



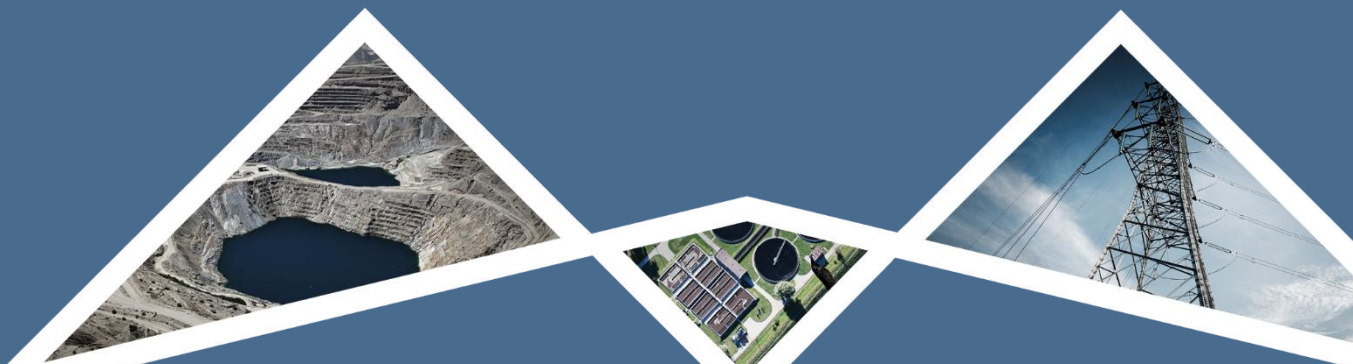
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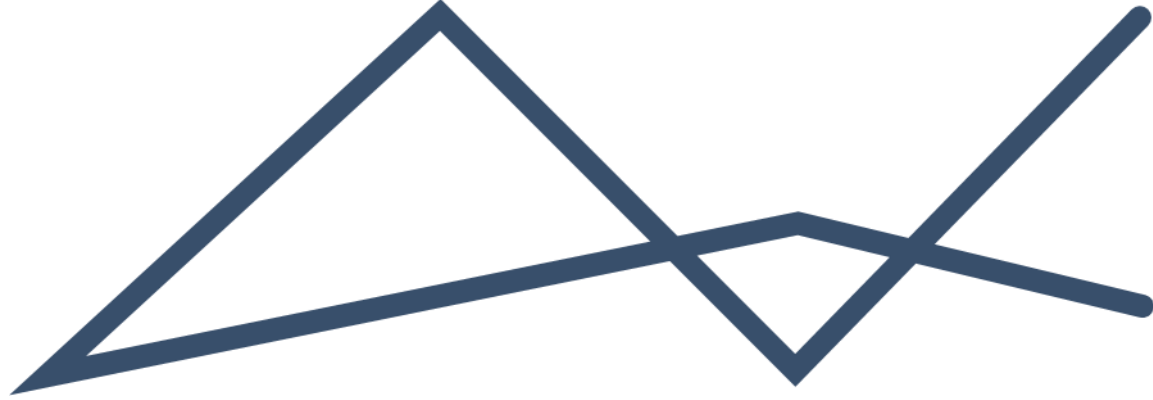
ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

MOTUOANE EXPLORATION RIGHT 386, WITHIN VARIOUS FARMS IN
MATJHABENG AND MOQHAKA LOCAL MUNICIPALITIES,
LEJWELEPUTSWA AND FEZILE DABI DISTRICT MUNICIPALITIES, FREE
STATE PROVINCE, SOUTH AFRICA

