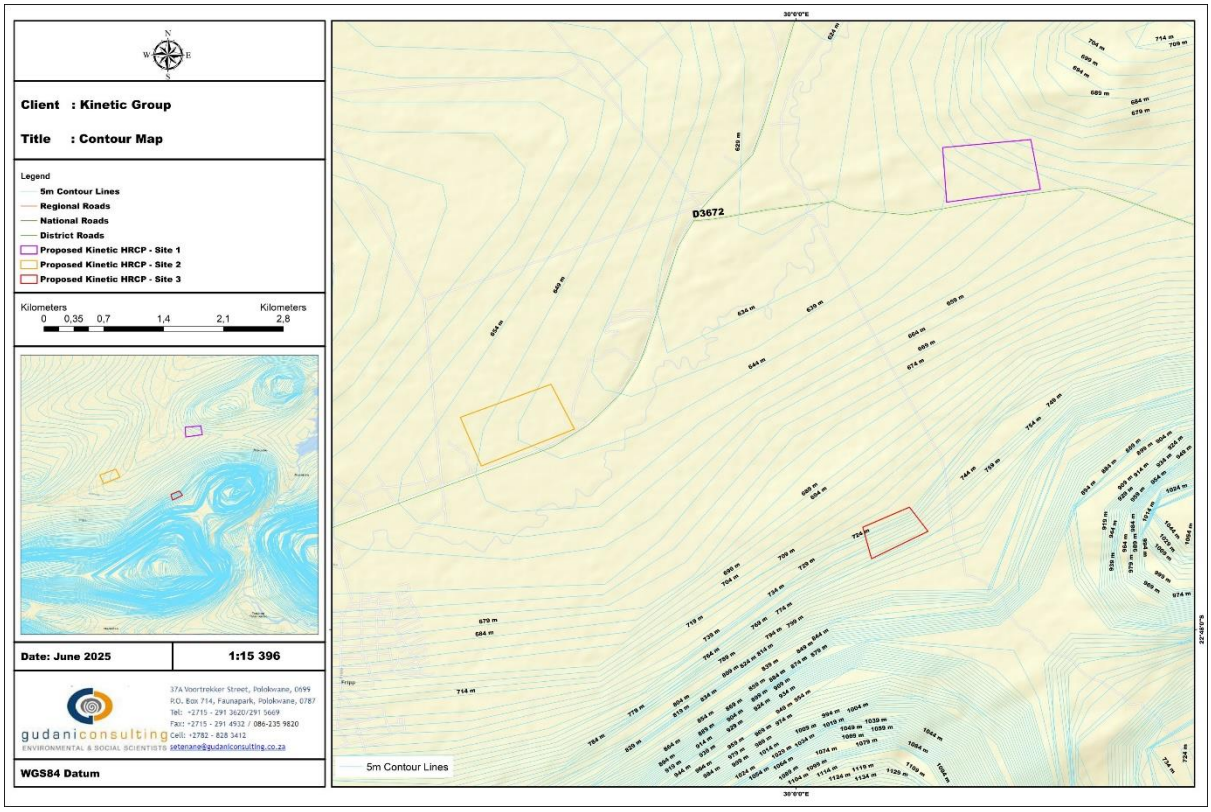
1.10.10 Continuous Communication

Throughout the process the consultant (EAP) has communicated with registered stakeholders by means of telephonic conversations, email correspondences, and registered mail. All comments received through the process to-date were documented in the Issues/Comments Register. This method of communication will continue throughout the process until a decision is reached by relevant authorities.

2.0 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITE – BASELINE ENVIRONMENT

2.1 Topography

The horizontal configuration of the proposed Kinetic coke and heat recovery plants area (Boas and/or Martha farms) is generally flat to undulating and irregular plains with hills and ridges. There are some non-perennial drainage courses in the area and no wetland units. Altitude varies from 600m to 700m. Drainage occurs in the north-easterly direction. The area is flat with intermittent low hills bounded in the south by the Soutpansberg Mountains. The Mutamba River valley is underlain by the relatively young Karoo deposits and the mountain range is made up of Soutpansberg quartzite and lavas which are considerably older and more weather resistant.



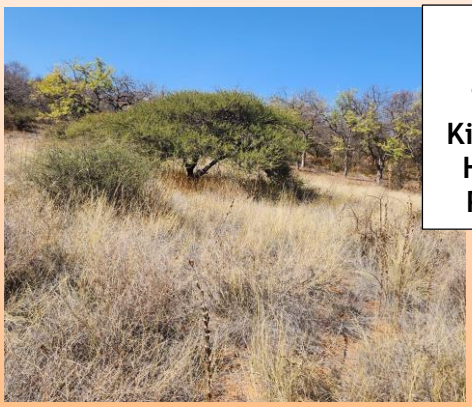
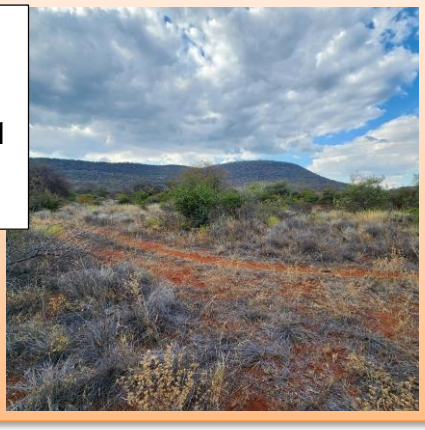


Plate 4: Undulating Topography - Kinetic Coke and Heat Recovery Plants Project



2.2 Geology and Soils

2.2.1 Geology

The geology and stratigraphy of the study area consists of 3 main geological entities. From oldest to youngest: the Limpopo Mobile Belt basement (1.8 Billion years); the Soutpansberg Group (1.7 Billion years) and The Karoo Sequence (240 to 160 million years). The above are overlain in places by superficial deposits of Quaternary age (< 10 million years).

The Limpopo Mobile Belt basement occurs as an up thrown block on the farms Juliana, Coen Britz and Boas and is comprised of meta-quartzite, mafic granulite and amphibolite. Soutpansberg Group strata form the mountainous and hilly terrain in the study area. The strata in the south, dip northwards at 25 - 30º becoming more variable northwards with dips ranging between 10 and 45º. The Soutpansberg strata have been duplicated by normal faulting, resulting in the parallel sets of E-W trending mountain ranges.

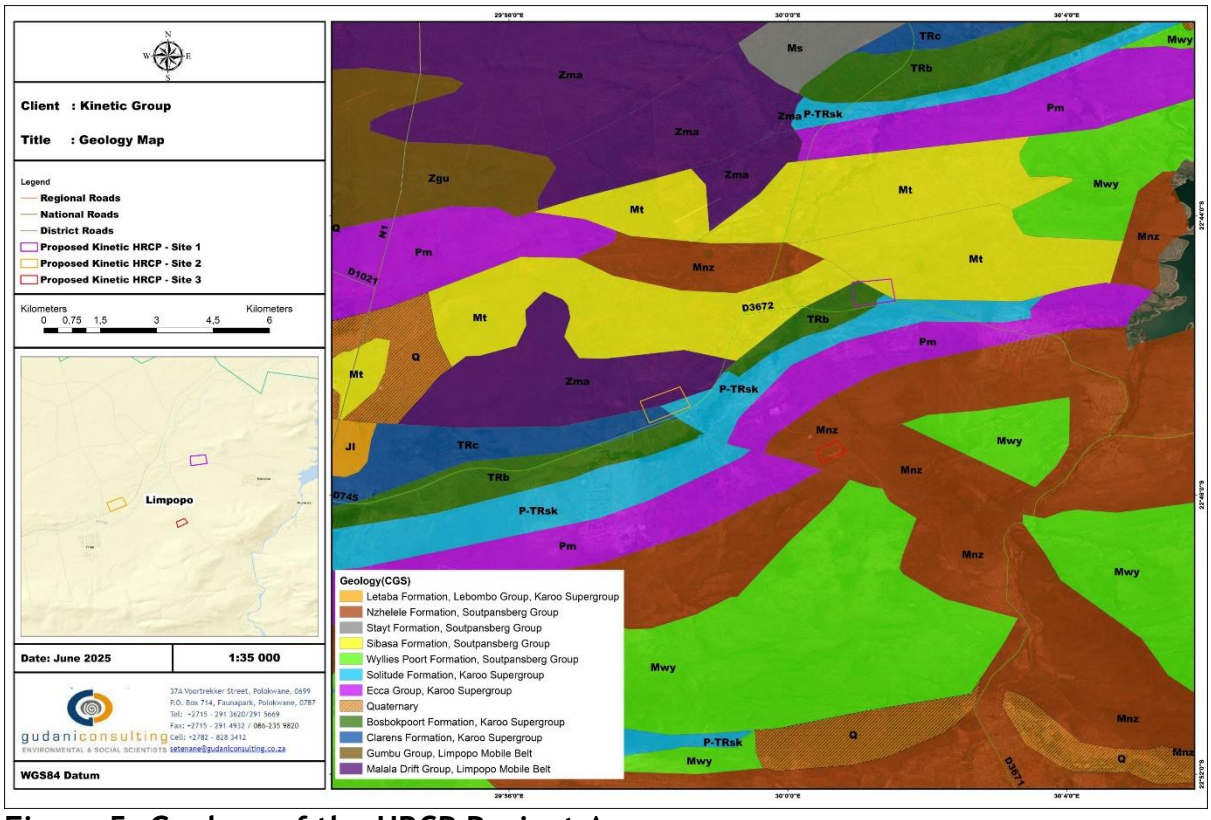


Figure 5: Geology of the HRCP Project Area

The study area is characterized by rift and wrench faulting. Rifting causes normal fault systems, resulting in horst and graben type topography. The wrench faults are vertical shear faults caused by relative displacement of rifted blocks.

All of these structural breaks present potential groundwater targets, of which the normal faults are of greater potential. The major regional fault system separating the Karoo lithology from the basement on the farms Juliana, Coen Britz and Boas is host to significant quantities of groundwater. This fault system is associated with the regional Tshipise fault system.

2.2.2 Soil

four soil forms were recorded, and soil form patterns are strongly tied to landscape position. Shallower, rocky soils occur on sloping mid-slopes and crests and deeper, sandy soils lower down the landscape on irregular plains.

The general soil pattern for the HRCP sites is classified as non-arable grazing woodland/wildlife land and wilderness capability. The grazing capacity ranges from non-arable in the north to wilderness area in the south, with low grazing potential. The general soil classification can be described as red and yellow, sandy well drained soils with high base status and minimal development, with or without intermittent diverse soils.

Soil structure ranges from single grain to weak blocky for the majority of topsoils and subsoils. However, the structured broad soil group displays moderate to strong blocky structure in the pedocutanic subsoils, the vertic broad soil group displays strong blocky structure in the vertic topsoils, while the duplex broad soil group displays strong blocky structure in the prismacutanic sub-soils.

All of the soils have a high base status (eutrophic = very poorly leached; or calcareous = extremely poorly leached), given the interaction of the low rainfall (approximately 388mm), the high mean annual temperature, and the low to high base reserve of the parent materials in the area.

Table 25 below presents the variety of soil forms that were recorded together with information on the effective soil depth (the vertical distance from the soil surface to a layer that stops the downward growth of plant roots) of each. Soil form maps for each site alternative are presented in Figures 14 and 15 further below.

Table 25: Soil Forms Recorded in the Project Area.

Soil form & observation location	Description	Photographs
Coega Date: 06-08-2025 Coordinates: 22°46'52,90"S 29°58'04,37"E	A-horizon: 0 - 100 mm Hard carbonate: 100+ mm	
Mispah Date: 06-08-2025 Coordinates: 22°46'42,44"S 29°58'02,78"E	A-horizon: 0 - 200 mm Hard rock: 200+ mm	

Soil form & observation location	Description	Photographs
Vaalbos Date: 06-08-2025 Coordinates: 22°46'56,35"S 29°58'03,64"E	A-horizon: 0 - 200 mm B-horizon: 200 - 900 mm Hard rock: 900+ mm	
Hutton Date: - Coordinates: - (photographic example)	A-horizon: 0 - 250 mm B-horizon: 250 - 1500+ mm	

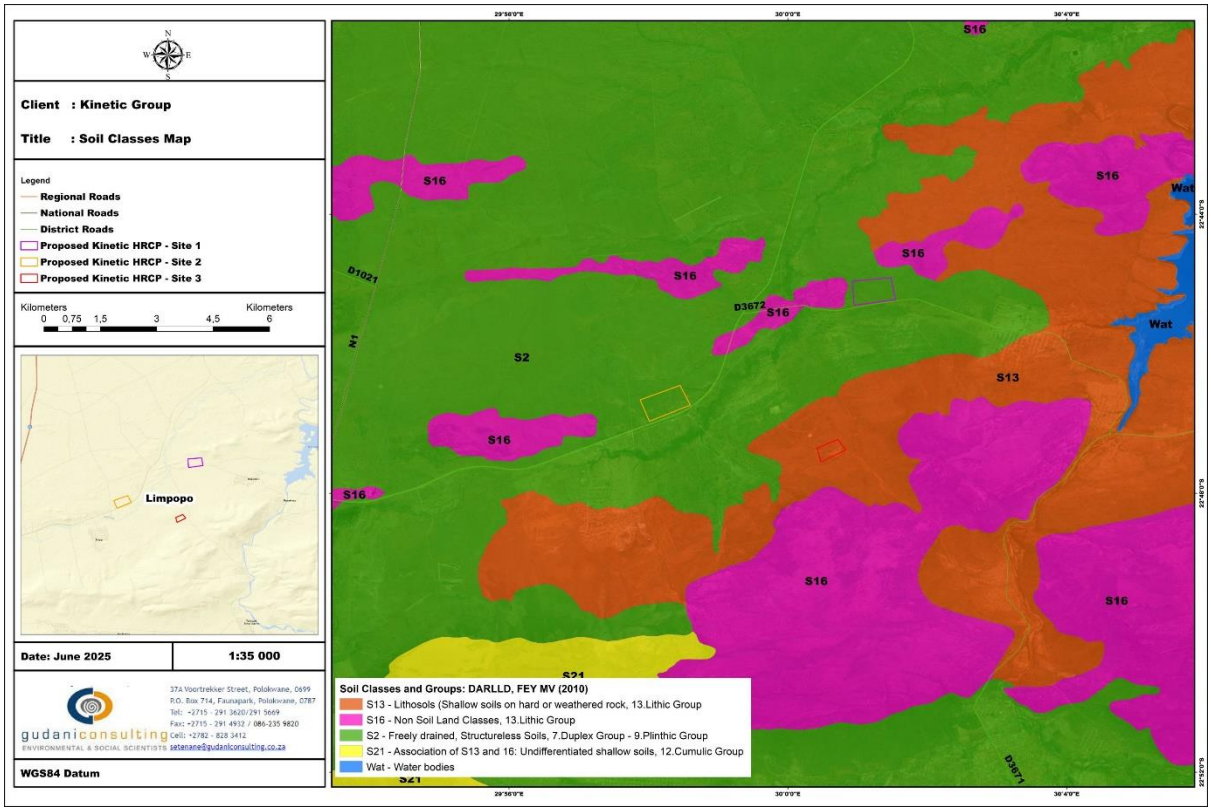


Figure 6: Soil Map – HRCP

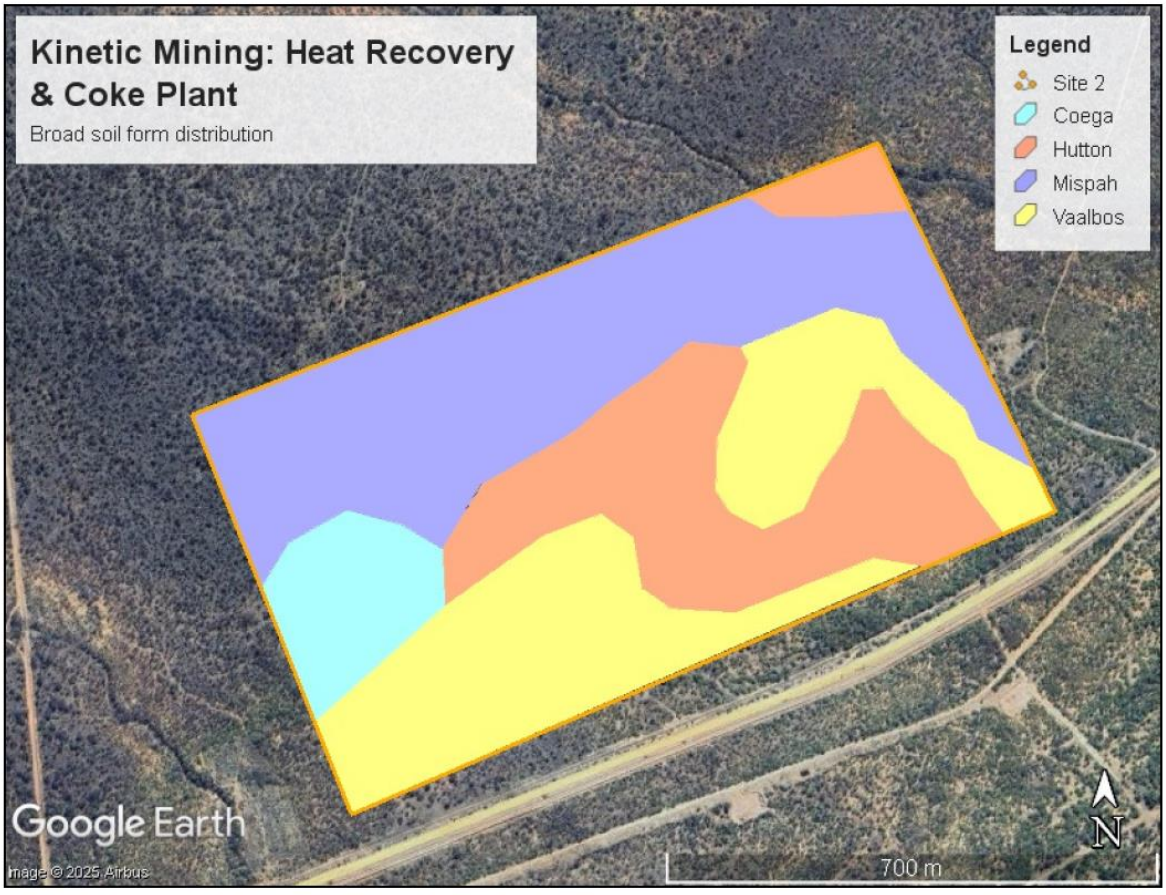


Figure 7: Broad Distribution of Soil Forms – Boas Farm.

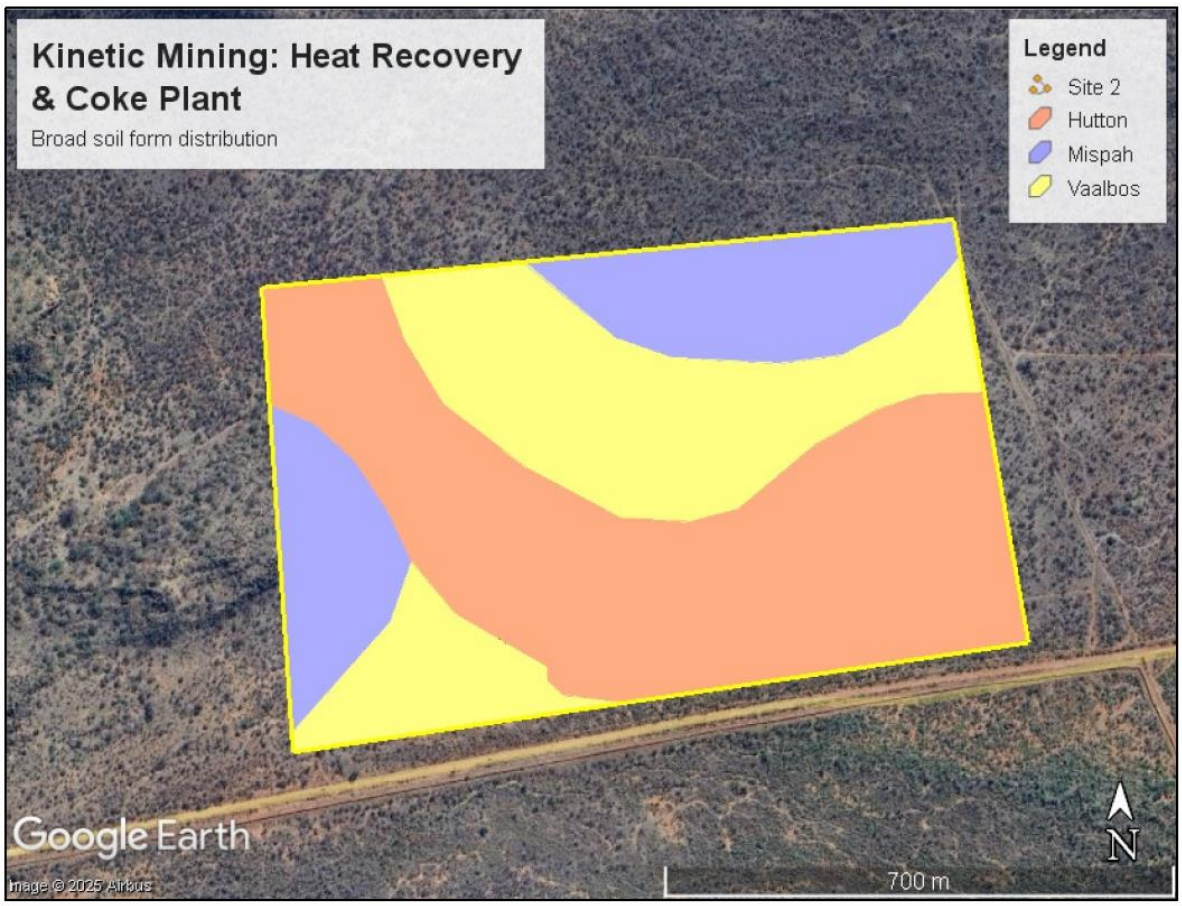


Figure 8: Broad Distribution of Soil Forms – Martha Farm.