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List of Abbreviations

2D	Two-dimensional
AA	Administrative Authority
AQIA	Air Quality Impact Assessment
AWD	Accelerated Weight Drop
BID	Background Information Document
CA	Competent Authority
CBA	Critical Biodiversity Area
CBL	Cement Bond Log
CH ₄	Methane
CMA	Catchment Management Agency
CO	Carbon Monoxide
CO ₂ e	Carbon dioxide equivalent
CR	Critically Endangered
CSIR	Council for Scientific and Industrial Research
dBA	A-weighted decibels
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries, and the Environment
DMRE	Department of Mineral Resources and Energy
DMPR	Department of Mineral and Petroleum Resources
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
ECA	Environmental Conservation Act
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EIMS	Environmental Impact Management Services (Pty) Ltd.
ELWU	Existing Lawful Water Use
EMPR	Environmental Management Program



EMS	Environmental Management System
EN	Endangered
EPF	Exploration and Production Forum
ER	Exploration Right
ESA	Ecological Support Area
ESO	Environmental Site Officer
FEPA	Freshwater Ecosystem Priority Area
FIT	Formation Integrity Test
FSBP	Free State Biodiversity Plan
GA	General authorisation
GHG	Greenhouse Gases
GIS	Geographic Information Systems
GNR	Government Notice Regulation
GPS	Global Positioning System
Ha	Hectare
HGM	Hydrogeomorphic
HIA	Heritage Impact Assessment
Hz	Hertz
I&AP's	Interested and Affected Parties
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IUCN	International Union for Conservation of Nature
LC	Least Concern
MAE	Mean Annual Evaporation
mamsl	meters above mean sea level
MAP	Mean Annual Precipitation
mg/l	Milligrams per litre
mm/a	Millimetre per annum
MP	Marginally Protected
MPRDA:	Mineral and Petroleum Resources Development Act
MT	Magnetotellurics Survey
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act



NEMAQA:	National Environmental Management: Air Quality Act
NEMBA	National Environmental Management: Biodiversity Act
NEMWA:	National Environmental Management: Waste Act
NFEPA	National Freshwater Ecosystem Priority Areas
NGDB	National Groundwater Database
NHRA	National Heritage Resources Act
NO ₂	Nitrogen Dioxide
NPAES	National Protected Area Expansion Strategy
NT	Near threatened
PASA	Petroleum Agency South Africa
PEG	Propelled Energy Generator
PES	Present Ecological State
PM	Particulate Matter
PM ₁₀	Particles with a diameter of 10 micrometers or less
PM ₂₀	Particles with a diameter of 2.5 micrometers or less.
PPP	Public Participation Process
Ptn	Portion
RE	Remaining Extent
SAHRA	South African Heritage Resources Agency
SAHRIS:	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SAPAD	South African Protected Areas Database
SCC	Species of conservation concern
SEI	Site Ecological Importance
SO ₂	Sulphur Dioxide
t	Tonne
TA	Target Area
TC	Total concentration
TCP	Technical Cooperation Permit
TDS	Total Dissolved Solids
TOPS	Threatened and Protected Species
TVD	True Vertical Depth



VOC	Volatile Organic Compounds
VU	Vulnerable
WMA	Water Management Area
WUL	Water Use Licence



Definitions

Aspect - Element of an organisation's activities, products or services that can interact with the environment.

Auditing - A systematic, documented, periodic and objective evaluation of how well the Environmental Management Programme (EMPr) is being implemented and is performing with the aim of helping to safeguard the environment by facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems, while keeping track of their compliance with the Environmental Authorization.

Clearing of vegetation - Clearing refers to the removal of vegetation through permanent eradication and in turn no likelihood of regrowth. 'Burning of vegetation (e.g. fire-breaks), mowing grass or pruning does not constitute vegetation clearance, unless such burning, mowing or pruning would result in the vegetation being permanently eliminated, removed or eradicated.

Contractor - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.

Corrective (or remedial) action - Response required in addressing an environmental problem that is in conflict with the requirements of the EMPr. The need for corrective action may be determined through monitoring, audits or management review.

Construction - According to the regulations this term is defined as – the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint'. In this application, construction refers to the site establishment, seismic surveys and drilling activities.

Degradation - The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

Developer – Entity which applies for environmental approval and is ultimately accountable for compliance to conditions stipulated in the EA (Environmental Authorisation) and EMPr.