2.3 Climate

The proposed coke and heat recovery plants area is situated in a semi-arid zone to the north of the Soutpansberg. The regional climate is strongly influenced by the east-west orientated mountain range which represents an effective barrier between the south-easterly maritime climate influences from the Indian Ocean and the continental climate influences (predominantly the Inter-Tropical Convergence Zone and the Congo Air Mass) coming from the north.

2.3.1 Rainfall

The rainfall in this area usually varies between 300 and 400 mm in summer, while experiencing very dry winters. The area is characterised by cool, dry winters (May to August) and warm, wet summers (October to March), with April and September being transition months. Temperature ranges from 0.9°C to 39.9°C and the area is generally frost free (Mucina and Rutherford, 2006).

2.3.2 Temperature

Average monthly minimum and maximum temperatures for the Tshipise weather station (No. 0766277 1) some 24 km north-east of the Kinetic HRCP area are shown in the table below. Average daily maximum and minimum summer temperatures (November to February) at the weather station range between ~33°C and ~20°C, while winter temperatures (May to August) range between ~28°C and ~7°C respectively. The high average temperatures are reflected by the fact that the

minimum average daily summer temperature is a high 20°C and the minimum average daily winter temperature does not dip below 7°C.

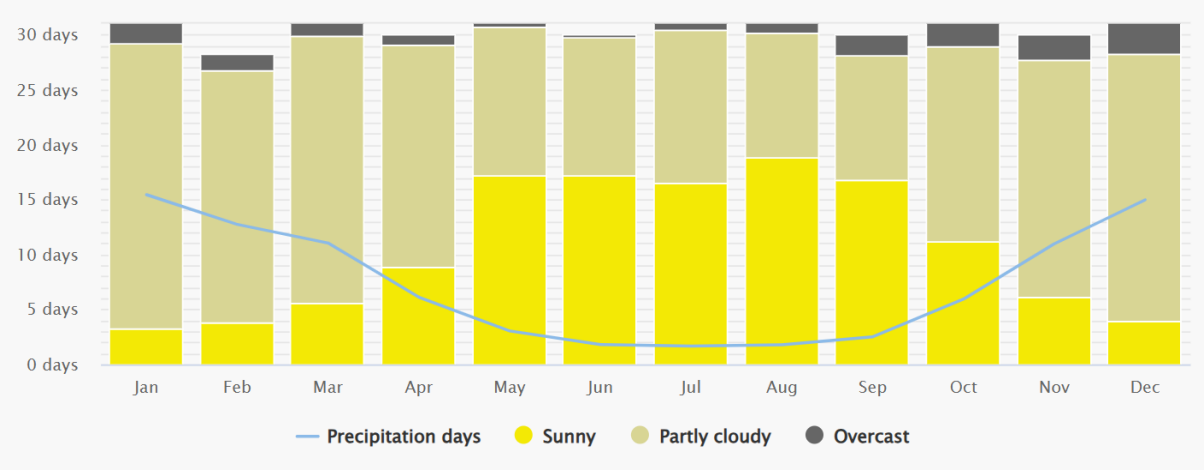


Figure 9: Annual Rainfall Figures in Days

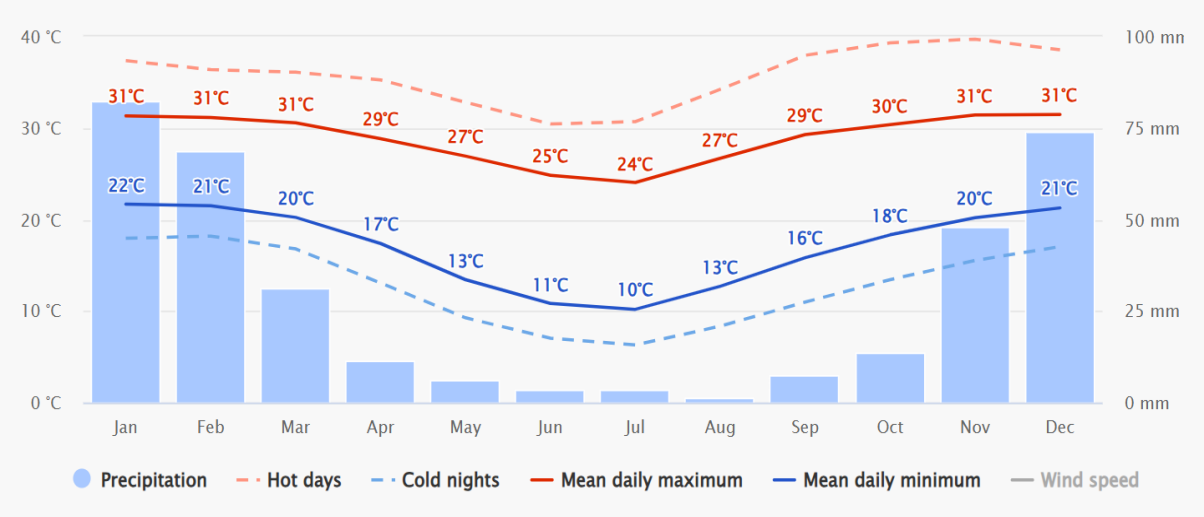


Figure 10: Tshipise Annual Precipitation (mm) and Temperatures (° C)

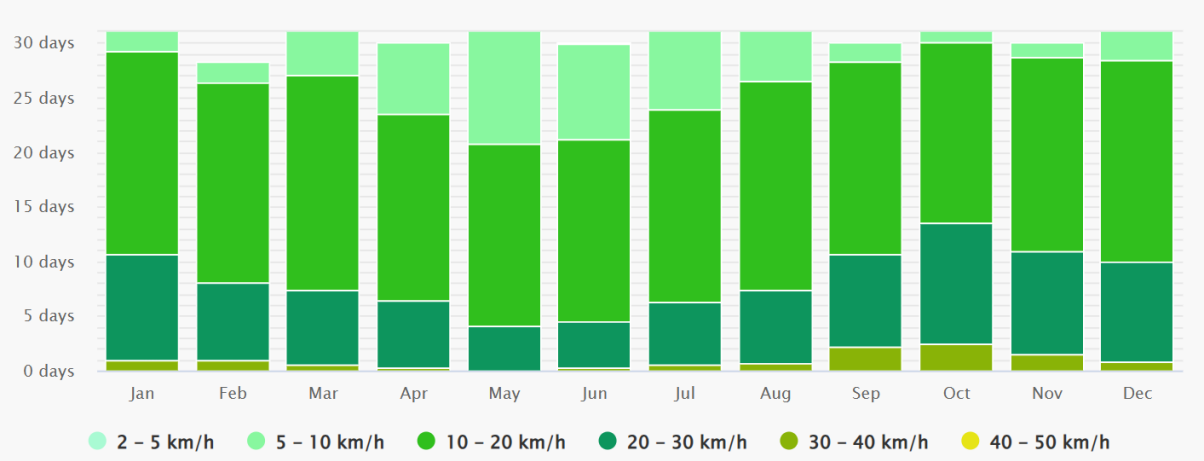


Figure 11: Wind Speeds in Days Per Annum

2.3.3 Wind Direction

Based on an evaluation of the meteorological data obtained from the South African Weather Services, the following deductions regarding the prevailing wind direction and wind frequency can be assessed. Looking at the figure below the dominant wind is easterly, with the predominant wind speed being between 0.5 – 2.1m/s), but the winds from a more easterly direction may exceed 5.7 m/s. Calm periods for this region are 0.2% of the time period. The wind from the west, and south west occur also at 6% of the time, when the wind can reach speeds of up to 5.7 m/s.

A period wind rose for the HRCP area is shown in Figure 12 below.

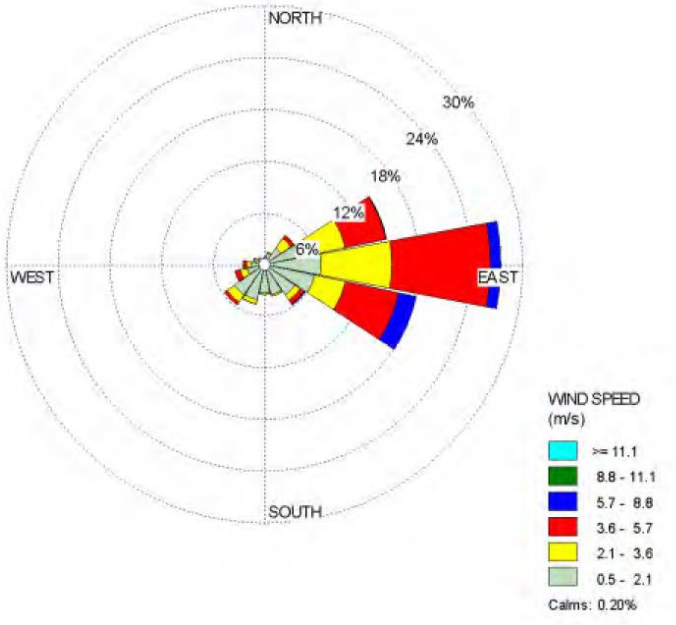


Figure 12: Wind Rose for the HRCP Area

2.4 Ecology and Bio-Diversity

According to Mucina & Rutherford (2006) and SANBI (2024), the study area is situated in the in the Savanna Biome and in the in the Musina Mopane Bushveld (SVmp1) vegetation type. From a terrestrial biodiversity perspective, it is not a Red Listed Terrestrial Ecosystem (Skowno & Monyeki, 2021).

2.4.1 Musina Mopane Bushveld (SVmp 1)

This is the largest vegetation unit occurring within the proposed project area. The Musina Mopane Bushveld occurs on undulating plains around Baines Drift and Alldays, remaining north of the Southspansberg and south of the Limpopo River, through Tshipise to Malongavlakte, Masisi, and Banyini Pan in the east. This vegetation type is typically characterised by undulating plains with some hills at an altitude of approximately 600 m. In the undisturbed state, on areas with deep sandy soils, the *Kirkia acuminata* (White Seringa) is one of the most dominant woody species along with *Colospermum mopane* (Mopane), *Combretum apiculatum* (Red Bushwillow) and *Grewia* spp. (Raisin bushes). In the Mopane Bushveld, the herbaceous layer is poorly developed, especially in areas where mopane occurs in dense stands. This vegetation unit is classified as Least Threatened and is poorly protected with only 2% statutorily

conserved in the Mapungubwe National Park, as well as the Nzele, Nwanedi, Musina and Honnet Nature Reserves. Approximately 3% is transformed mainly by cultivation, and soil erosion is moderate to high (Mucina and Rutherford, 2012).

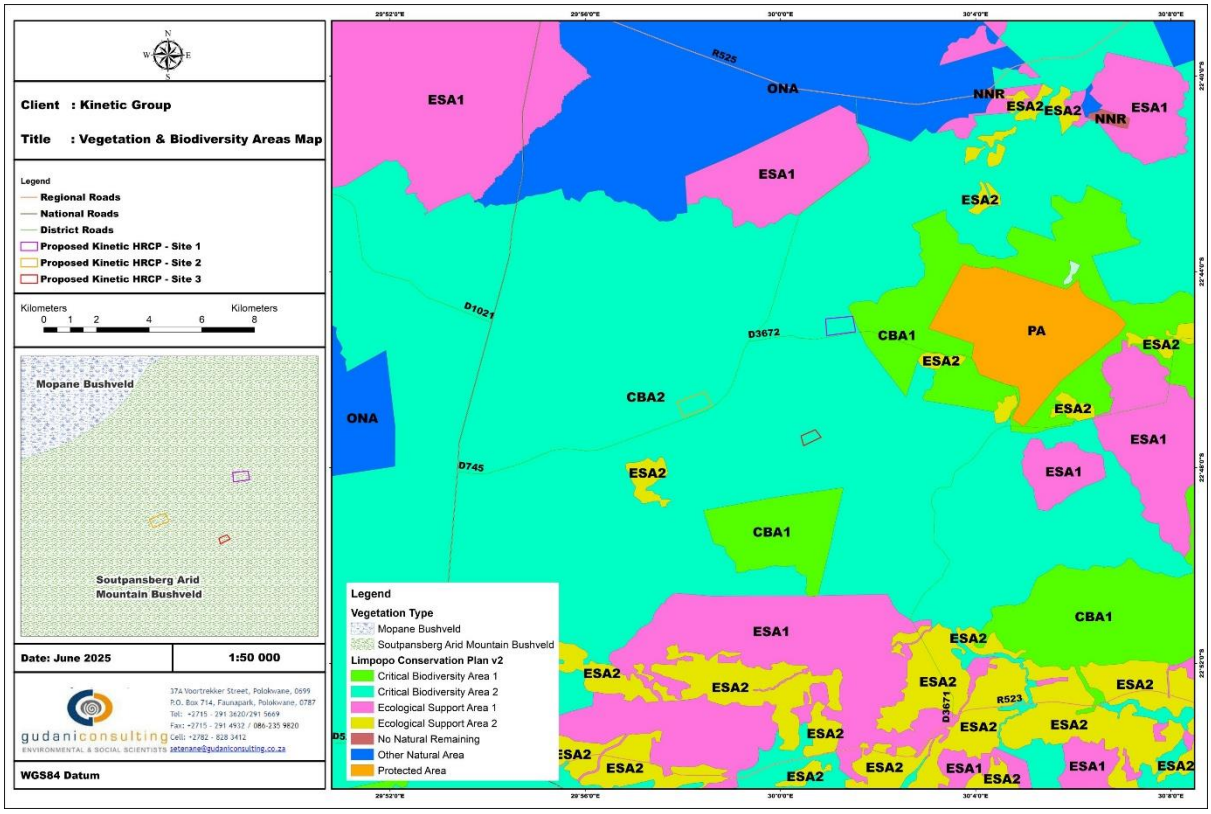


Figure 13: Vegetation and Biodiversity Map for HRCP Area

The study area is dominated by tree and shrub forms of *Colophospermum mopane*, *Terminalia prunoides, Commiphora spp., Grewia spp. and Senegalis spp.* The herbaceous layer was not well developed, this was due to low rainfall and overgrazing and consists mostly of grasses such as *Aristida congesta subsp. congesta, Aristida adscensionis, Tragus berteronianus, Brachiaria brizantha, Melinis repens and Enneapogon cenchroides.*

According to the 2018 updated Limpopo Map of Critical Biodiversity Areas and Ecological Support Areas of the Limpopo Conservation Plan (Version 2) (Desmet et al. 2013) the project area and two site alternatives coincide with a Critical Biodiversity Area 2 (CBA2).

2.4.2 Species of Special Concern

A total of four SSC concern were identified, including one species listed as a schedule 12 (Threatened Plant Species, LEMA (2014)) and four species listed as Protected according to the NFA (1998). A list of these species is included in Table 18. Protected trees in South Africa are regulated in terms of section 15(1) of the National Forests Act, 1998 (Act No. 84 of 1998). In this Act, the definition of a 'tree 'is any tree seedling, sapling, transplant or coppice shoot of any age and any root, branch or other part of it. The Minister of Agriculture, Forestry and Fisheries has published a list of all protected trees belonging to different species under section 12(1)(d) of the above mentioned NFA, as set out in the schedule to this notice. The effect of

this declaration is that in terms of section 15(1) no person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister and relevant authorities.

The LEMA was compiled to consolidate and amend the environmental management of the Limpopo Province. This act includes regulations which call for the protection of indigenous plants and animals which require a permit from the provincial authority for its picking, selling, removal, donation, and/or export in the province.

Table 26: Flora (Tree) Species of Special Conservation Concern (SCC)

Scientific Name	Common Name	NFA 1998	LEMA	SANBI Red List	IUCN 2019
Adansonia digitata	Baobab	Protected tree	Protected, Schedule 12	LC	Not Listed
Boscia albitrunca	Sheppard's Tree	Protected tree	-	LC	Not Listed
Combretum imberbe	Leadwood	Protected tree	-	LC	Not Listed
Sclerocarya birrea	Marula tree	Protected tree	-	LC	Not Listed

2.4.3 National Protected Area Expansion Strategy (NPAES)

The National Protected Area Expansion Strategy (NPAES), first published in 2008, presents a 20-year strategy for the expansion of protected areas (PA) in South Africa (DEA, 2018). The South African Protected Areas and -Conservation Areas Databases (SAPAD & SACAD) contains spatial data for the conservation estate of South Africa. It includes spatial and attribute information for both formally protected/conserved areas and areas that have less formal protection/conservation.

According to the 2023 updated map of the NPAES, a priority focus area is situated directly east of the S1 alternative and 5.9 km north-east of S2 (Figure 14). S2 is situated 3.6 km north of a different priority focus area.

2.4.4 Vegetation Conservation Status

The National List of Threatened Terrestrial Ecosystems for South Africa (NEM:BA: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011) was published in terms of NEM:BA. The list categorizes ecosystems into Critically Endangered, (CR) which have undergone severe degradation, Endangered (EN) which have undergone lesser degradation, Vulnerable (VU), which are at a high risk of undergoing degradation and protected which are of high conservation importance. According to Activity 12 of the third list of the 2017 NEMA listed activities, GN R324, authorisation is required for the clearance of 300 m^2, or more of vegetation where 75 % or more of the vegetation cover constitutes indigenous vegetation within any listed critically endangered ecosystems.

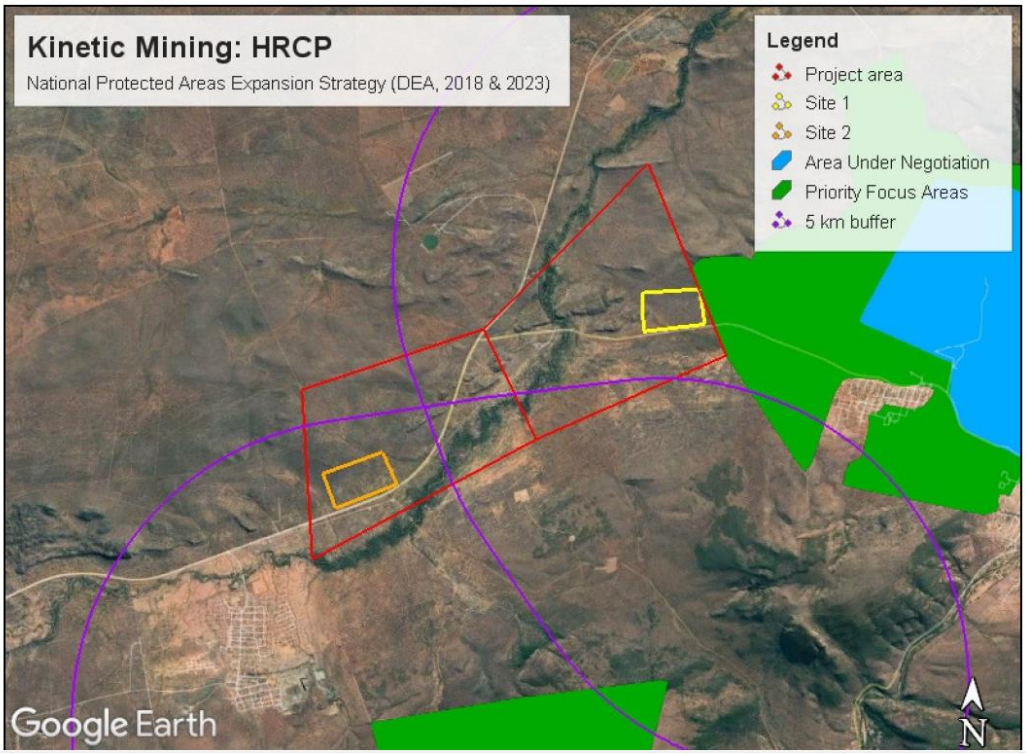


Figure 14: The Project Area in Relation to NPAES Priority Focus Areas

According to the National List of Threatened Terrestrial Ecosystems, the proposed HRCP area does not traverse any threatened ecosystems. Thus activity 12 of GNR 324 Listing Notice 3 will not be triggered and will not require authorisation. Activity 12 in Listing Notice 3 relates to the clearance of 300 m^2 of more of vegetation, which will trigger a basic assessment within any critically endangered or endangered ecosystem listed in terms of the Biodiversity Act.

The Limpopo Conservation Plan v2 (LCPv2) was developed with two primary products in mind, the map of Critical Biodiversity Areas and associated land use guidelines. Bioregional plans are one of a range of tools provided for in the (NEMBA) (No. 10 of 2004) that can be used to facilitate biodiversity conservation in priority areas outside the protected area network. The purpose of a bioregional plan is to inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity.

This is done by providing a map of biodiversity priority areas or CBAs together with accompanying land-use planning and decision-making guidelines. The conservation plan applies a target driven systematic spatial biodiversity planning methodology to develop this map and it is based on the best available biodiversity and context data, and an explicit set of biodiversity conservation targets. The resultant map represents the minimum area necessary to maintain biodiversity pattern and ecological processes in the landscape, i.e. ecologically functional landscapes.