Environment - The surroundings within which humans exist and that are made up of land, water and atmosphere of the earth, micro-organisms, plant and animal life: or any part or combination of the two and the interrelationships among them, the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact Assessment (EIA) - 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 a proposed development. The EIA includes an evaluation of alternatives; recommendations for appropriate management actions for minimising or avoiding negative impacts and for enhancing positive impacts; as well as proposed monitoring measures.

Environmental Management System (EMS) - Environmental Management Systems (EMS) provide guidance on how to manage the environmental impacts of activities, products and services. They detail the organisational structure, responsibilities, practices, procedures, processes and resources for environmental management. The ISO14001 EMS standard has been developed by the International Organisation for Standardisation.

Environmental Policy – A statement of intent and principles in relation to overall environmental performance, providing a framework for the setting of objectives and targets.

Habitat - A habitat is an ecological or environmental area that is inhabited by a particular species of animal, plant, or other type of organism. It is the natural environment in which an organism lives, or the physical environment that surrounds a species population.

Hazardous substance - is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995.



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

Indigenous species - Flora and Fauna species that are naturally found in an area.

Infrastructure - The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage, etc.

Integrated Environmental Management- This is a philosophy used in the assessment of and management of the environment, during all actions, plans, activities, etc. that could affect the environment. Its aim is to ensure sustainability.

Method statement - means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification.

The method statement must cover as a minimum, applicable details regarding:

- (i) Construction procedures;
- (ii) Plant, materials and equipment to be used;
- (iii) Transporting the equipment to and from site;
- (iv) (iv) How the plant/ material/ equipment will be moved while on site;
- (v) How and where the plant/ material/ equipment will be stored;
- (vi) The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- (vii) Timing and location of activities;
- (viii) Compliance/ non-compliance; and
- (ix) Any other information deemed necessary by the Project Manager.

Mitigation - Measures designed to avoid, educe or remedy adverse impacts. Actions that limit, stop or reverse the magnitude and/or rate of long-term effect on the environment.

Natural environment - Encompasses all living and non-living things occurring naturally on Earth or some region thereof. It is an environment that encompasses the interaction of all living species. Climate, weather, and natural resources that affect human survival and economic activity.

Policy - A set of aims, guidelines and procedures to help you make decisions and manage an organisation or structure. Policies are based on people or an organisation's values and goals.

Process - Development usually happens through a process - a number of planned steps or stages.

Resources - Parts of our natural environment that we use and protect, e.g. land, forests, water, wildlife, and minerals.

Slope- means the inclination of a surface expressed as one unit of rise or fall for so many horizontal units.

Solid waste- means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

Spoil- means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works.



Topsoil- means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil.

Works- means the works to be executed in terms of the Contract.



1 INTRODUCTION

D3 Energy South Africa (Pty) Ltd (previously Motuoane Energy (Pty) Ltd¹ (hereafter referred to as D3 Energy / the Applicant) compiled and submitted an application for an Exploration Right (ER) to explore hydrocarbons, in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA, as amended) to the Administrative Authority (AA), the Petroleum Agency South Africa (PASA) in 2024. The accepted (not yet approved) ER is located over an area of approximately 58 000 hectares (ha) / 580km², covering various farms near the towns of Welkom, Virginia, Hennenman and Odendaalsrus, within the Free State Province. The local municipalities in which the proposed exploration area is located are Matjhabeng and Moqhaka Local Municipalities, which are part of the Lejweleputswa and Fezile Dabi District Municipalities, respectively. Noticeable boundaries of ER386 are 28°13'28.95"S; 26°55'2.76"E in the South, 27°57'37.57"S; 26°48'49.15"E in the West, 27°59'13.57"S; 27°11'13.06"E in the East and 27°46'34.45"S; 26°57'44.05"E in the North, the central coordinates are approximately 27°58'23.27"S; 26°59'38.94"E. See **Figure 1** and **Figure 2** for the locality map including the proposed exploration activities.