The Limpopo Conservation Plan (v2) provides a spatial representation of land areas required to ensure the persistence and conservation of biodiversity and biodiversity targets within the Limpopo Province. These are represented as CBA and Ecological

Support Areas (ESA). There are four main categories that appear on the LCPv2 map hosted on the SANBI BGIS interactive map these include the following:

Critical Biodiversity Areas (CBAs): Critical Biodiversity Areas are those areas (outside of Protected Areas) that are required to meet biodiversity targets for biodiversity pattern (species and ecosystems) and ecological processes. They should remain in a natural state that is maintained in good ecological condition. CBAs are areas of high biodiversity value, but are often also at risk of being lost through biodiversity-incompatible land-use practices. CBAs include, inter alia, Critically Endangered Ecosystems and critical linkages (corridor pinch-points) to maintain connectivity.

Ecological Support Areas (ESAs): Ecological support areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of critical biodiversity areas or for generating or delivering important ecosystem services. They support landscape connectivity and resilience to climate change adaptation. ESAs need to be maintained in at least an ecologically functional state. The proposed coke and heat recovery plants area falls under this category.

Protected Areas: These are national assets that serve as nodes in South Africa's ecological infrastructure network, protecting ecosystems that deliver important services to people, such as the production of clean water, flood moderation, prevention of erosion, and the aesthetic value of the landscape.

Other Natural Areas (ONA): These are natural areas that have not been selected to meet biodiversity pattern or ecosystem process targets, or to support the functioning of Critical Biodiversity Areas. Despite this, they are not without 'value'. ONAs often retain much of their natural character and may contribute significantly to maintenance of viable species populations and natural ecosystem functioning, and may provide important ecological infrastructure and ecosystem services. They are not, however, prioritized for immediate conservation action, unless CBAs or ESAs are lost, or impacting activities within the ONAs impact negatively on other areas.

Loss of this biodiversity may pose serious risks to the health and socio-economic aspects of life for future generations. The establishment and management of an extensive and representative system of protected areas is thus a critical strategy in the conservation of South Africa's biodiversity and ecosystems. Developments within areas adjacent to or within protected areas could have far-ranging detrimental consequences as far as impacts on these areas are concerned. The proposed development areas do not traverse any either a formal or informal protected area.

According to the SACAD (2025) the project area is situated within the Vhembe Biosphere Reserve (VBR) that is part of a network of 727 UNESCO registered Biosphere Reserves across the globe and one of 10 in South Africa, of which three are in Limpopo. The VBR is one of the largest biosphere reserves in South Africa, with a surface area of 30 700 km, it stretches from the Shingwedzi river in the Kruger National Park to Crooks Corner in the north, bordering the Limpopo River all the way across to Mapungubwe National Park and the Mogalakwena River in the west, down to the Blouberg-Makgabeng and Soutpansberg mountain range in the south.

2.4.5 Fauna

Important Bird and Biodiversity Areas (IBAs) according to Marnewick et al (2015). IBA's are sites of international significance for the conservation of the world's birds and other biodiversity. 112 such sites are situated in South Africa.

The Martha farm alternative is situated in the Soutpansberg IBA of the Limpopo region (Figure 15). This IBA supports one colony of Cape Vulture (Gyps coprotheres) (300 individuals and 147 breeding pairs). The thick forest vegetation in the valleys and basins holds Crowned Eagle (Stephanoaetus coronatus), Forest Buzzard (Buteo trizonatus), Knysna Turaco (Tauraco corythaix), Chorister Robin-Chat (Cossypha dichroa), Narina Trogon (Apaloderma narina), Grey Cuckooshrike (Coracina caesia), Olive Bush-Shrike (Chlorophoneus olivaceus), Black-fronted Bush-Shrike (C. nigrifrons), Green Twinspot (Mandingoa nitidula) and Forest Canary (Crithagra scotops). The bushveld on the slopes supports Gorgeous Bush-Shrike (Chlorophoneus viridis), White-throated Robin-Chat (Cossypha humeralis) and Burnt-necked Eremomela (Eremomela usticollis) (BirdLife SA, 2015).

Cape Vulture and Crowned Eagle are the globally threatened species in this IBA. Regionally threatened species are Black Stork (Ciconia nigra) and Orange Ground Thrush (Zoothera gurneyi). Common biome-restricted and restricted-range species are Knysna Turaco, Gurney's Sugarbird, White-starred Robin (Pogonocichla stellata), White-throated Robin-Chat, Chorister Robin-Chat, Kurrichane Thrush (Turdus libonyanus), Barred Wren-Warbler (Calamonastes fasciolatus), Gorgeous Bush-Shrike, White-bellied Sunbird (Cinnyris talatala) and Swee Waxbill (Coccopygia melanotis). Uncommon species in these categories are Grey Cuckooshrike, Yellowthroated Woodland Warbler (Phylloscopus ruficapilla), Forest Canary, Orange Ground Thrush, Kalahari Scrub Robin (Erythropygia paena) and Barratt's Warbler (Bradypterus barratti) (BirdLife SA, 2015).

Figure 15: Important Bird and Biodiversity Area's in relation HRCP Area

Table 27: List of Animal Species in the Project Area

FAMILY	SPECIES NAME	COMMON NAME	THREATENED STATUS	TYPE OF OBSERVATION (which VU?)
MAMMALS				
Bovidae	Raphicerus campestris	Steenbok	LC	Droppings (S2)
Cercopithecidae	Papio ursinus	Chacma Baboon	LC	Spoor, foraging (S1 & S2)
Herpestidae	Cynictis penicillata	Yellow Mongoose	LC	Sighted (S1)
Hystricidae	Hystrix africaeaustralis	Cape Porcupine	LC	foraging; burrows (S1 & S2)
Leporidae	Lepus saxatilis	Scrub Hare	LC	Droppings (S1 & S2)
Procaviidae	Procavia capensis	Cape Rock Hyrax	LC	Droppings (S1)
REPTILES				
Lacertidae	Heliobolus lugubris	Bushveld Lizard	LC	Sighted (S1 & S2)
Scincidae	Trachylepis margaritifer	Rainbow Skink	LC	Sighted (S1)

*LC = Least Concern

Due to good habitat connectivity of the two site alternatives with natural surroundings, it is expected that other fauna species will utilize the area for grazing / foraging or as corridor to other areas from time to time. Mammals, herpetofauna and avifauna can access the area freely to forage, brood or nest.

2.5 Surface Water Resources

2.5.1 Ecoregion

According to the delineation of Ecoregions within South Africa, both site 1 (Martha) and site 2 (Boas) fall within the Soutpansberg Level 1 Ecoregion (Dallas, 2007). This is a mountainous area characterised by moderate to high relief and vegetation consisting mainly of Bushveld types but with patches of Afromontane Forest. The Blouberg to the west of the Soutpansberg is included in this region.

Several streams have perennial sources in this region, e.g. the Luvuvhu, Mutale, Nzhelele, Nwanedzi and Brak.

Other general characteristics of the Ecoregion are as follows:

- Mean annual precipitation: Generally moderate to high, but very high in isolated spots towards the east.
- Coefficient of variation of annual precipitation: Varies from very low to moderate.
- Drainage density: Medium.
- Stream frequency: Medium to high.
- Slopes <5%: >80%. <20% of the region.
- Median annual simulated runoff: Mostly moderate but high to very high in spots in the south.
- Mean annual temperature: Mostly moderate, but very hot in the east.
- Size = 7323.2 km^2

2.5.2 Catchment

The proposed sites fall within the Limpopo Water Management Area (WMA). The Limpopo WMA includes the following major rivers: the Limpopo River, Matlabas River, Mokolo River, Lephalala River, Mogalakwena River, Sand River and Nzhelele River.

The Limpopo WMA also include the following major dams:

- Cross Dam, Nwanedi River
- Doorndraai Dam Sterk River
- Glen Alpine Dam Mogalakwena River
- Luphephe Dam, Luphephe River
- Mokolo Dam Mokolo River
- Mutshedzi Dam Mutshedzi River
- Nwanedi Dam, in the Nwanedi River
- Nzhelele Dam Nzhelele River

The proposed project area is located in the A80 tertiary catchment within the Limpopo WMA, specifically in the A80F quaternary catchment. The major river of the A80F quaternary catchment is the Mutamba River, feeding the Nzhelele River (the major river of the A80 tertiary catchment) just north of the Nzhelele Dam.

Limpopo River

The river is the second largest perennial river in South Africa and it is about 1 600 km long. The Limpopo River flows through Botswana, Zimbabwe, South Africa and Mozambique where it empties into the Indian Ocean. It also acts as a border which separates South Africa from Zimbabwe on the north for 240 km and South Africa from Botswana on the north-east for 400 km.

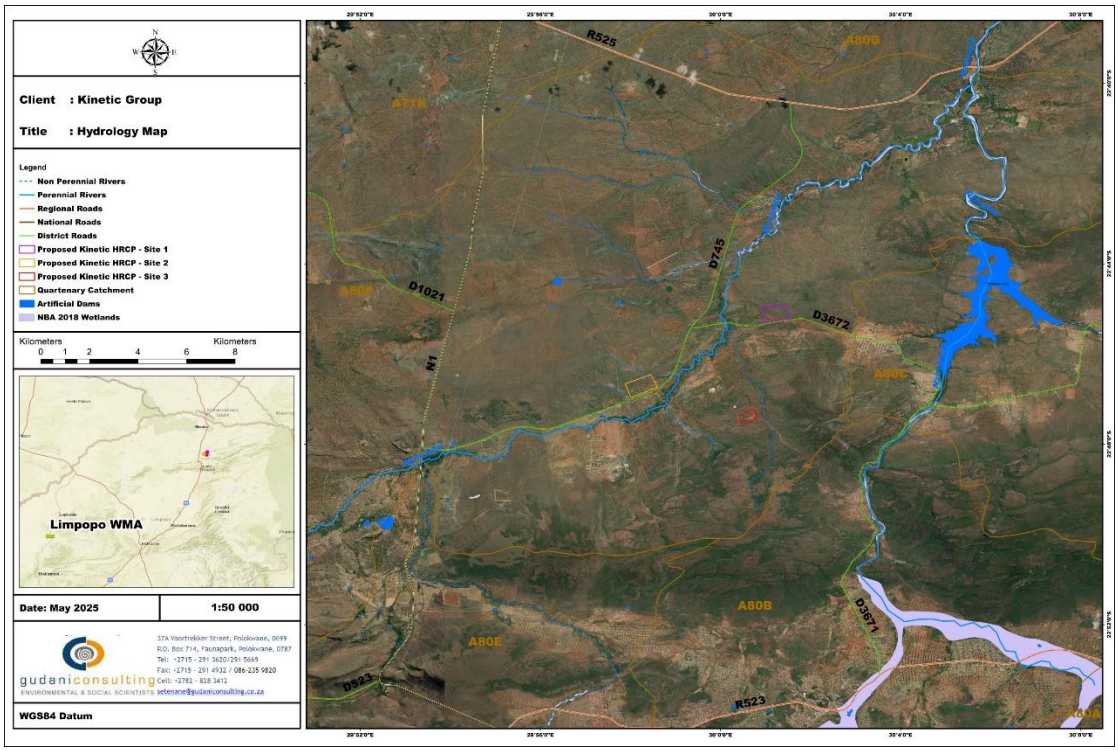


Figure 16: Surface Water Features within HRCP Area

Nzhelele Dam
The Nzhelele Dam is situated on the Nzhelele River, approximately 50 km north-east of Makhado (10 km south-east of the farm Antrobus 566), in the Limpopo province (see the following figure). The capacity of the dam is 55.3 million m3 17. On 1 February 2019, the DWS gazetted the limiting of water in terms of Item 6 of Schedule 3 of the National Water Act of 1998 for irrigation, urban, industrial and mining purposes from the Polokwane Water Supply System, Mutshedzi, Nshelele, Nwanedi and Luphephe, Albasini, Middle Letaba, Nsami, Modjadji, Tzaneen, Doorndraai and Glen Alphine sub-system/dams. Herein the Nzhelele Dam received a 10% restriction (2.9 Million m^3/annum) for irrigation usage of 29.01 million m^3/annum, therefore 26.109 million m^3/annum supply.

According to information provided by Jeffares & Green Consultants, the dam has a total storage volume of 55.3 million m^3, with a capacity of 790 m^3/s. The main purpose of the dam is to serve irrigation.

Nzhelele River
The catchment drains north from the Soutpansberg into the Limpopo River. The Nzhelele catchment (A80A to A80G) is small and is dominated by irrigation, with a small area of afforestation and domestic use by the rural sector. The Nzhelele Dam is the second largest dam in the Limpopo North WMA and provides most of the water requirements in this catchment while groundwater is also extensively used. The Nwanedzi catchment (A80H to A80J) is a small catchment in the north-eastern corner of the WMA characterised by over-allocated and over-developed large areas under irrigation and is included as part of the Nzhelele catchment discussion (DWS, 2015).

Water use in the Nzhelele catchment is dominated by irrigation, which is supplied from river runoffs in the upper reaches of the catchment and the Nzhelele Dam in the lower reaches of the catchment. Much of this water for irrigation is allocated to commercial farmers downstream of Nzhelele Dam. The area is in deficit due to the over-allocation and over development of irrigation, which can negatively impact on water quality due to agro-chemical determinants. Domestic and small industrial requirements are mainly supplied by the Mutshedzi Dam and from groundwater (DWS, 2015)

2.5.3 Drainage Systems
Site 1 (Martha) have no distinctive watercourses within the proposed project area. The site drains both northwest and south into unnamed tributaries of the Mutamba River to the west.

Site 2 (Boas) have two non-perennial watercourses within the proposed project area. These watercourses are unnamed tributaries of the Mutamba River draining east into the Mutamba River.

The Mutamba River flow northeast between these two proposed sites and converge with the Nzhelele River, north of the Nzhelele Dam. The Nzhelele River continues northeast to the Limpopo River at the Zimbabwe border and continues as the Limpopo River along the border of South Africa up to Mozambique where it continues southeast through Mozambique and drains into the Indian ocean.

2.5.4 Wetlands

The delineation results indicate the presence of two watercourses within the Boas site:

- North-eastern ephemeral stream: This watercourse is more clearly defined, with an associated buffer of 59 m. Its visibility on both historical and recent imagery indicates that it has been a persistent ecological feature, albeit with limited flow restricted to rainfall events.
- Southern episodic stream: This watercourse is weakly developed and less discernible in the historical record, with a buffer of 68 m. Its channel is only activated during extreme rainfall events, which aligns with its classification as episodic.

Both systems fall within the 100 m regulated area as per DWS requirements, and site-specific buffer calculations highlight the need for protection of these ecological features. The aquatic ecological state is considered moderately modified, reflecting weak natural development of channels, ongoing but limited disturbance from adjacent infrastructure, and the retention of natural vegetation cover.

No watercourses were delineated within the Martha site boundary. The closest aquatic feature is the non-perennial stream located south of the site, which is likely to flow seasonally in response to rainfall events and contributes to the broader catchment hydrology. As the site itself does not host wetlands, riparian zones, or drainage features, the aquatic ecological state within the property is considered unaltered / natural. However, the proximity of the southern non-perennial stream highlights the need to consider downstream ecological connectivity and ensure that development-related activities (e.g., stormwater runoff or contamination) do not impact this system.

2.5.5 Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project is a multi-partner project between the Council for Scientific and Industrial Research (CSIR), the Water Research Commission, the South African National Biodiversity Institute, the Department of Forestry, Fisheries and the Environment, the South African Institute of Aquatic Biodiversity and South African National Parks. The project responds to the reported degradation of freshwater ecosystem condition and associated biodiversity, both globally and in South Africa. It uses systematic conservation planning to provide strategic spatial priorities for conserving South Africa's freshwater biodiversity, within the context of equitable social and economic development (Nel, et al., 2011).

The FEPA project has three inter-related components:

- A technical component to identify a national network of freshwater conservation areas;
- A national governance component to align DFFE and DWS policies and approaches for conserving freshwater ecosystems; and
- A sub-national governance and management component that conducts case studies to demonstrate how NFEPA outcomes can be implemented (Nell et al, 2011).

The project area does not intercept with any Freshwater Ecosystem Priority Areas (FEPA) areas.

2.6 Groundwater

Natural groundwater quality is dependent on the concentrations of soluble salts and the residence time of water within the host rock. The water quality derived from secondary aquifers in the area can vary considerably.

Good quality groundwater can be found in the quartzite and lavas of the Soutpansberg strata. Moderately fresh to brackish water can be found in the Nzhelele shale. The Karroo Sequence deposition cycle commenced with glacial tillite deposits grading into shallow fresh water lake/sea deposits to fluviatile terrestrial deposits in an increasingly arid environment and capped by Aeolian sands. Increasing aridity generally accompanies increasing salinity. Moderately fresh to brackish water can be found in the lower Karoo strata increasing in salinity up the sequence to the base of the Aeolian sands (Tshipise Member) of the Clarens formation. Groundwater occurring in the formations just below the Tshipse member.

Regional groundwater flow is oriented northeast towards the Nzhelele River. Flow volumes are extremely low due to the low permeability and low recharge, especially in the northern half of the catchment underlain by the Limpopo Mobile Belt and overlain by alluvium. Groundwater also enters the catchment from the west through the series of faults associated with the Tshipise fault.

In the south, where the catchment is underlain by Karoo and Soutpansberg rocks and where HRCP is proposed, a local northward hydraulic gradient is present due to high recharge in the Soutpansberg mountains. Under natural conditions, groundwater drains via localised springs, as baseflow to the perennial tributaries south of the Mutamaba, and by evapotranspiration by riverine vegetation along the Mutamba River.

The aquifer(s) underlying the project area and District were classified in accordance with “A South African Aquifer System Management Classification, December 1995.” The main aquifers underlying the area were classified in accordance with the Aquifer System Management Classification document. The aquifers were classified by using the following definitions:

- Sole Aquifer System: An aquifer which is used to supply 50% or more of domestic water for a given area, and for which there is no reasonably available alternative sources should the aquifer be impacted upon or depleted. Aquifer yields and natural water quality are immaterial.
- Major Aquifer System: Highly permeable formations, usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good (Electrical Conductivity of less than 150 mS/m).
- Minor Aquifer System: These can be fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large quantities of water, they are important for local supplies and in supplying base flow for rivers.

- Non-Aquifer System: These are formations with negligible permeability that are regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer unusable. However, groundwater flow through such rocks, although imperceptible, does take place, and needs to be considered when assessing the risk associated with persistent pollutants.

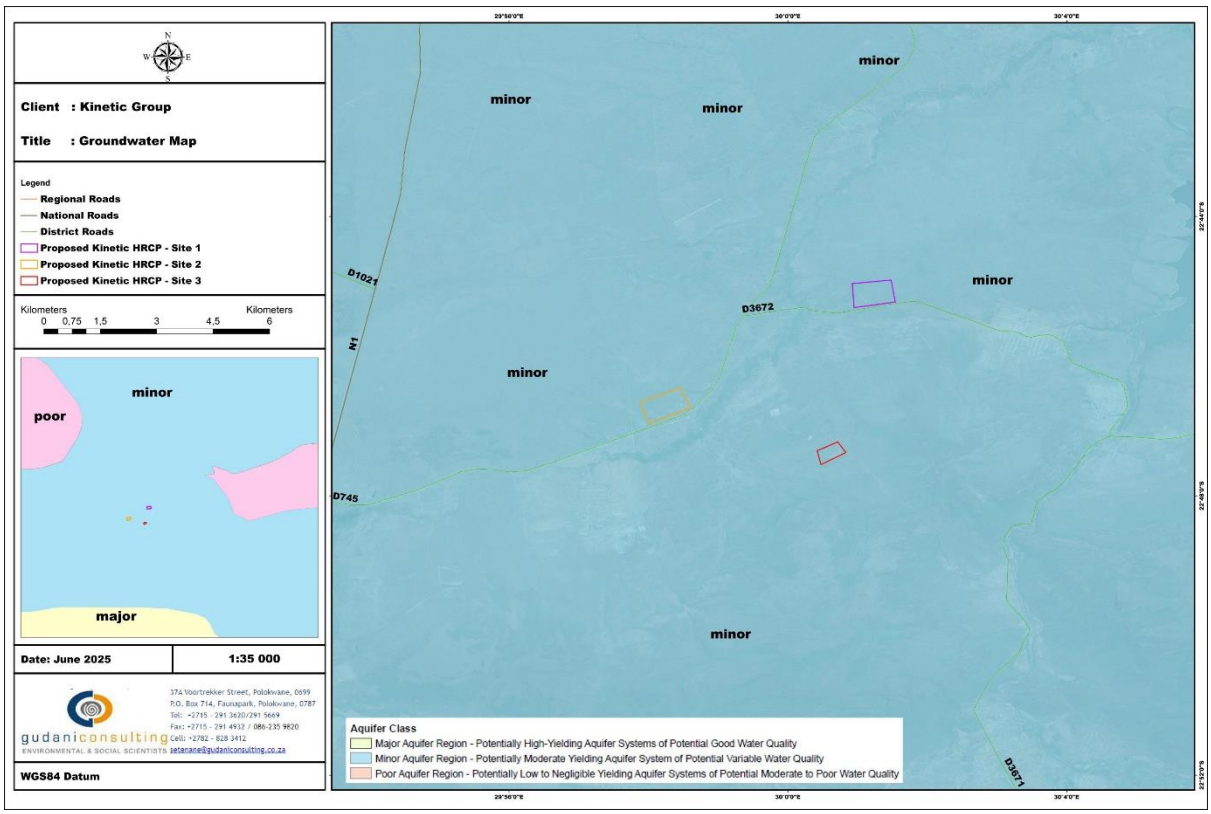


Figure 17: Groundwater and Aquifer Classes within HRCP Area

Recharge and Evaporation

The main source of recharge into the shallow aquifer is rainfall that infiltrates the aquifer through the unsaturated (vadose) zone. Vertical movement of water is faster than lateral movement in this system as water moves predominantly under the influence of gravity. Groundwater recharge in the HRCP area and region ranges between 0 and 12mm/a while evaporation ranges between 1300 and 2200mm/a – See Figure 18 and 19.