D3 Energy proposes to explore all saleable gases including but not limited to Methane, Carbon Dioxide, Helium, and Nitrogen in the licensed area. Published reports, general experience, experience within D3 Energy and contacts with individuals familiar with the area indicate the presence of potentially commercial quantities of these gases. Direct evidence includes gas-emitting boreholes, nearby commercial gas production, gas encountered during drilling and underground mining operations. Due to the large area and complex exploration methodology, the ER will be required for an initial period of three years with the option to renew three additional periods of two years resulting in a total of nine years.

Exploration Right 386 is a consolidation of Technical Cooperation Permit (TCP) 235 and 240, and Exploration Right Application (ERA) 341 which were tenures in 2024 before ER386 application was submitted to the Administrative Authority, the Petroleum Agency South Africa (PASA) on the 8th of October 2024. The areas (ERA341, TCP235 and TCP240) were then consolidated to one ER (ER386). D3 Energy's application for an ER for hydrocarbons was accepted on the 22nd of October 2024 in terms of Section 79 of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA, as amended). The accepted application for an Exploration Right (ER386) is located over an area of approximately 58 000 hectares (ha), covering various farm portions in Welkom near the towns of Virginia, Hennenman and Odendaalsrus, Free State Province. The boundaries of ER386 are 28°13'28.95"S; 26°55'2.76"E in the South, 27°57'37.57"S; 26°48'49.15"E in the West, 27°59'13.57"S; 27°11'13.06"E in the East and 27°46'34.45"S; 26°57'44.05"E in the North, the central coordinates are approximately 27°58'23.27"S; 26°59'38.94"E.

The proposed activities to be undertaken as part of the exploration activities include the following:

- Identifying existing blowers within the ER, undertaking well workover and intervention if necessary;
- The undertaking of new core exploration well drilling and undertaking well workover and intervention where necessary (at preidentified / new areas of interest);
- Undertaking seismic survey and/or magnetotellurics survey activities (at preidentified / new areas of interest); and
- Perform testing and gas composition analysis on gas from existing boreholes and newly drilled wells on the ER.

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application

¹ It must be noted that that D3 Energy South Africa has recently changed its name from Motuoane Energy (Pty) Ltd. The EA Application / Project name will also be **changed from Motuoane Exploration Right 386 Application**, Within Various Farms in Matjhabeng and Moqhaka Local Municipalities, Lejweleputswa and Fezile Dabi District Municipalities, Free State Province, South Africa **to D3 Energy Exploration Right 386 Application**, Within Various Farms in Matjhabeng and Moqhaka Local Municipalities, Lejweleputswa and Fezile Dabi District Municipalities, Free State Province, South Africa during the final submission of the EIA Report and EA Application Form.



for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended (EIA Regulations) or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including but not limited to the applicant and the Competent Authority (CA).

The main activities are exploration drilling and seismic survey activities. The proposed approach is to first determine and map the geographic extent of all boreholes currently emitting gas on and near the ER area. Then measure rates and monitor pressures where possible and perform gas composition analysis. The geophysical wireline logging of existing boreholes (where possible) will include monitoring of water levels. If no existing gas emitting boreholes are identified near a target area, new drilling activities are proposed within that area using percussion or rotary drilling method.

Although up to five (5) Target Areas (TA) for the drilling activities with 500m buffer within the exploration right may be undertaken over the 9-year period, the current Works Program caters for only three (3) drilling wells. It must be noted that there may be a single, multiple or no drilling activities within some of the target areas. Should more than 3 drilling wells be required within the ER, the current Works Program will be required to be updated accordingly.