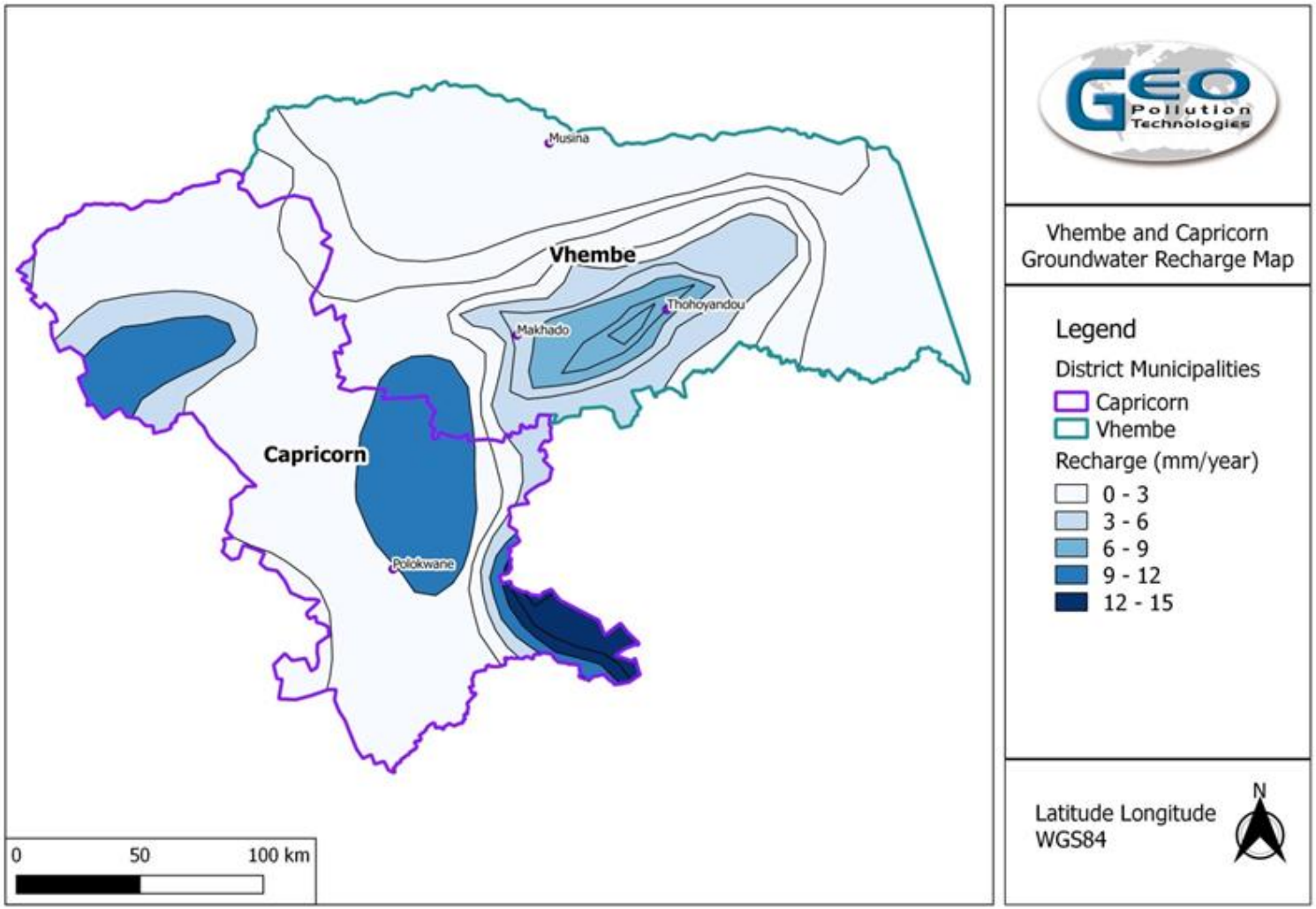


Figure 18: Recharge in the Vhembe District Municipality (GRDM Database, DWAF, 2015)

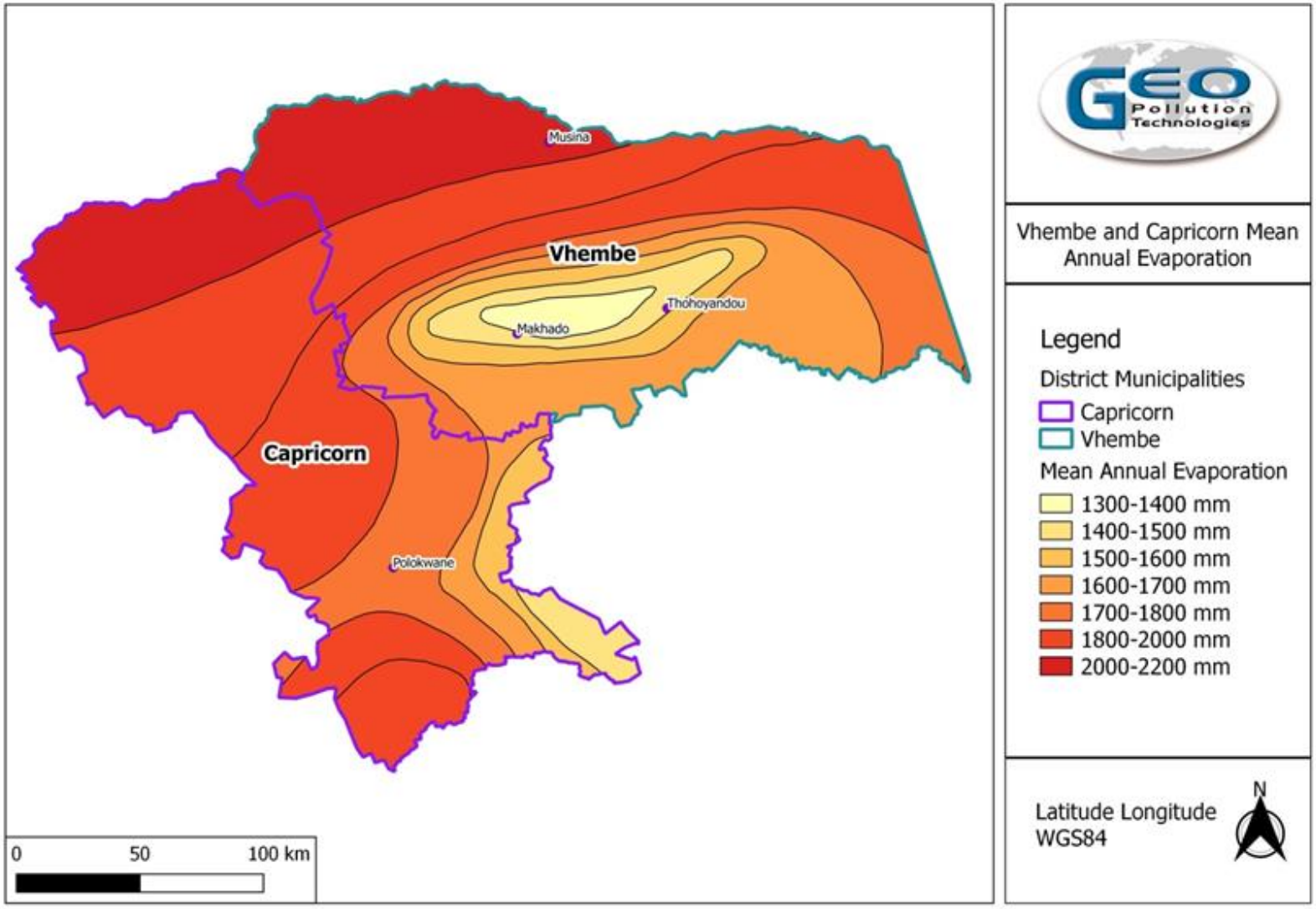


Figure 19: Mean Annual Evaporation in the Vhembe District Municipality (GRDM Database, DWAF, 2015)

Groundwater is of good quality in the Soutpansberg rocks south of HRCP area, which is the main recharge zone; however, increased salinity occurs northwards towards the Mutamba as groundwater flows through saline Karoo sediments, accumulating salts. Low recharge rates in the drier terrain north of the Soutpansberg also results in low recharge rates to dilute these salts. The movement of groundwater passing through saline deposits of the Karoo rocks, and subsequent evapotranspiration by riverine vegetation along the Mutamba, causes a rapid salt accumulation northward, with a peak salt load along the fringes of the Mutamba River, resulting in poor natural water quality in the vicinity of the mine.

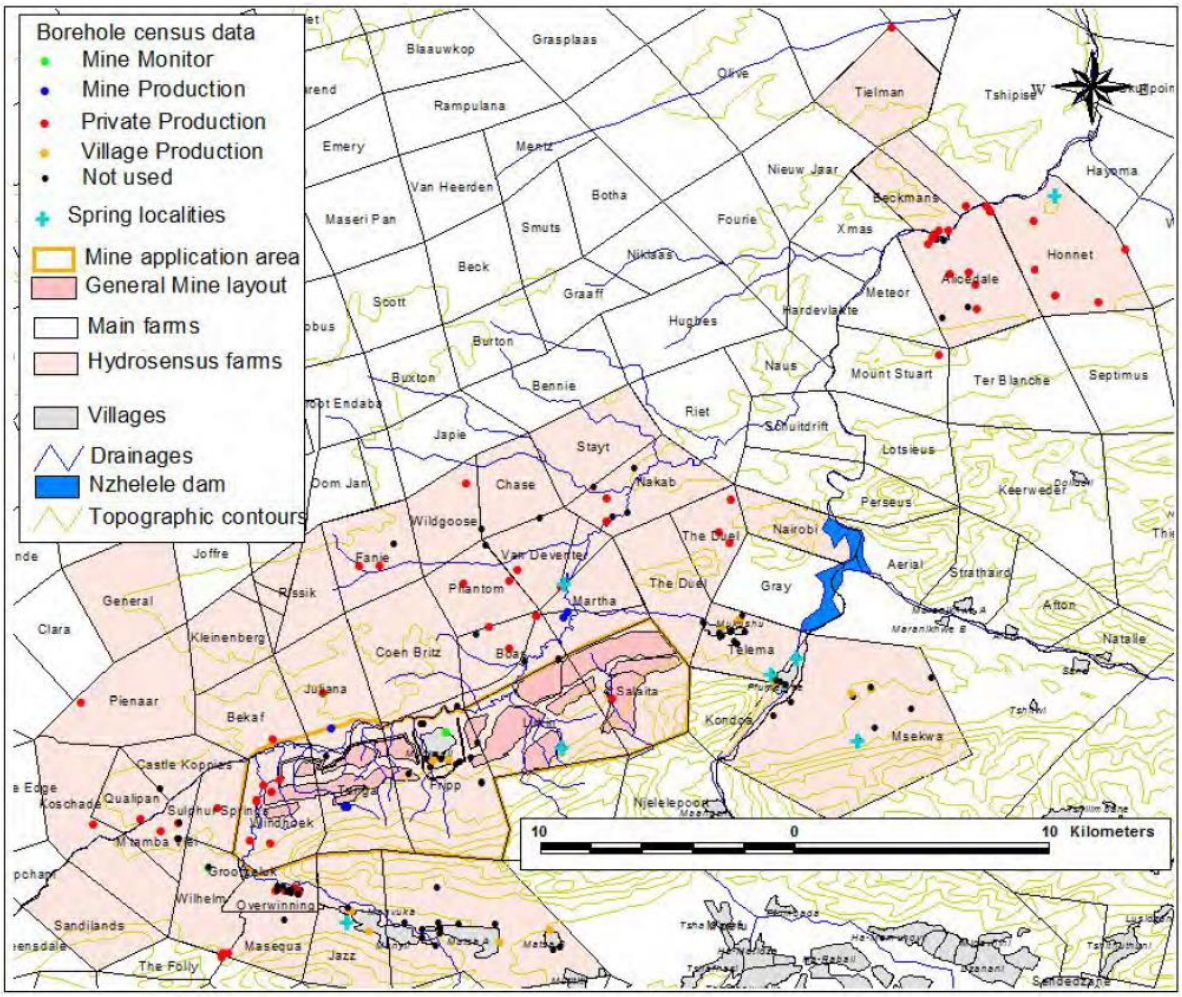


Figure 20: Hydro-Census Borehole Localities – WSM Leshika, 2012[3]

[3] Hydro Census Investigations – WSM Leshika, 2012 for Makhado Coal Mine

Table 28: Summary of Pump Test Data – WSM Leshika, 2012[4]

FARM	BORE HOLE No	CO ORDINATES				DATE TESTED	WATER LEVEL (mbgl)	WATER STRIKE (mbgl)	BLOW YIELD (l/sec)	STEP TEST		CONSTANT DISCHARGE TEST				RECOMMENDATIONS				WATER QUALITY CLASS
		LAT	LONG	X	Y					Time (mins)	% Recovery	Duration (mins)	Rate (l/sec)	T (m3/d/m)	% Recovery	Rate (l/sec)	Duty cycle (hrs/day)	Supply (Kl/day)	Pump set (mbgl)	
MARTHA	WCAS-5	-22.75676	30.01451	2517957	-104199	28/07/11	14.3	21	2	140	89.0	720	0.6	24	89	0.5	8	14.4	24	III
BOAS	CAS-1	-22.75575	30.00011	2517912	-102524	31/07/09	10.0	?	?	120	88.0	480	11.0	231	85	10.0	8	288.0	45	IV
BOAS	CAS-2	-22.75738	29.98929	2517836	-102721	01/08/09	17.3	?	?	9	92.0	-	-	-	-			NR		
BOAS	CAS-3	-22.75772	29.99885	2518053	-102590	9/10/10	9.5	?	?	240	99.4	1440	5.6	25	86	2.0	8	57.6	35	IV
BOAS	WCAS-3	-22.76114	29.99054	2518426	-101734	1/09/09	15.1	45	10	120	98.8	480	7.4	72	93	5.0	8	144.0	45	IV
BOAS	WCAS-4	-22.77839	29.98571	2520333	-101225	05/07/11	14.8	122	10	310	91.2	720	7.7	94	86.8	7.0	8	201.6	80	IV
BOAS	WBOAS-5	-22.76652	29.98174	2519015	-100826	21/10/10	27.0	44	3	180	99.9	1440	3.7	16	100	1.5	8	43.2	44	III

[4] Borehole Pump Test Data – WSM Leshika, 2012 for Makhado Coal Mine

2.7 Landuse and Capability

The northern and western parts of the Vhembe district are sparsely populated, whereas Thohoyandou, Makhado areas are of the most densely populated areas in the District. The nodes are well defined, with Makhado, Thohoyandou and Musina as the most important economical nodes.

The area north of the Soutpansberg mountain range is Mopani veld, and is only suitable for extensive cattle or game farming. There are a number of irrigation regions along the more important river systems with the Limpopo, Nwanedi and Nzhelele regions as examples. Various game farming which is linked to eco-tourism is situated north of the Soutpansberg area.

Mudimeli and Makushu rural semi-settlements are located 2.8k m south-west of Boas Farm and 3.6 km south-east of Martha Farm respectively.

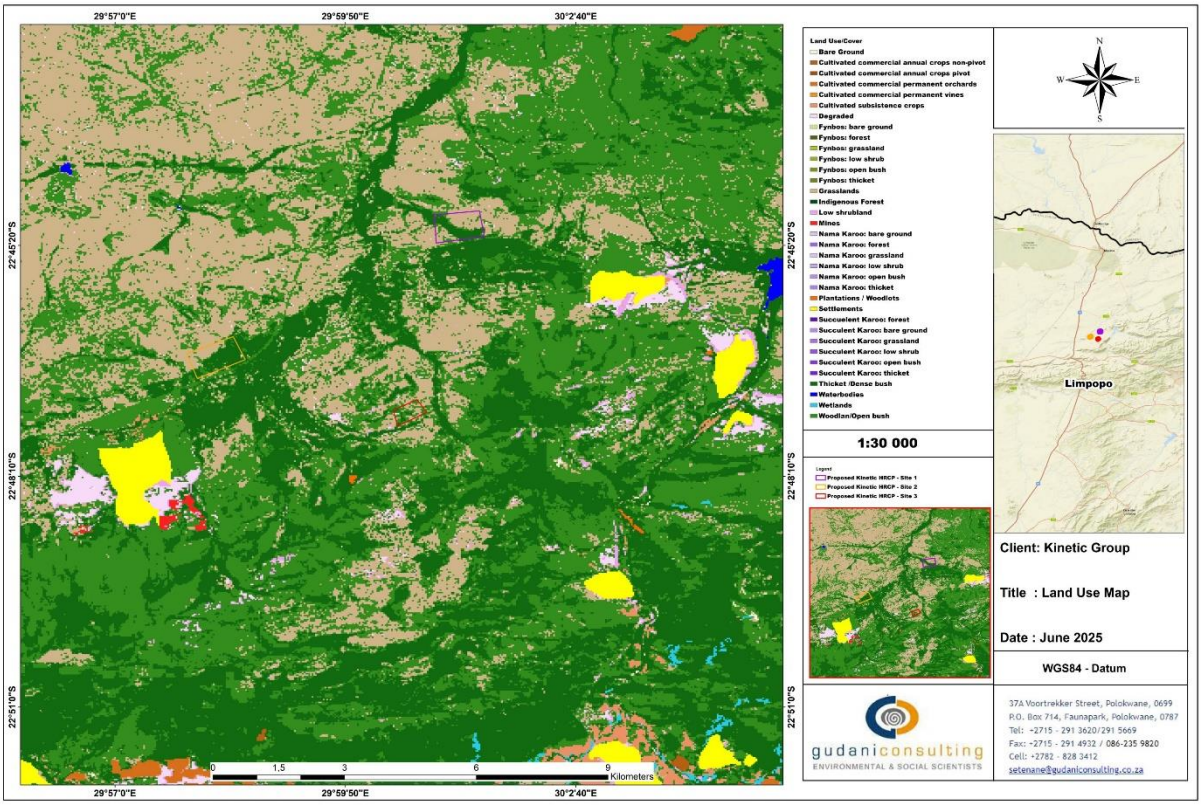


Figure 21: Landuse Map Around the HRCP Area

The proportion of the land-use where the proposed HRCP will be located is used for subsistence cattle farming – with limited farm households and eco-tourism practices and woodland. No active centre pivot irrigation systems over the applicable alternative sites/farms area were observed during the site investigations.

During EIA/EMP phase land use and capability will be assessed in categories of arable land, grazing land, wetlands/riparian zones and household/settlement. Wetlands and riparian zones will also be delineated as part of the soil and land capability assessment

based on soil properties. Auger observations will be made systematically towards possible wetland zones in order to locate the point where soil properties reflect signs of wetness within 500 mm from the surface or where soil, topography or vegetation indicate the boundary of the riparian zone.

2.8 Air Quality

In order to effectively assess the possible impacts of air pollutants on the surrounding environment and human health, it is important to understand the air dispersion potential of the area. The dispersion, chemical transformation and eventual removal of pollutants from the atmosphere are governed by meteorological conditions (Godish, 1990; Pasquill and Smith, 1983). Dispersion comprises vertical and horizontal components of motion. The vertical component is defined by the stability of the atmosphere and the depth of the surface mixing layer. The horizontal dispersion of pollution in the boundary layer is primarily a function of the wind field. Thus, the degree of thermal and mechanical turbulence within the earth's boundary layer will influence the extent to which pollution will accumulate or disperse in the atmosphere. Similarly wind direction, and the variability thereof, will influence the dispersal path pollutants will follow and the scale of cross-wind spreading (Oke, 1990; Pasquill and Smith, 1983; Shaw and Munn, 1971).

2.8.1 Ambient Air Quality

The proposed HRCP site is located in an area currently affected by air pollution sources such as mining, unpaved roads, wind-erodible areas and vehicle exhaust emissions. Pollutants released include but are not limited to fugitive PM_{10} and TSP and gaseous pollutants as products of the combustion of petrol and diesel.

2.8.2 Surface Wind Field

Wind roses are presented for the two SAWS weather stations for the 2011 period (Figure 22). The predominant wind direction at Tshipise is from the south-east with wind speed frequently less than 5.7 m/s. Winds at the Thohoyando are predominantly from the west frequently of speeds between 2.1 and 3.6 m/s. Calm conditions (wind speeds less than 1 m/s) are more common at Tshipise (40.13%) compared with Thohoyando (4.14%).

Increased wind speeds were recorded during day-time conditions with calm conditions more commonly occurring during the night.

2.8.3 Sources of Air Pollution in the Region

Neighbouring land-use in the surrounding areas of the coke and heat recovery plant project sites comprises predominantly of mining activities (MC Mining Coal Mine), farming, eco-tourism, businesses along N1 main road and settlements (Mudimeli and Makushu). These land-uses contribute to baseline pollutant concentrations through fugitive and process emissions, vehicle tailpipe emissions, household fuel combustion, biomass burning, unpaved gravel roads, and openpit mining.