The previous TA's and associated seismic transects, Target Area 3 (ED G), Target Area 4 (ED H), Target Area 5 (ED J), Target Area 6 (ED I), Target Area 7 (ED F) and Target Area 8 (VEG A) as well as seven (7) seismic transects (Transects ED 1 to 5, VEG 1 & 2) which were proposed within the western section of the exploration right on the agricultural fields between Saaiplaas, Bronville, Thabong and Whites have been removed from the current application (may be revisited at a later stage in line with the necessary processes i.e., authorisations, licensing, etc.). The current application entails:

- Two Target Areas; Target Area 1 (RSB D) and Target Area 2 (RSB E) and associated seismic transects (Transects RSB1, RSB2 and RSB3) located in the south of ER386, approximately 7km southeast of Meloding;
- Target Area 9 (HF C) and associated transects (Transects HF 1, HF2 and HF7) located approximately 6km west the eastern boundary of ER386 (N1);
- Two Target Areas proposed within the northern section namely, Target Area 10 (GP B) and Target Area 11 (GP A) and three associated seismic transects (Transect G1, G2 and G3) R34 located between Odendaalsrus and Kroonstad.

The seismic survey activities are proposed throughout ER386, as and when necessary. D3 Energy will search records at the Council for Geoscience and the Petroleum Agency for seismic data that was acquired on the Exploration Right in the past. If no data is available, D3 Energy will either acquire its own seismic or telluric data on the property, following proper environmental protocols and with the written permission of the landowner. There are nine (9) preliminary proposed transects for seismic / telluric survey, approximately 70km long around known structures and possible drill locations.

The site sensitivity mapping approach allows for the identification of lower risk areas for positioning the project infrastructure whilst protecting identified sensitive environmental areas/ features through more rigorous mitigation (where possible). Areas identified as no-go would be fully excluded from any project related development regardless of the level of mitigation put forward. Furthermore, environmental sensitivity is used to aid in decision-making during consultation processes, forming a strategic part of environmental assessment processes. This sensitivity mapping approach allows for the proposed activities to be undertaken whilst protecting identified sensitive environmental areas / features. Furthermore, environmental sensitivity is used to aid in decision-making during consultation processes, forming a strategic part of Environmental Assessment processes. **Figure 3** presents the combined sensitivity map for the project. Identified sensitivities indicated in **Figure 3** and **Figure 4** include the following:

- High Heritage Sensitivity;



- Sensitive air quality receptors;
- Species of conservation concern;
- Natural habitats with high Site Ecological Importance; and
- Wetlands with high Present Ecological State and Site Ecological Importance.

The compilation of this map has taken into consideration the individual ranking of sensitivity by all the identified specialist disciplines (e.g. Air Quality, Geohydrology, Terrestrial and Aquatic Ecology, Heritage, Social, etc.). Work within the various sensitivity rankings must be managed according to the EMPr as well as the recommendations in the individual specialist reports.

A desktop sensitivity map (**Figure 5**) was also generated based on latest available datasets to inform the EMPr approach of the procedure to be implemented based on environmental sensitivity of the area should the final drilling activities fall within the ER but outside the assessed areas as part of this EIA. The exploration activities may only be undertaken within the assessed corridors i.e. 50 corridors for seismic transects and 1km buffers for drilling wells. Should additional seismic surveys and/or drilling wells fall outside of the EA assessed footprint areas, but within ER386, then depending on the final location of the seismic survey / drill site with respect to the locations sensitivity as defined by the sensitivity maps, and in consultation with the ECO and relevant specialists, the following must be undertaken prior to surveying / drilling:

- In low sensitive areas, an ECO walkdown (at minimum) must be undertaken by an independent ECO to assess potential impacts and/or provide site-specific mitigation measures as well as identify any additional specialist input requirements prior the commencement of activities. The conditions of the EMPr (as a minimum) must be complied with;
- In medium sensitive areas, the respective specialists must be brought to site to assess the final drill site and surroundings (1km radius around the site) and develop site-specific mitigation measures. Furthermore, the conditions of the EMPr must be complied with; and
- In high sensitive areas, the respective specialists must be brought to site to assess the final drill sites and surroundings (with relevant buffer zones, e.g. 1km radius for wetlands, etc.) and develop site specific mitigation measures. These measures (site specific EMPr conditions) must be submitted to the PASA for approval prior to commencement with the drilling operations.