Traffic Emission

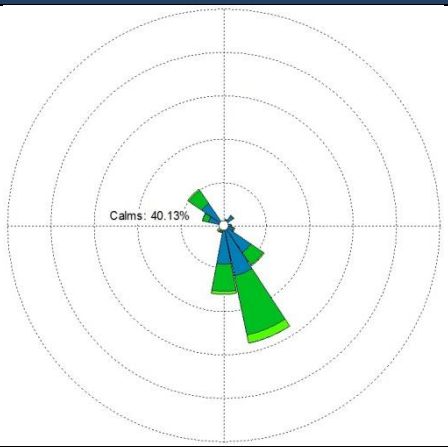
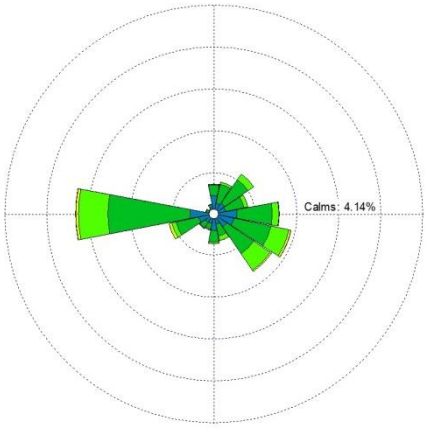
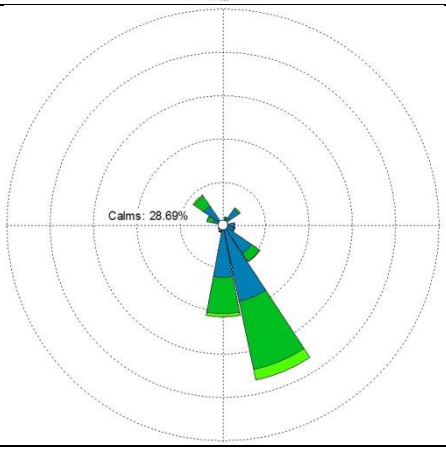
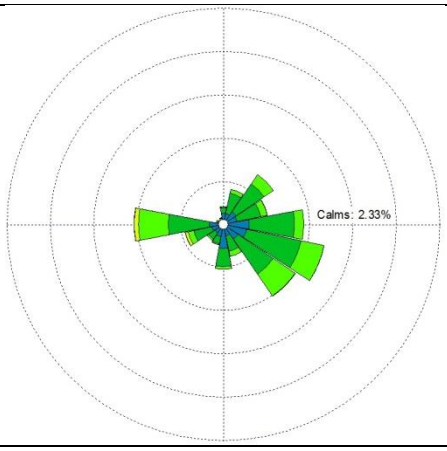
Vehicle emissions are a significant source of carbon monoxide (CO), oxides of nitrogen (NOx), organic compounds (including non-methane organic compounds – NMTOC; and total organic compounds - TOC), benzene, lead, acetaldehyde,

formaldehyde and 1.3-butadiene emissions in all urban areas. The significance of vehicle emissions in terms of their contribution to air pollutant concentrations and health risks is enhanced by the low level at which the emissions occur, and the proximity of such releases to high exposure areas. Vehicle emissions also tend to peak in the early morning and evenings, at which time atmospheric dispersion potentials are reduced.

In Vhembe District, vehicle tailpipe emissions will contribute to sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) resulting primarily from the national and regional roads (Table 29).

Table 29: Total Vehicle Tailpipe Emissions Quantified for Vhembe DM (Limpopo AQMP, 2013)

District	Emission rate (tpa)				
	CO	HC	NO_x	TPM	CO_2
Vhembe					
National roads	884.6	90.9	1 142.7	36.1	214 526.5
Regional roads	4.6	0.4	4.2	0.1	933.9

Averaging Period	Tshipise	Thohoyandou
Period		
Day		

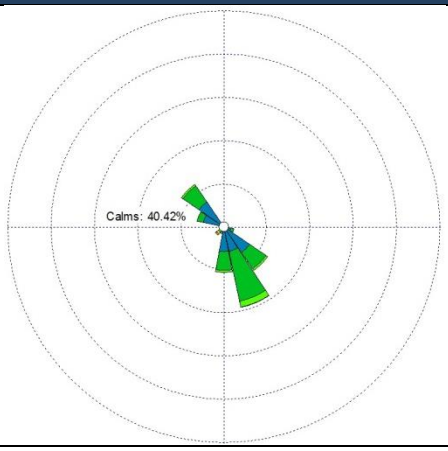
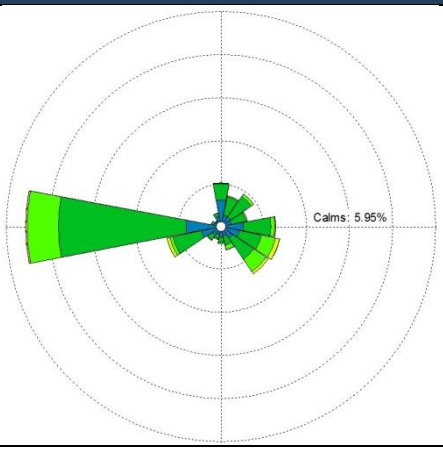
Averaging Period	Tshipise	Thohoyandou
Night		

Figure 22: Wind Roses for Vhembe SAWS Meteorological Station (1-Jan to 31-Dec 2011)

Mining Sources

Existing mines located in the region of the proposed HRCP project include the MC Mining Coal Mine adjacent to the proposed HRCP site (1.5 km south east of Boas Farm and 3.5 km south west of Martha Farm). Particulates represent the main pollutant of concern at mining operations, especially opencast operations. The amount of dust emitted by the mining activities depends on the physical characteristics of the material (coal), the way in which the material is handled and weather conditions (e.g. high wind speeds, rainfall, etc.).

Biomass Burning

Crop-residue burning and general wild fires (veld fires) represent significant sources of combustion-related emissions associated with agricultural areas. Biomass burning includes the burning of evergreen and deciduous forests, woodlands, grasslands, and agricultural lands. Within the Limpopo province, wild fires (locally known as veld fires) may represent significant sources of combustion-related emissions (Maenhaut et al., 1996; Galpin and Turner, 1999). Three vegetation biomes occur across the province although the most predominant is the savanna biome (97% of the total area). Grassland (2.9%) and forest (0.1%) patches occur in the higher lying areas. The type of savanna varies across the province from moist low-veld savanna where woody biomass is large to the more arid savanna with lower woody biomass in the west. With this diversity in plant biomass, the frequency of wildfires is likely to vary between annual and triennial (Scholes, 2004).

Biomass burning is an incomplete combustion process (Cachier, 1992), with CO, methane (CH_4) and NO_2 gases being emitted. Approximately 40% of the nitrogen in biomass is emitted as nitrogen, 10% is left in the ashes, and it may be assumed that 20% of the nitrogen is emitted as higher molecular weight nitrogen compounds (Held et al., 1996). The visibility of the smoke plumes is attributed to the aerosol (particulate matter) content. In addition to the impact of biomass burning across the province, long-range transported emissions from this source can be expected to impact on the air quality between the months August to October. It is impossible to control this source of atmospheric pollution loading; however, it should be noted as

part of the background or baseline condition before considering the impacts of other local sources.

The concern with biomass burning is high potential of secondary anthropogenic $PM_{2.5}$ formation due to incomplete combustion of organic matter. It is expected that the amount of PM_{10} and $PM_{2.5}$ resulting from biomass burning are underestimated and hence the potential health risk associated with it. This also directly relate to the underestimation of the effect on atmospheric chemistry such as photochemistry.

Aerosols, black carbon and hydrocarbons are associated with biomass burning. Biomass burning is also a significant source of greenhouse gases, especially CO_2, black carbon and photochemical gases (NOx, CO and hydrocarbons) that lead to the production of tropospheric ozone (O_3).

Agricultural Activities
Agricultural activities within the province primarily include cattle farms, game farms, fruit trees and crop production. Particulate matter is the main pollutant of concern from agricultural activities as particulate emissions derive from windblown dust, burning crop residue, and dust entrainment as a result of vehicles travelling along dirt roads. In addition, pollen grains, mould spores and plant and insect parts from agricultural activities all contribute to the particulate load (WHO, 2000). Chemicals associated with crop spraying and odiferous emissions resulting from manure, fertilizer and crop residue have been identified as a main concern. Spray drift due to aerial crop spraying can distribute organo-chemicals in the nearby vicinity or even further afield. Crop residue burning and burning for frost prevention are additional sources of particulate emissions and other toxins.

Fugitive Dust Sources
These sources are termed fugitive because they are not discharged to the atmosphere in a confined flow stream. Sources of fugitive dust identified in the study area include paved and unpaved roads and wind erosion of sparsely vegetated surfaces.

Unpaved and Paved Roads
Emissions from unpaved roads may constitute a significance source of emissions to ambient air. When a vehicle travels on an unpaved road the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong turbulent air shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed. Dust emissions from unpaved roads vary in relation to the vehicle traffic and the silt loading on the roads. Unpaved roads in the region are the main access road to Mudimeli and Makushu villages – D745 and D3672, MC Mining and mine haul roads.

Domestic Fuel Combustion
Domestic households are known to have the potential to be one the most significant sources that contribute to poor air quality within residential areas. Individual households are low volume emitters, but their cumulative impact is significant. It is likely that households within the local communities or settlements in Mudimeli and Makushu utilize coal, paraffin and/or wood for cooking and/or space heating (mainly

during winter) purposes. Pollutants arising from the combustion of wood include respirable particulates, CO and SO_2 with trace amounts of polycyclic aromatic hydrocarbons (PAHs), in particular benzo(a)pyrene and formaldehyde. Particulate emissions from wood burning have been found to contain about 50% elemental carbon and about 50% condensed hydrocarbons.

2.9 Noise

Noise can be defined as "unwanted sound", and an audible acoustic energy that adversely affects the physiological and/or psychological well-being of people, or which disturbs or impairs the convenience or peace of any person. One can generalise by saying that sound becomes unwanted when it:

- Hinders speech communication;
- Impedes the thinking process;
- Interferes with concentration;
- Obstructs activities (work, leisure and sleeping); and
- Presents a health risk due to hearing damage.

Noise does not need to be loud to be considered “disturbing”. One can refer to a dripping tap in the quiet of the night, or the irritating “thump-thump” of the music from a neighbouring house at night when one would prefer to sleep. Severity of the annoyance depends on factors such as:

- Background sound levels and the background sound levels the receptor is used to;
- The manner in which the receptor can control the noise (helplessness);
- The time, unpredictability, frequency distribution, duration, and intensity of the noise;
- The physiological state of the receptor; and
- The attitude of the receptor about the emitter (noise source).

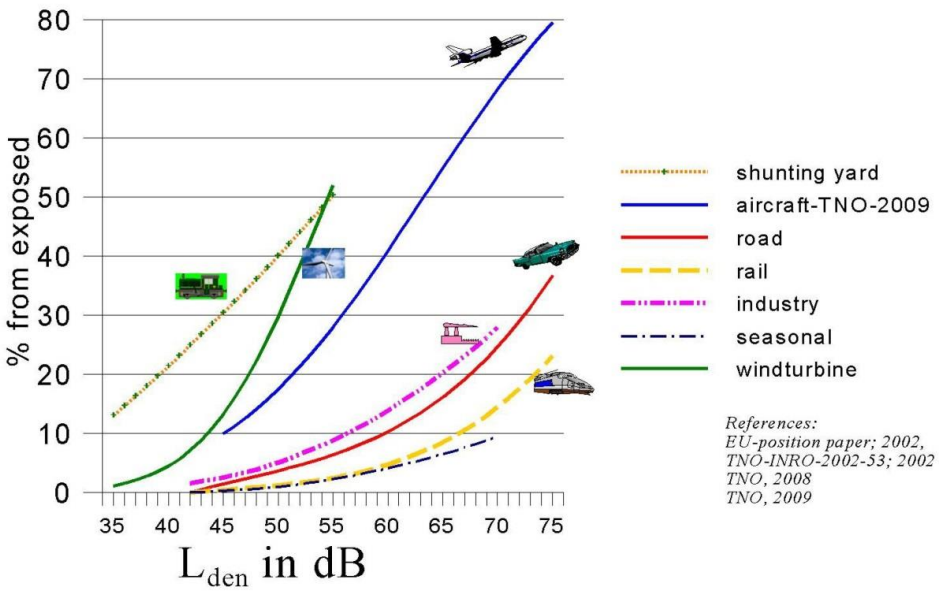


Figure 23: Percentage of Annoyed Persons for the Day-Evening-Night Noise Exposure

On the basis of a number of studies into noise annoyance, exposure-response relationships were derived for high annoyance from different noise sources. These relationships, illustrated in Figure 23, are recommended in a European Union position paper published in 2002, stipulating policy regarding the quantification of annoyance. This can be used in Environmental Health Impact Assessment and cost-benefit analysis to translate noise maps into overviews of the numbers of persons that may be annoyed, thereby giving insight into the situation expected in the long term. It is not applicable to local complaint-type situations or to an assessment of the short-term effects of a change in noise climate.

2.9.1 Existing Ambient Noise Levels

The soundscape is complex, with elevated sound levels around the MC Mining operations as well as close to the main gravel (D745 and D3672) and N1 national roads. Excluding the activities mentioned above, most of the site is undeveloped with the ambient sound levels more typical of a rural noise district with natural sound (wind and faunal) being the dominant source of noise. Sound levels will be briefly elevated along the gravel roads in the area during the passing of vehicles.

The main roads influencing the HRCP study area are[5]:

- National Road N1 is aligned in a north-south direction through the western sector of the HRCP study area. It links Makhado (approximately 32km to the south of the planned HRCP) to Musina (approximately 50km to the north of the planned HRCP).

- Road D745. This Provincial road is aligned in an east-west direction along the southern boundary of Boas farm, linking from National Road N1 to Road D3672, where it turns northwards to link to Road P135/1 (Route R525). This road provides access from National Road N1 to Mudimeli Village and to the planned HRCP. It is a gravel road. For convenience in this report the section of Road D745 from National Road N1 to Road D3672 is called Road D745 (South) while the section from Road D3672 to Road P135/1 is called Road D745 (North). Road D745 (South) is aligned along the southern property boundary of the farm Boas.
- Road D3672. This Provincial road is aligned in an east-west direction along the southern boundary of Martha farm, linking from Road D745 (South) to Road D3671. This road provides access to the villages of Makushu and Musekwa, and to the southern sector of the Nzhelele Dam.

Potentially noise-sensitive developments (NSDs), located within or close to the focus area (HRCP) were identified as indicated in Figure 18.

The most important road noise/sound contributors include:

- Road traffic volume and speeds (most significant);
- Other road noise contributors (maintenance conditions, modifications etc.);
- Road vehicle type (trucks, busses, cars, motorbikes, etc.);
- Road/tyre interaction which includes:
  - Vehicle tyre design;
  - Stick-slip, stick-snap and air pumping;
  - Horn amplification;

[5] Jongens Keet Associates - Noise Impact Assessment of the Proposed Makhado Colliery Project - 2012

- Sub-grade, sub-base (or granular/cemented sub-base) and base course of road pavement material - Hot-mix, cold-mix, synthetic binder, resin modified etc. asphalt, Portland cement concrete (PCC), Unpaved Roads
- Surface texture;
- Surface porosity; and

- Single maximum noise events - magnitude and occurrences (LAmax).

Table 30: Acceptable Zone Sound Levels for Noise in Districts (SANS 10103:2008)

1	2	3	4	5	6	7	
Type of district	Equivalent continuous rating level ($L_{Req,T}$) for noise dBA						**EARES rating colour code**
	Outdoors			Indoors, with open windows			
	Day/night $L_{R,dn}$	Daytime $L_{Req,d}$	Night-time $L_{Req,n}$	Day/night $L_{R,dn}$	Daytime $L_{Req,d}$	Night-time $L_{Req,n}$	
Recommended for Residential Use							
a) Rural districts	45	45	35	35	35	25	Rural
b) Suburban districts with little road traffic	50	50	40	40	40	30	Suburban
c) Urban districts	55	55	45	45	45	35	Urban
Not Recommended for Residential Use							
d) Urban districts with one or more of the following: workshops; business premises; and main roads	60	60	50	50	50	40	Busy urban
e) Central business districts	65	65	55	55	55	45	Business
f) Industrial districts	70	70	60	60	60	50	Industrial

Sensitive noise receptors for the HRCP project will predominantly be the Mudimeli and Makushu Community/Households situated on the south-west and south-east of the proposed project alternative farms of Boas and Martha.

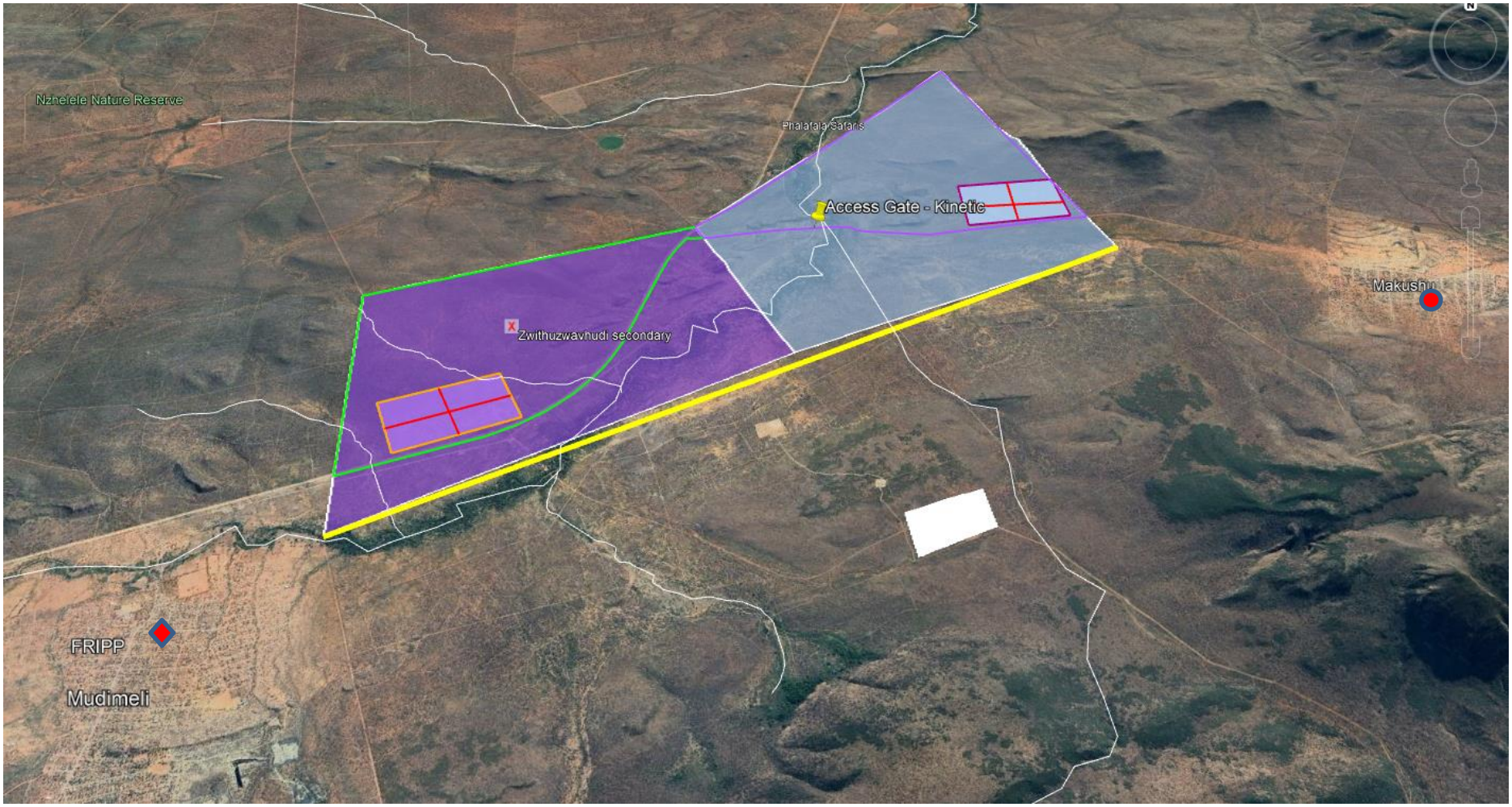


Figure 24: Potentially Noise-Sensitive Receptors Close to HRCP Project Area/Sites

2.10 Heritage, Cultural and Archaeological Aspects

The field assessments of the study will be conducted according to generally accepted Heritage Impact Assessment (HIA) practices and aimed at locating all possible objects, sites and features of heritage significance in the area of the proposed development. The location/position of all sites, features and objects will be determined by means of a Global Positioning System (GPS) where possible, while detail photographs are also taken where needed.

The proposed project area is considered a "greenfields development" in that there has been minimal investment and development on the affected properties. This notwithstanding, the project area has been greatly disturbed through anthropogenic activity, including the grazing of livestock and individual residences. Some of the modern structures identified within the Project area during the pre-disturbance survey appear to have been used as tourist accommodation. The following heritage findings from previous studies have been noted within the vicinity of the HRCP site:

- Cultural Landscapes of Heritage Value:
    - Mopane Vegetation System;
    - Baobab Trees;
    - Marula Trees;
    - Modern Commercial Farmsteads;
    - Buildings and Structures Older than 60 Years;
    - Graves and Burial Grounds
- Archaeological Sites:
    - The Stone Age (very rarely encountered);
    - The Later Iron Age;
- Historical Archaeology:
    - A number of archaeological sites represent a young layer of abandoned farm workers dwellings.

The findings of these studies are indicative of the heritage aspects that affect the properties for the proposed HRCP.

The HIA will determine the stone age, iron age and historical age cultural and archaeological resources within the proposed HRCP alternative sites.

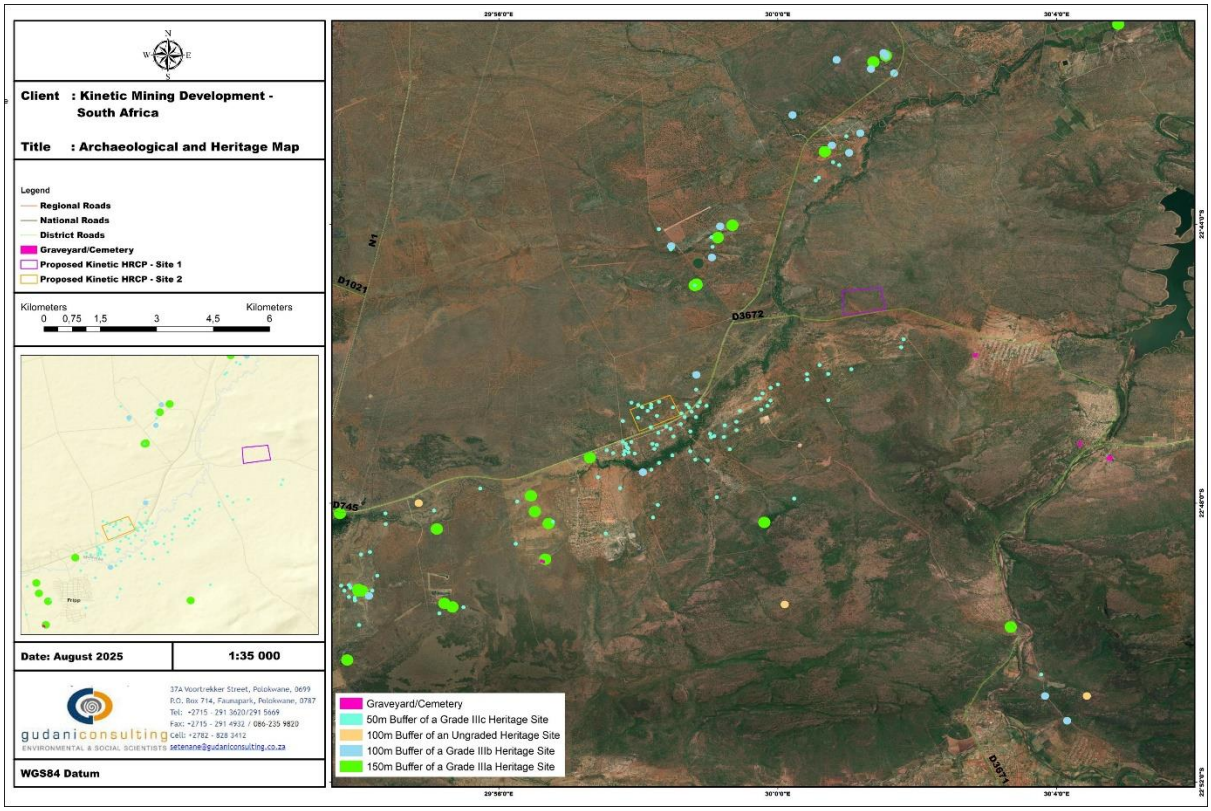


Figure 25: Heritage Sites Around the HRCP Area

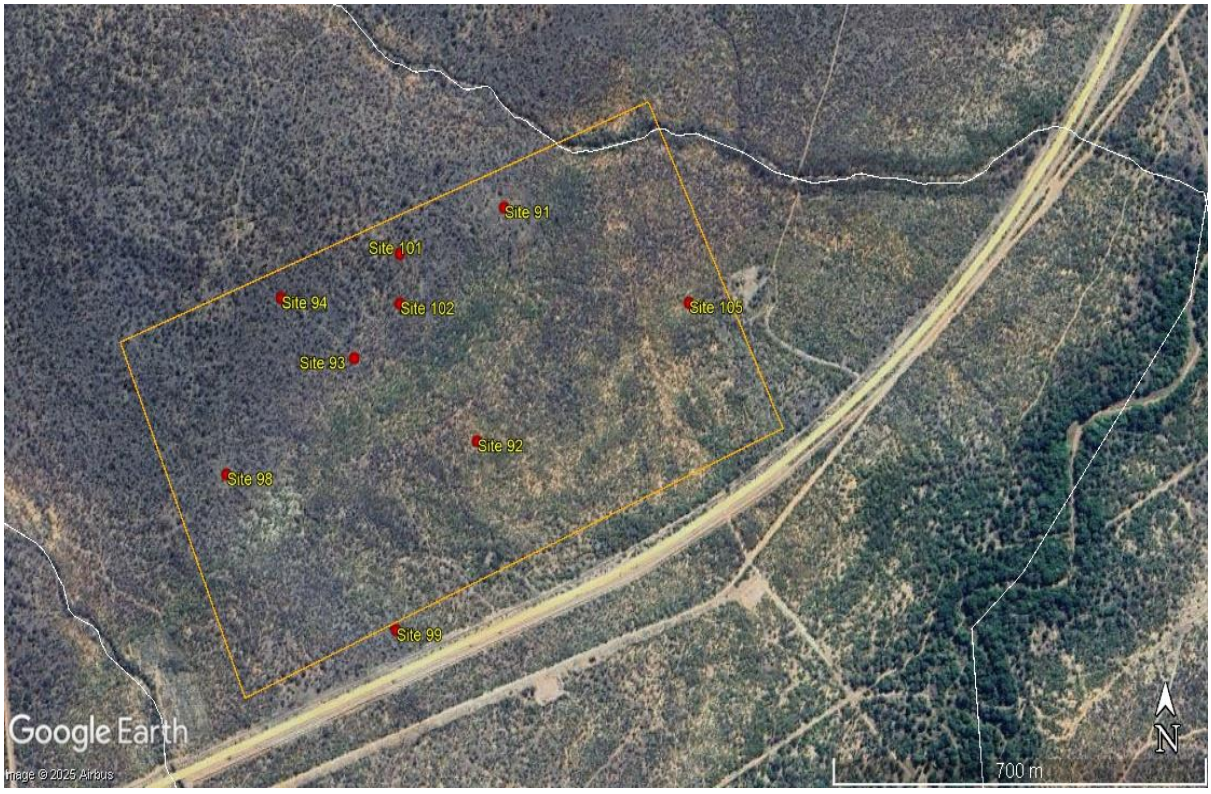


Figure 26: Heritage Resources Identified During Previous Studies

2.11 Visual Aspects

The proposed HRCP project site will be visible from Mudimeli and Makushu settlements, MC Mining operations, and along main gravel roads (D745 and D3672), and the adjacent farm homesteads.

The site and surrounds are sparsely developed and primarily in agricultural use. An active MC Mining coal mine is located on the southern west/east boundary of the proposed HRCP alternative sites. Mudimeli village is situated 2.8 km south west of project alternative site 2 (Boas Farm) – along D745 and Makushu village is 3.2 km south east of alternative site 1 (Martha Farm) – along D3672.

The construction and operation phase of the proposed HRCP project activities and associated infrastructure will have visual impacts on the natural scenic resources and the topography. However, with the correct mitigation measures the impact might decrease to a point where the visual impact can be seen as less significant. The moderating factors of the visual impact of the proposed HRCP operations in close range will include the following:

- Number of human inhabitants located in the area;
- Natural topography and vegetation;
- Mitigation measures that will be implemented such as the establishment of barriers or screens;
- The size of the operation; and
- High absorption capacity of the landscape.

The visual impact from the HRCP activities can be mitigated to a point where it can be seen as less significance. Thus, mitigation measures are very important and one of the most significant mitigation measures are the rehabilitation of the area during and after the HRCP operations are concluded. If the rehabilitation of the impact is not done correctly and the final landform do not fit into the surrounding area, then the visual impact will remain high and become a concern. However, with correct rehabilitation, the impact will be minimal and there should be less visual impact after the landform has been restored.

2.12 Socio-Economic Aspects

The proposed HRCP site is located 50 km south-east of Musina Town and 35 km north-east of Makhado Town in Vhembe District, Limpopo Province. It is located close to the N1 national route from Makhado to Musina, along road D745 and D3276 gravel roads to Mudimeli and Makushu respectively.

2.12.1 Administrative Settings

The Vhembe District Municipality (Venda: Masipala wa Tshiṱiriki tsha Vhembe; Tsonga: Masipala wa Xifundza xa Vhembe) is one of the 5 districts of the Limpopo province of South Africa. VDM comprise of the following local municipalities: (Musina, Thulamela, Makhado, and Collins Chabane). It is the northernmost district of the country and shares its northern border with the Beitbridge District in Zimbabwe and on the east with the Gaza Province in Mozambique. The seat is Thohoyandou, the capital of the former Venda Bantustan. According to the 2011

census, the majority of the municipality's 800,000 inhabitants spoke TshiVenda as their mother language, while 400,000 spoke Xitsonga as their home language. However, the Tsonga people form the majority south of the Levubu River, while the Venda are the minority south of Levubu at 15%. The Sepedi speakers number 27,000. The district code is DC34. The Limpopo River valley forms the border between the district and its international neighbours. The municipal area is 25 597 km^2 in extent and covers a geographical area that is predominantly rural. The main economic sectors of Vhembe District are mining, community services and finance.

The Vhembe region became the Vhembe Biosphere Reserve in 2009, which was officially declared a biosphere reserve in 2011. The reserve includes the Blouberg Range, the Kruger National Park, the Philip Herd Nature Reserve, the Nwanedi Nature Reserve, the Makgabeng Plateau, the Makuleke Wetlands, the Mapungubwe Cultural Landscape and the Soutpansberg.

The Vhembe District Municipality has a low economically active population of about 24%, with an employed economically active of 61.7%. Notable is the integration of skills profile that holds 26.2% of skilled occupations. The district also holds 40.2% of Semi-skilled occupations and 33.6% low-skilled occupations. All these have contributed to the high unemployment levels in the Vhembe District. The concern is that instead of the unemployment decreasing, it is increasing.

Vhembe District is predominantly comprised of a young population with 74.99% of the population being at 35 years of age and below. Much of the population are at a good age to be trained and acquire the skills necessary for the development of the economy. The Vhembe district municipality is characterised and or dominated by mining, finance, trade, community services and with agriculture, construction, electricity and transport form the other parts of the economics activities.

2.12.2 Settlements

The area surrounding the proposed HRCP project is characterised by Mudimeli and Makushu communities, farm homesteads and MC Mining activities.

2.12.3 Rationale Behind HRCP Project

With an eye to international trends, the South African government has adopted the policy to accelerate the country's industrialisation, regional and economic development. Similar to the SEZ programme, the proposed HRCP will be a critical tool for the attraction of foreign direct investment (FDI), creation of decent jobs, establishment of new industrial centres, the development and improvement of existing infrastructure.

In-line with the South African government's objectives, there proposed HRCP will enhance:

- Promotion of targeted industrial capabilities within the framework of the IPAP and the NDP,
- Promotion of beneficiation and value-addition to the country's minerals and other natural resources,
- Development of the world-class infrastructure required to support the development of the targeted industrial activities,
- Attraction of foreign and domestic direct investment,

- Acceleration of economic growth and the creation of much needed jobs in previously marginalised regions of the country.

The proposed coke and heat recovery plants will have a construction capital investment of R9.98 billion and employ a total of 874 people over the implementation of the three phases (I – III) over a period of 5 – 10 years. An operational income of approximately R21.6 billion and working capital of approximately R800 million are envisaged.

3.0 ENVIRONMENTAL IMPACTS AND RISKS IDENTIFIED

This section outlines the preliminary assessment of the nature, extent, duration, probability and significance of the identified potential environmental impacts of the proposed coke and heat recovery plants project, including the cumulative environmental impacts.

This section therefore provides:

- Details of the potential **environmental impacts** that were identified during Scoping Phase;
  - A list of the potential impacts of the aforesaid proposed coke and heat recovery plants project activities;
- An assessment of all the potential impacts in terms of their significance.

3.1 Methodology Used in Determining the Significance of Environmental Impacts

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout need revision).

The criteria for the description and assessment of environmental impacts were drawn from the EIA Guidelines (DEAT, 1998) and as amended from time to time (DEAT, 2002).

The level of detail as depicted in the EIA Guidelines (DEAT, Environmental Impact Assessment Guidelines., 1998) (DEAT, Impact Significance, Integrated Environmental Management, Information series 5., 2002)) was fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value, ranging from one (1) to five (5), depending on its definition. This assessment is a relative evaluation within the context of all the activities and the other impacts within the framework of the project.

3.2 Impact Measurement Criteria and Rating

The criteria and explanation followed to measure each impact is outlined below:

NATURE: The character of the impact

EXTENT	DURATION	PROBABILITY	MAGNITUDE
Area	Time Frame	Likelihood	Intensity of impact to destroy or alter socio-economic and biophysical environment.
SIGNIFICANCE: Implication of the impact both with or without mitigation			
TYPE: Description as to whether the impact is negative or positive or neutral.			
MITIGATION: Possible impact management, minimization and mitigation of the identified impacts.			
NO GO OPTION: Evaluation of the no-go-option			

Table 21A: Impact Assessment Criteria

EXTENT	
Classification of the physical and spatial scale of the impact	
Footprint	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.
Site	The impact could affect the whole, or a significant portion of the site.
Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
National	The impact could have an effect that expands throughout the country (South Africa).
International	Where the impact has international ramifications that extend beyond the boundaries of South Africa.
DURATION	
The lifetime of the impact that is measured in relation to the lifetime of the proposed development.	
Short term	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase (0 – 1) years

Short to Medium term	The impact will be relevant through to the end of a construction phase (1 - 5 years).
Medium term	The impact will last up to the end of the development phases (6 – 10 years), where after it will be entirely negated.
Long term	The impact will continue or last for the entire operational lifetime i.e. 11 - 30 years of the development, but will be mitigated by direct human action or by natural processes thereafter.
Permanent	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
INTENSITY	
The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. The intensity is rated as	
Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
Medium	The affected environment is altered, but functions and processes continue, albeit in a modified way.
High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
PROBABILITY	
This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:	
Improbable	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0 %).
Possible	The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25 %.
Likely	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50 %.

Highly Likely	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.
Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.

3.2.1 Nature

Nature of impact describes the character of the impact in terms of the effect on the relevant environmental, social and economic aspect.

3.2.2 Significance and Mitigation

Significance measures the foreseeable significance of the impacts of the HRCP activity both with and without mitigation measures. The significance on the aspects of the environment is classified as:

Mitigation

The impacts that are generated by the development can be minimised if measures are implemented in order to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.

Determination of Significance-Without Mitigation

Significance is determined through a synthesis of impact characteristics as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact "without mitigation" is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as "positive". Significance is rated on the following scale:

Table 21B: Significance-Without Mitigation

NO SIGNIFICANCE	The impact is not substantial and does not require any mitigation action.
LOW	The impact is of little importance, but may require limited mitigation.

MEDIUM	The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
HIGH	The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

Determination of Significance- With Mitigation

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation is rated on the following scale:

Table 21C: Significance- With Mitigation

NO SIGNIFICANCE	The impact will be mitigated to the point where it is regarded as insubstantial.
LOW	The impact will be mitigated to the point where it is of limited importance.
LOW TO MEDIUM	The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.
MEDIUM	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
MEDIUM TO HIGH	The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.
HIGH	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

Assessment Weighting
Each aspect within an impact description was assigned a series of quantitative criteria. Such criteria are likely to differ during the different stages of the project's life cycle. In order to establish a defined base upon which it becomes feasible to make an informed decision, it was necessary to weigh and rank all the criteria.

Ranking, Weighting and Scaling
For each impact under scrutiny, a scaled weighting factor is attached to each respective impact (refer Table 31). The purpose of assigning weights serves to highlight those aspects considered the most critical to the various stakeholders and ensure that each specialist's element of bias is taken into account. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspect criteria.

Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance.

The significance on the aspects of the environment is classified as:

Table 31: Description of Assessment Parameters with its Respective Weighting

Significance Rating (SR) =	(Extent + Intensity + Duration + Probability) x WF

EXTENT		**DURATION**		**INTENSITY**		**PROBABILITY**		**WEIGHTING FACTOR (WF)**		**SIGNIFICANCE RATING (SR)**	
Footprint	1	Short term	1	Low	1	Improbable	1	Low	1	Low	0-19
Site	2	Short to Medium	2			Possible	2	Low to Medium	2	Low to Medium	20-39
Regional	3	Medium term	3	Medium	3	Likely	3	Medium	3	Medium	40-59
National	4	Long term	4			Highly Likely	4	Medium to High	4	Medium to High	60-79
International	5	Permanent	5	High	5	Definite	5	High	5	High	80-100
MITIGATION EFFICIENCY (ME)						**SIGNIFICANCE FOLLOWING MITIGATION (SFM)**					

High	0.2	Low	0 - 19
Medium to High	0.4	Low to Medium	20 - 39
Medium	0.6	Medium	40 - 59
Low to Medium	0.8	Medium to High	60 - 79
Low	1.0	High	80 - 100

Identifying the Potential Impacts Without Mitigation Measures (WOM)
Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1:

Significance Rating (WOM) = (Extent + Intensity + Duration + Probability) x Weighting Factor

Identifying the Potential Impacts with Mitigation Measures (WM)
In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it was necessary to re-evaluate the impact.

Mitigation Efficiency (ME)
The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value (WOM) a mitigation efficiency (ME) rating (refer to Table 31). The allocation of such a rating is a measure of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will manage the impact.

Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2:

Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency
or WM = WOM x ME

Significance Following Mitigation (SFM)
The significance of the impact after the mitigation measures are taken into consideration. The efficiency of the mitigation measure determines the significance of the impact. The level of impact is therefore seen in its entirety with all considerations taken into account.

3.2.3 Status of Impact

Status of impact describes whether the impact is positive (beneficial) on the affected environment (social and bio-physical) or negative (detrimental) or neutral.

Degree of confidence in predictions: The degree of confidence in the predictions, based on the availability of information and specialist knowledge.

Other aspects to take into consideration in the specialist studies are:

- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the full-lifecycle of the proposed development, including construction, operation and decommissioning.
- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region.
- The specialist studies must attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

3.3 Topography

Project Phase	Existing Impact	Project Impact – Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Low	-Ve Med	-Ve	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Operational		-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	
Decommission		-Ve High	-Ve High	-Ve Low	-Ve Low	-Ve Med	-Ve Low	

Environmental Risks Identified:

- Change in the natural topography.
- Disturbance to geophysical and landscape features.
- Impacts of lowering of land elevation due to construction/operational activities.
- Construction of HRCP infrastructure and office buildings.

3.4 Soils

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No Mitigate		Mitigate		No Mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Low	-Ve Med	-Ve Med	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Operational	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Decommission	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low

Environmental Risks Identified:

- Loss of soil as vegetation growth medium.
- Loss of soil productivity.
- Erosion.
- Contamination of soils.
- Unsightly soil heaps around the HRCP site.

3.5 Geology

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No Mitigate		Mitigate		No Mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low
Operational	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low
Decommission	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low	-Ve Low

Environmental Risks Identified:

- Use and loss of geological resources in the area.

3.6 Climate

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Low	-Ve Med	-Ve Med	-Ve Low	-Ve Low	-Ve Med	-Ve Med	-Ve Low
Operational	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve High	-Ve Med	-Ve Low
Decommission	-Ve Low	-Ve High	-Ve High	-Ve Low	-Ve Low	-Ve High	-Ve Med	-Ve Low

Environmental Risks Identified:

- Greenhouse gas emissions – Smoke, Dust and Carbon Dioxide.
- Creation of microclimates.

3.7 Ecology and Bio-Diversity

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Med	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Med
Operational	-Ve Med	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Med
Decommission	-Ve Med	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Med

Environmental Risks Identified:

- Disturbance of sites of conservation importance.
- Loss of species of conservation importance.
- Fragmentation and loss of habitats.
- Displacement of animal species, increased competition in areas where carrying capacity is already compromised.
- Biodiversity impacts.
- Spreading of invasive species.

3.8 Surface Water Resources

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Operational	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Decommission	-Ve Low	-Ve High	-Ve High	-Ve Low	-Ve Low	-Ve Med	-Ve Low	-Ve Low

Environmental Risks Identified:

- Changes in natural surface water flow parameters.
- Disruption of stream banks and wetlands.

- Reduced catchment yield and water available to downstream users and environments.
- Flooding.
- Changes to water regime of pans, wetlands and affected streams.
- Contamination of surface water.
- Changes to water quality.
- Sedimentation of downstream areas.
- Decant / release of contaminated water to the environment.

3.9 Groundwater

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Operational	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Decommission	-Ve Low	-Ve High	-Ve High	-Ve Low	-Ve Low	-Ve Med	-Ve Low	-Ve Low

Environmental Risks Identified:

- Contamination of groundwater.
- Impact on boreholes in area affected by pollution plume (if any).
- Over abstraction of borehole water.

3.10 Landuse and Capability

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Operational	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low

Decommission	**-Ve Low**	**-Ve High**	**-Ve High**	**-Ve Med**	**-Ve Med**	**-Ve Med**	**-Ve Low**	**-Ve Low**

Environmental Risks Identified:

- Loss of undisturbed space.
- Disruption of land uses.
- Damage to and disruption of existing services and infrastructure.
- Change in land use.
- Loss of agricultural land.

3.11 Noise

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	**-Ve Med**	**-Ve Med**	**-Ve Med**	**-Ve Low**	**-Ve Low**	**-Ve Med**	**-Ve Low**	**-Ve Med**
Operational	**-Ve Med**	**-Ve High**	**-Ve High**	**-Ve Med**	**-Ve Med**	**-Ve Med**	**-Ve Low**	**-Ve Med**
Decommission	**-Ve Med**	**-Ve Med**	**-Ve Med**	**-Ve Low**	**-Ve Low**	**-Ve Low**	**-Ve Low**	**-Ve Med**

Environmental Risks Identified:

- Increase in ambient noise levels.
- Disturbances to sensitive receptors.

3.12 Air Quality

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Operational	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Decommission	-Ve Low	-Ve High	-Ve High	-Ve Low	-Ve Low	-Ve Med	-Ve Low	-Ve Low

Environmental Risks Identified:

- Increase in dust level.
- Fallout dust nuisances.
- Air quality impacts on surrounding residents.
- Smoke, dust and carbon dioxide emissions.
- Health impacts due to fine particulate emissions and gaseous emissions.

3.13 Heritage, Cultural and Archaeological Aspects

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Low	-Ve High	-Ve Med	-Ve Med	-Ve Low	-Ve Med	-Ve Low	-Ve Low
Operational	-Ve Low	-Ve High	-Ve Med	-Ve Med	-Ve Low	-Ve Med	-Ve Low	-Ve Low
Decommission	-Ve Low	-Ve High	-Ve Med	-Ve Low	-Ve Low	-Ve Med	-Ve Low	-Ve Low

Environmental Risks Identified:

- Disturbance of graves, stone-age sites, iron age, historical age and other heritage sites and artefacts.
- Establishment of coke and heat recovery plants and associated infrastructure.

3.14 Socio-Economic Aspects

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Med	+Ve Low	+Ve Low	+Ve High	+Ve High	+Ve Low	+Ve High	-Ve Med
Operational	-Ve Med	+Ve Med	+Ve Med	+Ve High	+Ve High	+Ve Med	+Ve High	-Ve Med
Decommission	-Ve Med	+Ve Low	+Ve Low	+Ve Med	+Ve Med	+Ve Low	+Ve Med	-Ve Med

Environmental Risks Identified:

- Economic benefits and risks.
- Increased theft risk and potential for damage to private property during the construction phase.
- Impacts on neighbours and landowners.
- Impact on property/farm values.
- Influx of job seekers during construction phase.
- Provision and availability of adequate chrome supply.
- Industrial development and change of livelihoods.

3.15 Visual Aspects and Sense of Place

Project Phase	Existing Impact	Project Impact Coke and heat recovery plants				Cumulative Impacts		No-Go Option
		No mitigate		Mitigate		No mitigate	Mitigate	
		Boas	Martha	Boas	Martha			
Construction	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Operational	-Ve Low	-Ve High	-Ve High	-Ve Med	-Ve Med	-Ve Med	-Ve Low	-Ve Low
Decommission	-Ve Low	-Ve High	-Ve High	-Ve Low	-Ve Low	-Ve Med	-Ve Low	-Ve Low

Environmental Risks Identified:

- Changes to landscape character, visual appeal and sense of place of the area.

3.16 The Positive and Negative Impacts that the Proposed Activity and Alternatives will have on the Environment and the Community that may be Affected.

(Provide a discussion in terms of the advantages and disadvantages of the proposed coke and heat recovery plants sites and layout compared to the No-Go option to accommodate concerns raised by affected parties)

Actions/Activities/Processes	Technical / Management Options	
	CONSTRUCTION PHASE	OPERATIONAL PHASE
Creation of new employment opportunities	Kinetic Mining Development - SA coke and heat recovery plants project is well aware of the socio-economic pressure an influx of people in a semi-urban area has on the hosting communities and farm homesteads as well as the additional need for Municipal service delivery and infrastructure development. In order to curb the negative impact of the HRCP operation on the area, the HRCP will have a strong focus on local recruitment.	
Loss of agricultural land and skills	All the directly affected parties on whose land the coke and heat recovery plants will be located, will be notified of the project commencement, if authorized, prior to the planting/grazing/hunting season so as to minimize the financial loss.	All the affected parties on whose land the coke and heat recovery plants will be located will be notified of the project life (LOM – 30-40 years).
Increase in criminal activities	Whilst the HRCP has a finite life and therefore, will not be an indefinite economic activity for the region, it will create an economic 'window of opportunity', and financial resources generated through the HRCP can be harnessed to the development of alternative forms of income generation in the area of operation and the region as a whole. A significant portion of the HRCP's operating costs will flow into the local economy.	Kinetic Mining Development - SA coke and heat recovery plants project will initiate and maintain close communications and liaisons with the local Police Station and Makhado Local Municipality in respect of the timing of their development and recruitment activities in order to keep the Police abreast of progress and potential influx of people into the area. Further, a good working relationship with the Police force will help to manage any incidents as and when they arise. Kinetic Mining Development-SA coke and heat recovery plants will contribute towards the establishment of Community Policing Forums (CPFs), if not already established, within the communities immediately adjacent to the HRCP operation and MC Mining. Stakeholders should include but not be limited to the

		local youth, police, local businesses, local landowners and security.
Increased spending power into the local economy	Kinetic Mining Development - SA coke and heat recovery plants will facilitate opportunities for local retail and service industries to establish themselves or expand current services to meet the needs of the HRCP and its employees. The HRCP will support and enhance this positive impact by encouraging and supporting life skills education programmes which focus on responsible personal financial management.	
Social infrastructure to support the influx of people	Infrastructure and Poverty Eradication Projects: Kinetic Mining Development-SA coke and heat recovery plants will endeavour to participate in the local upliftment of the surrounding community. To this end, KMD-sa coke and heat recovery plants proposes to investigate the potential for investment into infrastructure and poverty eradication project. In addition, one of the strategies for meeting this objective is to create Public Private Partnerships in order to accelerate implementation and investment in infrastructural development projects	

4.0 POSSIBLE IMPACT MANAGEMENT MEASURES

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

4.1 Topography

- The proposed HRCP project site (boas or Martha farms) will be permanent structures that will transform the current flat/undulating and topographical features and horizontal configuration of the site.
- The proposed waste dumps will be sloped and graded to an angle suitable for application of topsoil, and re-vegetated, where practical as part of the ongoing maintenance and landscaping of the site. The slopes and landscaping will conform to the surrounding topography following the construction and operational activities.
- Demolition and removal of all temporary construction structures – including all the construction rubble, building material stockpiles, surface infrastructure, and access roads. Should any HRCP infrastructure not be demolished, this will be done in consultation and approval of the local authorities – including LDEDET, local communities and Makhado Municipality (MLM).
- Topsoil stockpiles will be used for various rehabilitation purposes.

4.2 Geology and Soils

- Where possible, prevent sterilization of minerals and promote optimal exploitation.
- To conserve topsoil that will be used for various rehabilitation and re-vegetation programmes following construction phase.
- To ensure rapid and easy establishment of vegetation over rehabilitated areas.
- Progressive rehabilitation and re-vegetation.
- To prevent and minimize soil erosion, which is crucial in rehabilitation.
- To contain any oil, fuel or chemical pollution and the spread of such pollution into the soil and underground and surface water structures – during construction and operational phases.

4.3 Climate

- Management of greenhouse gas emissions and prevention of climate change.
- Design and development of Green Buildings.
- Use of Clean/Green Energy technologies.

4.4 Ecology and Bio-Diversity

- Disturb and destroy as little as possible of the vegetation around the proposed HRCP project development sites.
- Progressively re-establish the destroyed vegetation.
- Conserve vegetation.
- Enable successful re-establishment of the vegetation.
- Limit the areas (habitats) disturbed or destroyed.
- Demolition and removal of all construction related structures when construction activities cease. Should any HRCP infrastructure not be demolished, this will be done in consultation with LDEDET and MLM. And local communities.
- Rehabilitation of disturbed land surfaces.

4.5 Surface Water Resources

- To conserve water resources, optimize water use and prevent pollution.
- To prevent and minimize soil erosion and conserve vegetation.
- Separation of clean and dirty water and compliance with Regulation 704 of the Water Act, 1998.
- Compliance with water resource use legal requirements.
- Investigate alternative sources of water for the proposed HRCP.

4.6 Groundwater

- Conserve and re-use water resources in the HRCP operations.
- To contain any oil, fuel or chemical pollution and the spread of such pollution into the soil, underground and surface water structures.
- Water quality management and pollution prevention.
- Compliance with water resource use legal requirements.
- Investigate alternative sources of water for the proposed HRCP.

4.7 Landuse and Capability

- Confine the proposed coke and heat recovery plants to 60 Ha project area and minimise any loss of undisturbed space and disruption of existing land uses.
- Prevent and minimize damage to and disruption of existing services and infrastructure.
- Where possible avoid and prevent change in landuse, and/or align with existing landuses to enhance both environmental and/or socio-economic benefits.

4.8 Air Quality

- Protect and maintain the health and welfare of employees against dust and other are pollutants.
- Minimize smoke, gas emissions and dust pollution from the construction and operations to the surrounding settlement areas – such as farmers, Mudimeli and Makushu communities.

- Keep records of pollution levels to inform adequate impact management and minimization measures.
- Minimize and prevent greenhouse gas emissions into the atmosphere – carbon dioxide (CO_2), smoke and any other gases.

4.9 Noise

- Keep noise pollution as low as possible, and minimize disturbance to the surrounding settlements/businesses during construction and operational activities. Minimize disruptions of the daily practices and social fabric.
- Protect the health of the employees and surrounding communities during construction and operational phase.
- Record and maintain the records on the health of in-coming and out-going employees.

4.10 Heritage, Cultural and Archaeological Aspects

- To protect and conserve any artefacts or finds of cultural, historic or pre-historic significance for the present and future generations.
- Educate and sensitize staff on the importance of the historical/heritage artefacts or structures – including graves and preservation thereof.
- Demolition and removal of all construction and operational structures when construction and HRCP activities ceases. Should any HRCP infrastructure not be demolished, this will be done in consultation with the LDEDET, SAHRA, MLM, MTC and local communities.

4.11 Visual Aspects

- Rehabilitate the land and minimize visual impact during and after construction/operational activities.
- Demolition and removal of all construction/operational phase structures when construction/operations of the HRCP development are completed. Should any HRCP infrastructure not be demolished, this will be done in consultation with the local authorities – LDEDET, SAHRA, MLM and local communities.

4.12 Socio-Economic Aspects

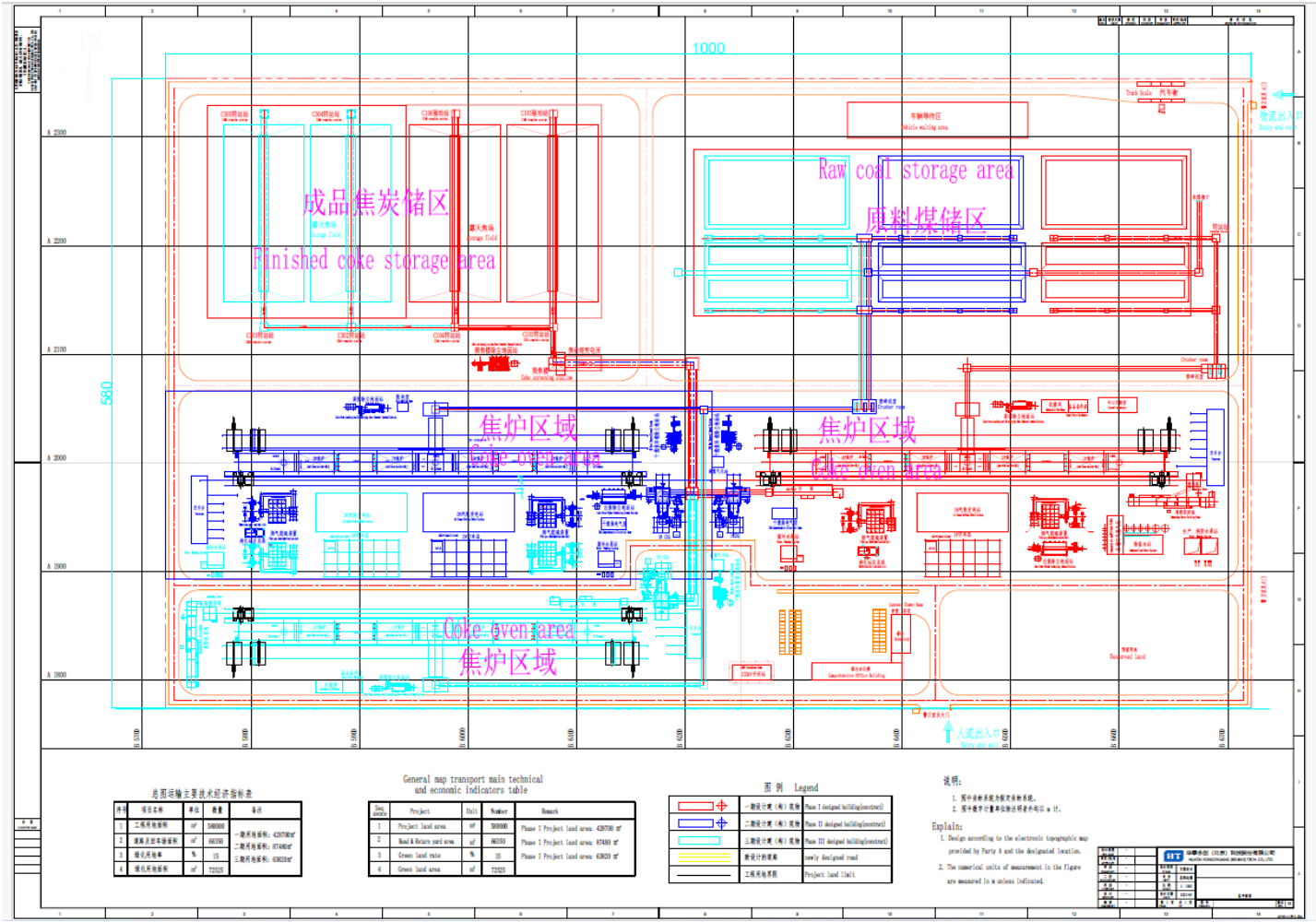
- Create some long-term economic activity, job market around Mphephu Traditional area (villages), Musina and Makhado area for the duration of the HRCP, and in turn poverty alleviation.
- Improved economic activity and opportunities and creation of multiplier economic effects due to the proposed HRCP development – such as supply and services of HRCP equipment, raw materials, transportation, medical services, accommodation, waste recycling businesses, CO_2 capture and re-use.
- Direct capital investment into the proposed development is expected to bring significant benefits through the value chain of machinery, inputs and expenditure. The proposed HRCP is likely to also contribute to sustaining the current operation of the MC Mining and save the current jobs. This will

improve livelihoods and contribute to sustainable development within the surrounding communities.

- New developments always require new skills which are often developed in the process of construction and operation.
- Prevention and minimization of social impacts such as alcoholism, crime, prostitution, HIV/AIDS and teenage pregnancies.
- Proper housing development and settlements in the vicinity of the HRCP area.

4.13 The Outcome of the Site Selection Matrix – Final Site Layout Plan

(Provide a final site layout plan as informed by the process of consultation with interested and affected parties)



4.14 Motivation Where no Alternatives Sites Were Considered

The proposed alternative sites – Boas (site 2) and Martha (site 1) farms are adjacent to the existing MC Mining coal mine, which will provide the primary source of the requisite coal raw material for coking coal production. The No-Go option is the other alternative identified during the scoping phase, which will be discussed in detail as part of the EIA/EMP phase. The following aspects were also considered and will be subject to the subsequent EIA/EMP investigations:

Site 1 (Martha Farm) Site Selection Rationale	Site 2 (Boas Farm) Site Selection Rationale
a) Site is 2.7km from MC Mining. b) Land is owned by MC Mining. c) Existing two boreholes on site. d) One borehole authorised for 42 000 m^3/year. e) Existing Electricity Powerline within the farm. f) Flat terrain suitable for the HRCP. g) Prominent wind direction – away from Makushu Village.	a) Site closest to MC Mining – direct shortest route. b) Land is owned by MC Mining. c) Site along main access road. d) Existing boreholes, but not authorised. e) Conveyor Belt Option - $\pm$ 5.2 km. f) Truck Option - $\pm$ 5.2 km. g) Flat terrain suitable for the HRCP. h) Possible railway line in the future.

4.15 Statement Motivating the Preferred Site

With an eye to international trends, the South African government has adopted a policy to accelerate the country's industrialisation, regional and economic development. This will attraction of foreign direct investment (FDI), creation of decent jobs, establishment of new industrial centres, the development and improvement of existing infrastructure:

- Promotion of targeted industrial capabilities within the framework of the IPAP and the NDP,
- Promotion of beneficiation and value-addition to the country's minerals and other natural resources,
- Development of the world-class infrastructure required to support the development of the targeted
- industrial activities,
- Attraction of foreign and domestic direct investment,
- Acceleration of economic growth and the creation of much needed jobs in previously marginalised regions of the country.

The development of the proposed HRCP will generate approximately 874 jobs in the 5 -10 years of its operation – Phase I to Phase III. The proposed coke and heat recovery plants will have an initial capital investment of R3.72 billion. This will increase by a further R6.2 billion for Phase II and Phase III expansions of the proposed project. There is, therefore, direct economic benefit from both Makhado Local Municipalities and the region at large.

5.0 PLAN OF STUDY FOR EIA

The Plan of Study for EIA is based on the findings and recommendations of the Scoping Report and the related process.

5.1 Description of Alternatives Considered

The inclusion of an alternative analysis is a specific requirement of the Integrated Environmental Management (IEM) procedure as underlined by the NEMA. The IEM procedure stipulates that the environmental investigation needs to consider feasible alternatives for any proposed development.

In order to ensure the proposed development enables sustainable development, a number of feasible options must be explored. The various alternatives will be assessed in terms of both environmental acceptability and socio-economic feasibility.

Two alternatives (Boas farm – site 2 and Martha farm – site 1) in terms of the proposed HRCP project have been considered in the report. The No-Go option is the other alternative identified and will be discussed as part of the EIA/EMP phase. During both the scoping and EIA/EMP phases, public participation plays a key role and is a vital part of the IEM process.

5.2 Description of the Environmental Aspects to be Assessed

Field and site investigations will be done by a team of specialists at the HRCP project site within the study area to identify all environmental and water risks and impacts. This phase will also include comprehensive public participation process and development of detailed environmental maps.

The environmental and technical teams have identified a range of issues that will need further investigation. These include – but not limited to – the following:

- **Ecology** – The natural vegetation and faunal habitat within the proposed HRCP project sites is still in good order, subject to prevailing climatic conditions and landuse in the applicable farms. The natural vegetation is subject to agriculture, farming and limited residential pressure and therefore modified. The extent of this disturbance and the condition of the remaining vegetation nonetheless still needs to be confirmed.
- **Soils** – coke and heat recovery plants development may result in the loss of soils, in an area where soil resources are scarce.
- **Surface water** – The coke and heat recovery plants project may affect surface water flows and may potentially lead to contamination if the runoff and drainage from the site, and potential spills are poorly managed. If dirty surface water is not properly managed it could possibly affect the quality of groundwater. The Mopane area is water scarce, therefore alternative options for water source must be investigated.
  Groundwater – Infiltration of contaminated water from the coke and heat recovery plants footprint and waste dumps may result in contamination of

underground water resources. If poorly managed, potentially contaminated water from the HRCP operations may affect the quality of groundwater and boreholes supplies in the vicinity. Over abstraction of borehole water must be avoided.

- **Land use** – Coke and heat recovery plants will curtail the current land use on the farms concerned and may affect land use in the surrounding area.
- **Air quality** – HRCP emits carbon dioxide, sulphur dioxide, nitrogen oxides, hydrogen sulphide, and particulate matter. These primary pollutants are emitted directly into the atmosphere and therefore, contribute to greenhouse effects. The handing of the coke raw materials may lead to dust and smoke emissions, which may blow over surrounding properties. This may possibly cause a nuisance and may affect people, livestock and plants if not managed properly.
- **Noise** – The HRCP process may lead to an increase in noise levels at surrounding properties and adjacent communities.
- **Socio-economics** – The proposed coke and heat recovery plants will probably have a significant impact on social and economic conditions in the area and should make some contribution to the local, regional and national economy. The HRCP activities may also increase pressure on local infrastructure and resources in terms of secondary economic opportunities.
- **Cultural and archaeological sites** – If graves and cultural or archaeological sites are located in the proposed HRCP area and footprint, they may be disturbed by HRCP operations.
- **Visual aspects** – HRCP infrastructure, especially the plants and waste disposal dumps, may be visually intrusive.

5.3 EIA/EMP Project Team

The Environmental Management team of Gudani Consulting was established in November 2001 and is fully acquainted with, amongst others, the specific application of the requirements of the National Environmental Management Act (No 107 of 1998), the NEMA Waste Management and Air Quality Acts, the National Water Act (Act 36 of 1998), the Mineral and Petroleum Resources Development Act (No 28 of 2002); amendments to these Acts, the Regulations thereof and the process required by government to adhere to. The personnel as depicted in **Table 32** will be involved with the proposed coke and heat recovery plants EIA/EMP/IWULA/AEL project.

Table 32: EIA/EMP Project Team

EIA/EMP Team	Qualification	Specialist Field
Lorato Tigedi EAP	BSc. Hons – Environmental Management - SACNASP (400161/09) and EAPASA (2020/2519)	Environmental Impact Assessment and Management Programme. Water Use Application, Atmospheric Emissions Application, Waste License
Mulanga Sikhitha EAP	BSc. Hons – Environmental Management - SACNASP (119514) and EAPASA (2019/795)	Environmental Impact Assessment and Management Programme. Water Use Application, Atmospheric Emissions Application, Waste License

Setenane Nkopane EAP	MSc Environmental Management (Pr.Sci.Nat) – (400022/13)	Project Management and Environmental Impact Assessment Public Participation

5.4 List of Specialist Studies Required

The identification and initial assessment of environmental aspects revealed the following potentially significant environmental aspects which require further detailed assessment, to be conducted during the EIA/EMP-phase:

Table 33: EIA/EMP Project Specialists

Specialist Study	Specialist	Specialist Assessment
Air Quality	Airshed Planning	Assessment of HRCP emissions of carbon dioxide, GHG, smoke, dust other pollutants directly into the atmosphere.
Biodiversity, Ecology and Wetlands	Environment Research Consulting	Assessment of impacts on flora and fauna, ecological aspects and bio-diversity.
Surface Water, Wetlands and IWWMP	Redkite Environmental Solutions	Assessment of existing surface water resources, flows and drainage patterns and how these will be affected by the coke and heat recovery plants project.
Noise Impact Assessment	Gudani/Enviro Acoustic Research	Coke and heat recovery plants noise impacts on the surrounding properties.
Groundwater Assessment	Geo Equilibria	Evaluation of groundwater resources, water-tables, aquifer characteristics and quality.
Heritage Impact Assessment	Anton Pelser Archaeological Consulting	Potential effects of the proposed coke and heat recovery plants on possible heritage, archaeological and cultural resources.
Public Participation Process	Gudani Consulting	Consultation with all interested and affected parties, stakeholders and authorities.
Socio-Economic Impact Assessment	Gudani / IB Modiba	Assessment of coke and heat recovery plants on social and economic conditions in the area, and contribution to the local and national economy.
Soil, Land Capability, Land-Use and Hydropedology	Environment Research Consulting	Soil, land and agricultural capability for the site.
Visual Impact Assessment	Gudani Consulting	Coke and heat recovery plants infrastructure and activities, plant and waste disposal areas – visual impacts.
Climate Change	Atmosfera Consulting	Atmospheric emissions, greenhouse gases, resource usage and waste

		management from the coke and heat recovery plants activities.
Health Impact Assessment	Naira Environmental Consultants	Coke and heat recovery plants infrastructure and activities, plant and waste disposal areas – health impacts.
Geotechnical Investigations	Geo Equilibria Geotechnical	Geotechnical and soil conditions for civil foundations and designs
Land Survey	SurvMap Survey Mapping/KJC Consultants	Horizontal and surface configuration surveys and mapping for designs and positioning of various coke and heat recovery plants infrastructure.

5.5 Proposed Method of Assessing Duration and Significance

The methodology will be utilised in the rating and evaluation of significance of impacts:

5.5.1 Identification and Description of Impacts

The purpose of undertaking an impact assessment is to ensure that the project proactively considers environmental issues as part of the project planning and decision-making processes throughout the project life cycle.

For each environmental component (i.e. topography, soil, noise, water, landuse, heritage, visual, and air quality etc.), impacts will be identified and described in terms of: detectability / visibility of the impact, exposure of receptors to the impact, compliance with legislation and standards, other applicable targets, limits or thresholds of concern, the level of change / intrusion imposed, and receptor sensitivity. This impact assessment will consider:

- Physical, biological, social and economic components of the environment and their interrelationships.
- The effects of all stages of the project life cycle, including planning, construction and operation will be considered.
- Positive and negative environmental, economic and social impacts.
- Direct, indirect and cumulative impacts.
- Short- and long-duration impacts within the zone(s) of influence, and extreme events.
- Potential trans-boundary effects and global impacts (e.g. air pollution, withdrawal of water from an inter-provincial waterway and emission of greenhouse gasses).
- Potential impacts on local communities/dwellings and/or other vulnerable individuals or groups.

Existing Impacts

The proposed coke and heat recovery plants project is located in an area affected by various historical and existing activities including agriculture, farming, mining, and other linear infrastructure – power-line, roads and railway lines.

The assessment of existing impacts will consider the current level of environmental degradation associated with existing activities and the proposed coke and heat recovery plants development for which the impacts will be defined.

Direct Impacts
Direct impacts refer to the impacts of the proposed coke and heat recovery plants activity, looked at in isolation (impacts of an individual activity), thus not considering the combined, cumulative or synergistic impacts of the activity, or the cumulative impacts of the activity with other activities or the existing impacts.

5.5.2 No-Go Development Impacts
In addition to coke and heat recovery plants activity, the no-go development will be considered as another alternative in the environmental impact assessment and impacts of not developing the proposed coke and heat recovery plants project will be discussed in the environmental impact report.

5.5.3 Cumulative Impacts
In terms of regulatory requirements and the principles of integrated environmental management, the EIA/EMP process for the proposed coke and heat recovery plants project must consider cumulative impacts. For this project, cumulative impacts will be determined as:

Existing Impacts + Direct Impacts = Cumulative Impacts

5.5.4 Impact Mitigation
The significance of environmental impacts will be rated before and after the implementation of mitigation measures. The impact rating system considers the confidence level that can be placed on the successful implementation of the mitigation.

The environmental impact assessment (EIA) will be conducted taking cognizance of the provisions of section 2 and Chapter 5 of the NEMA, 1998, and the relevant EIA Regulations. The criteria to be followed to measure each impact is outlined below:

Table 34: Impact Rating Matrix

NATURE: The character of the impact			
EXTENT	**DURATION**	**PROBABILITY**	**MAGNITUDE**
Area	Time Frame	Likelihood	Intensity of impact to destroy or alter the environment.
SIGNIFICANCE: Implication of the impact both with or without mitigation			
TYPE: Description as to whether the impact is negative or positive or neutral.			
MITIGATION: Possible impact management, minimization and mitigation of the identified impacts.			
NO GO OPTION: Evaluation of the no-go-option			

5.6 Authority Consultation Stages During EIA Process

Subsequent to the submission of the Scoping Report, Gudani Consulting will require additional consultation with the following Departments regarding the way forward:

a) Department of Forestry, Fisheries and the Environment
b) Limpopo Department of Economic Development, Environment and Tourism (LDEDET)
c) Department of Water and Sanitation(DWS)
d) Department of Agriculture and Rural Development - LDARD
e) Limpopo Heritage Resources Authority (LIHRA)
f) South African Heritage Resource Agency (SAHRA)
g) Makhado Local Municipality (MLM)

Table 35: Anticipated Key Dates

Process Phase	Process Details	Estimated Date
Application Phase	Lodge EIA Application with LEDET	09th December 2025
	Receive Confirmation of Application	December 2025
Scoping Phase	Submit Application with Scoping Report	09th December 2025
	Consideration of Scoping Report and Review by I&APs, and Other Authorities	09th December 2025 – 05th February 2026
	Acceptance of Scoping Report	05th February 2026
EIA/EMP Phase	Submit Draft EIA/EMP to LDEDET	28th February 2026
	Consideration of Draft EIA/EMP Report and Review by I&APs, and Other Authorities	01st March – 30th April 2026
	Submit Final EIA/EMP to LDEDET	15th May 2026
	Decision on the Application from LDEDET	May/June 2026

5.7 Public Participation Process During EIA Phase

5.7.1 Steps to be Taken to Notify Interested and Affected Parties

(These steps must include the steps that will be taken to ensure consultation with the affected parties identified in (h) (ii) herein):

The stakeholder engagement process is initiated during the Scoping Phase, but will be continued through the impact assessment phase to keep Interested and Affected Parties (I&APs) informed of the developments within the project, and to maintain liaison with authorities.

5.7.2 Details of the Engagement Process to be Followed

(Describe the process to be undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings and records of such consultation will be required in the EIA at later stage):

During the impact assessment phase stakeholder engagement activities will include:

- The Registration of any additional I&APs;
- The placement of newspaper advertisements in local papers, as identified during the Scoping Phase, with a 4-week commenting period;
- The placement of on-site/email notices to notify stakeholders;
- A public meeting will be held, where required, to dispatch project information to key stakeholders and facilitate communication between stakeholders and the project proponent;
- Communication through letters, email, telephonic conversations will be maintained with authorities and stakeholders throughout the EIA/EMP process until the environmental authorization (EA) has been issued.

5.7.3 Description of the Information to be Provided to the I&APs

(Information to be provided must include the initial site plan and sufficient detail of the intended operation and the typical impacts of each activity, to enable them to assess what impact the activities will have on them or on the use of their land):

The Draft EIA/EMP Report will be made available for review prior to submission of the final document to authorities for decision making. Comments received from I&APs will be included and addressed within the Final EIA/EMP Report. The Final Report will be submitted to LDEDET for final review and sanction.

5.8 Description of the Tasks to be Undertaken During EIA Process

The Environmental Impact Assessment component will aim at:

- Addressing any issues that have been highlighted during the Scoping Phase;
- Assessing all identified impacts to determine the potential significance of the impact; and
- Recommending mitigation measures for minimizing the significance of each impact.

The EIA phase will comprise of the following activities:

1) Stakeholder Engagement Process;
2) Assessment of Alternatives;
3) Baseline and Specialist Studies;
4) Identification of Potential Impacts;
5) Impact Assessment;
6) Identification and Description of Impact Mitigation Measures; and
7) Final Reporting and Decision-Making.

5.9 Identify Suitable Measures to Avoid, Reverse and Mitigate Impacts

Mitigation Objectives: What level of mitigation must be aimed at?
For each identified impact, the specialist must provide mitigation objectives (tolerance limits) which would result in a measurable reduction in impact. Where limited knowledge or expertise exists on such tolerance limits, the specialist must make an "educated analysis" based on his/her professional experience.

Recommended Mitigation Measures
For each impact the specialist will recommend practical mitigation actions which can measurably affect the significance rating. The specialist will also identify management actions, which could enhance the condition of the environment. Where no mitigation is considered feasible, this must be stated and reasons provided.

Effectiveness of Mitigation Measures
The specialist will provide quantifiable standards (performance criteria) for reviewing or tracking the effectiveness of the proposed mitigation actions, where possible.

Possible mitigation measures are outlined in Chapter 4 of this report. Mitigation measures should be recommended in order to enhance benefits and minimise negative impacts:

Environmental Aspect	Relevant Area	Environmental Objective	Potential Impact	Impact Mitigation
Topography	Site	To manage and minimize the topographical features and horizontal configuration of the site	Change in topographical characteristics of the site	The sloping and landscaping of the waste dumps will conform (where practical) to the surrounding topography following, the construction and operational activities.
Soil and Geology	Site	Prevention of mineral sterilization and pollution of soil	Soil pollution and mineral sterilization	Soil stripping and conservation and progressive site rehabilitation.
Climate	Local and Regional	Prevention and minimization of smoke GHG and CO_2 emissions	Greenhouse effect and climate change	Green building designs and green/clean energy use. Containment of GHGs and Harvesting of CO_2.
Ecology and Bio-Diversity	Local	To manage and minimize impacts on flora and fauna	Destruction of flora, fauna and site bio-diversity	Conserve flora and fauna; and species bio-diversity.

Surface and Groundwater	Local	To manage and prevent contamination of local water resources	Water resource contamination	Storm water management and pollution containment. Surface and Groundwater monitoring and management. Re-use of water.
Air Quality	Local	To minimize impacts on local air quality	GHGs, Dust, smoke and CO_2 emissions	Harvesting of CO_2 Dust and PM management Containment of GHGs
Noise	Site	To minimize noise levels around the site	High noise levels during operations.	Keep low noise levels and disturbance to locals residents.
Landuse	Site	Conform and align with existing landuses	Change and conflicting landuses	Rehabilitation of land to conform to existing landuse, where practical.
Heritage Aspects	Site	To minimize and prevent impacts on heritage and cultural resources	Destruction of heritage and cultural resources	To protect and conserve any artefacts or finds of cultural, historic or pre-historic significance.
Socio-Economic Aspects	Local	To enhance socio-economic benefits to locals	Job creation and multiplier effects	Employment of local labour during construction and operations. Enhance multiplier effects.
Visual Aspects	Site	To prevent and minimize littering and unsightly views from sensitive view points	Littering and visual change and sense of place	Progressive rehabilitation, vegetation screening and removal of unsightly structures.

6.0 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

6.1 Compliance with the Provisions of Section 24(4)(a) and (b) Read with Section 24(3)(a) and (7) of NEMA, 1998

6.1.1 Impact on the Socio-Economic Conditions of any Directly Affected Person

Mudimeli and Makushu settlement areas offer very low levels of employment opportunities and there are high levels of poverty in the area.

The development of the proposed HRCP will generate approximately 874 jobs in the first 5 -10 years of its operation – Phase I to Phase III. The proposed coke and heat recovery plants will have an initial capital investment of R3.72 billion. This will increase by a further R6.2 billion for Phase II and Phase III expansions of the proposed project. There is, therefore, direct economic benefit from both Makhado Local Municipalities and the region at large.

Contribution to Local Economy
Direct capital investment into the proposed development is expected to bring significant benefits through the value chain of machinery, inputs and expenditure. The proposed expansion is likely to also contribute to sustaining the current operation of the mine and save the current jobs. This will improve livelihoods and contribute to sustainable development within the surrounding community. Table 36 below outlines the proposed coke and heat recovery plants capital investment.

Table 36: Kinetic Mining Development - SA Capital Investment and Labour Estimates

Anticipated CAPEX value of the project – Phase I – Phase III	Approximately R9.2 billion (HRCP development)
Expected annual income to be generated by or as a result of the project	Approximately R270 000 000
New skilled employment opportunities created in the construction phase the project	100
New skilled employment opportunities created in the operational phase of the project	105
New un-skilled employment opportunities created in the construction phase of the project	150
New un-skilled opportunities created in the operational phase of the project	769
Expected value of the employment opportunities during the development and construction phase	R5 million per month x 12 = R 60 million per year.
Percentage employment values to be accrued to previously disadvantaged individuals	80%
The expected current value of the employment opportunities during the first 10 years	R600 million
Percentage of this value that will accrue to previously disadvantaged individuals	80%

Employment Creation
Both the development and operation of the HRCP will lead to increased demand for labour, particularly during construction of the HRCP and associated infrastructure. Surrounding communities, towns (Mudimeli, Makushu, Other villages with MTC area, Musina and Makhado) will benefit from new job opportunities.

Skills Development
New developments always require new skills which are often developed in the process of construction and operation.

Influx of Outside People
There is a possibility of increased influx of people to the area as people come in search of job opportunities during the construction phase of the project. This is likely to increase pressure on municipal services (water, sanitation, electricity, refuse removal, etc) and state infrastructure (clinics, schools, roads, etc).

Increased Informal Settlement and Associated Problems
Some surrounding villages (Mudimeli and Makushu) are already experiencing an increase in informal settlements and this is likely to continue. With increased informal settlements and the often delayed response in formalising and providing housing and services to these areas, tensions and unrest often results.

6.1.2 Impact on Any National Estate Referred to in Section 3(2) of the National Heritage Resources Act

The topography of the study area and application area is generally flat with undulating ridges present. Some portion of the general study area has been extensively impacted by ongoing mining operations (including opencast, as well as farming developments), while other impacts include large-scale agricultural activities (ploughing and crop growing). As a result of these activities the original natural and historical landscape of the area has been altered. If any cultural heritage (archaeological and/or historical) sites, features or material do exist within the study area in the past, it would have been disturbed or destroyed as a result. There are some heritage features that have been identified on the farm Boas in the past. These will be investigated further in the EIA/EMP phase.

6.1.3 Other Matters Required in terms of Section 24(4)(a) and (b) of the Act

Two alternatives in terms of the proposed coke and heat recovery plants project have been considered in the report: The Proposed HRCP project and associated activities. The No-Go option is the other alternative identified and will be discussed as part of the EIA/EMP phase. During both the scoping and EIA/EMP phases, public participation played a key role and is a vital part of the IEM process.

7.0 CONCLUDING STATEMENT

This Scoping Report is not intended to provide a comprehensive assessment, but a preliminary indication of the more pertinent impacts anticipated from the proposed HRCP development. In addition, this Scoping Report is intended to provide I&APs and Key Authorities (e.g. Local and District Municipalities, LDEDET, DWS, SAHRA, LDARD etc.) with sufficient information and background on the project to participate meaningfully in the EIA/EMP process. Furthermore, the Scoping Report and Plan of Study for Environmental Impact Assessment (PoSEIA) are intended to provide the Competent Authorities with sufficient information to make an informed decision on whether to allow for the continuation of the application for an environmental authorisation.

7.1 Potential Impacts

The impacts considered to be sufficiently important to warrant mitigation measures and management during the construction and operational phases of the proposed coke and heat recovery plants project were outlined in Chapter 3 and 4. The potential impacts and key issues which must be thoroughly investigated during the EIA/EMP phase include the following:

- Fauna and Flora impacts
- Surface water impacts
- Groundwater impacts
- Heritage impacts
- Air quality impacts
- Noise impacts
- Soil and Land Capability impacts
- Visual impacts
- Socio-economic impacts

7.2 Preferred Alternative and Location of Activity

Kinetic Mining Development South Africa (Pty) Ltd proposes to construct a 3 million tons per annum Coke Plant and a 390MW Heat Recovery Electricity Power Plant. The said proposed development will be done in three (03) phases of 1 million/tons/year coke plant and 130MW heat recovery electricity power plant over a period of 5-10 years. The proposed development will be on either of the farms Boas 642 MS and Martha 185 MT within Makhado Local Municipality, Vhembe District, Limpopo.

The inclusion of an alternative analysis is a specific requirement of the Integrated Environmental Management (IEM) procedure as underlined by the NEMA. The IEM procedure stipulates that the environmental investigation needs to consider feasible alternatives for any proposed development. Both Martha 185 MT (Site 1) and Boas 642 MS (site 2) will be evaluated as two alternative sites for the proposed HRCP.

The No-Go option is the only other alternative identified during the scoping phase, which will be discussed in detail as part of the EIA/EMP phase – including the mitigation hierarchy. During both the Scoping and EIA/EMP phases, public participation plays a key role and is a vital part of the IEM process.

7.3 Conclusion

The specialist studies to be conducted will assist with the development of an understanding of the system processes and the potential impacts of the proposed HRCP development on both the social and biophysical environments.

The EIA report will assess the impacts of each of the activities as well as ascertain the cumulative impacts of the development in its entirety. The EMP report will outline the necessary mitigation measures and delineate sensitive areas and facets worthy of conservation. Potential alternatives and mitigation measures will be devised in order to minimise negative impacts and optimise positive impacts.

An EIA Report, including an Environmental Management Programme (EMP), will be compiled as the next step of this EIA/EMP process.

8.0 UNDERTAKING BY EAP

8.1 EAP Undertaking

I **MULANGA SIKHITHA**, as the appointed independent environmental assessment practitioner ("EAP") hereby undertake/affirm, under Oath, that:

a) The information provided in this Scoping Report and to be provided in the EIA/EMP Report is/will be correct and true;
b) All comments and inputs received from interested and affected parties (I&Aps) and stakeholders have been recorded, included, analysed and will be addressed in the EIA/EMP Phase and report;
c) All comments and inputs received from interested and affected parties (I&Aps) and stakeholders have been included and responded to in this report. Any additional comments and inputs will also be responded to in the EIA/EMP Phase;
d) All information required and/or requested by the relevant authorities will be addressed and submitted to the said authorities;
e) Will comply with any other matter required in terms of Section 24(4)(a) and (b) of the Act;
f) We will implement the Plan of Study as outlined in the Scoping Report and in relation to all issues/inputs raised by interested and affected parties in undertaking the required environmental impact assessment for the proposed coke and heat recovery plants project:

……..
Signature of the environmental assessment practitioner (EAP)

GUDANI CONSULTING
……..
Name of Company

……
Date: 05th December 2025

9.0 REFERENCES

1. South African Energy Metallurgical Special Economic Zone Development Plan, April 2019
2. Kinetic Development Group Limited Pre-Feasibility Report
3. Coal of Africa Limited proposed Makhado Colliery Project – Environmental Impact Assessment and Management Programme - 2012
4. Jongens Keet Associates - Noise Impact Assessment of the Proposed Makhado Colliery Project – 2012
5. Kinetic Development Group Limited Feasibility Report- 2025
6. WSM Leshika Consulting - Groundwater Impact Assessment Report – Makhado Coal Project – 2012

10.0 LIST OF APPENDICES

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Appendix 2: Summary of the EAP's Past Experience
Appendix 3: Locality Maps – HRCP
Appendix 4: Site Layout Map and HRCP Layout
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Appendix 1: Qualification of the EAP

Appendix 2: Summary of the EAP's Past Experience

Appendix 3: Locality Maps – Kinetic Coke and heat recovery plants

Appendix 4: Site Layout Map – Including Kinetic Coke and heat recovery plants

Appendix 5: Public Participation Report

Appendix 6: EIA Application Form

Appendix 7: Kinetic Mining Development - SA HRCP Pre-Feasibility Report

Appendix 8: Coke and heat recovery plants Site Layout