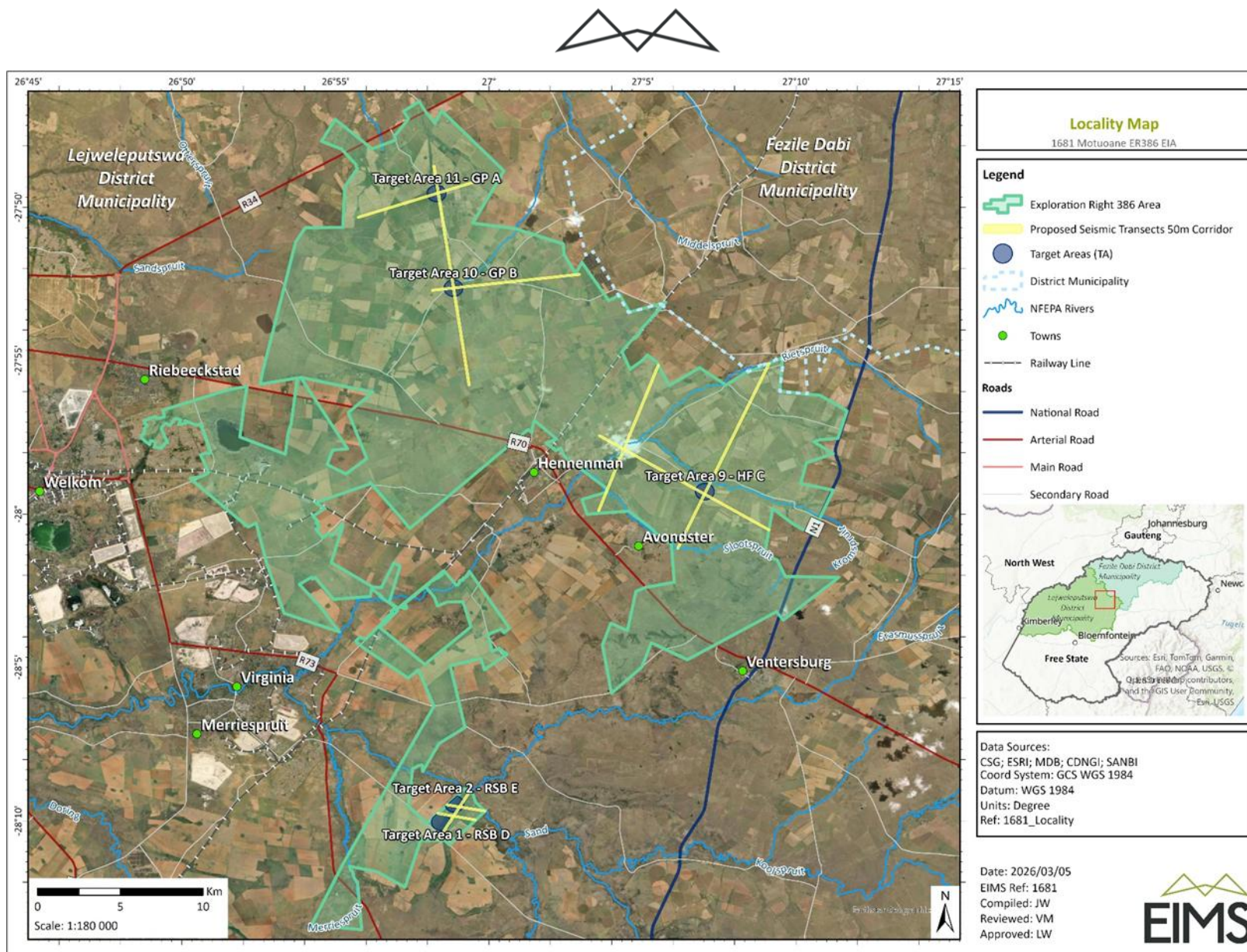


Figure 1: Aerial imagery locality map indicating the location of the proposed ER386.

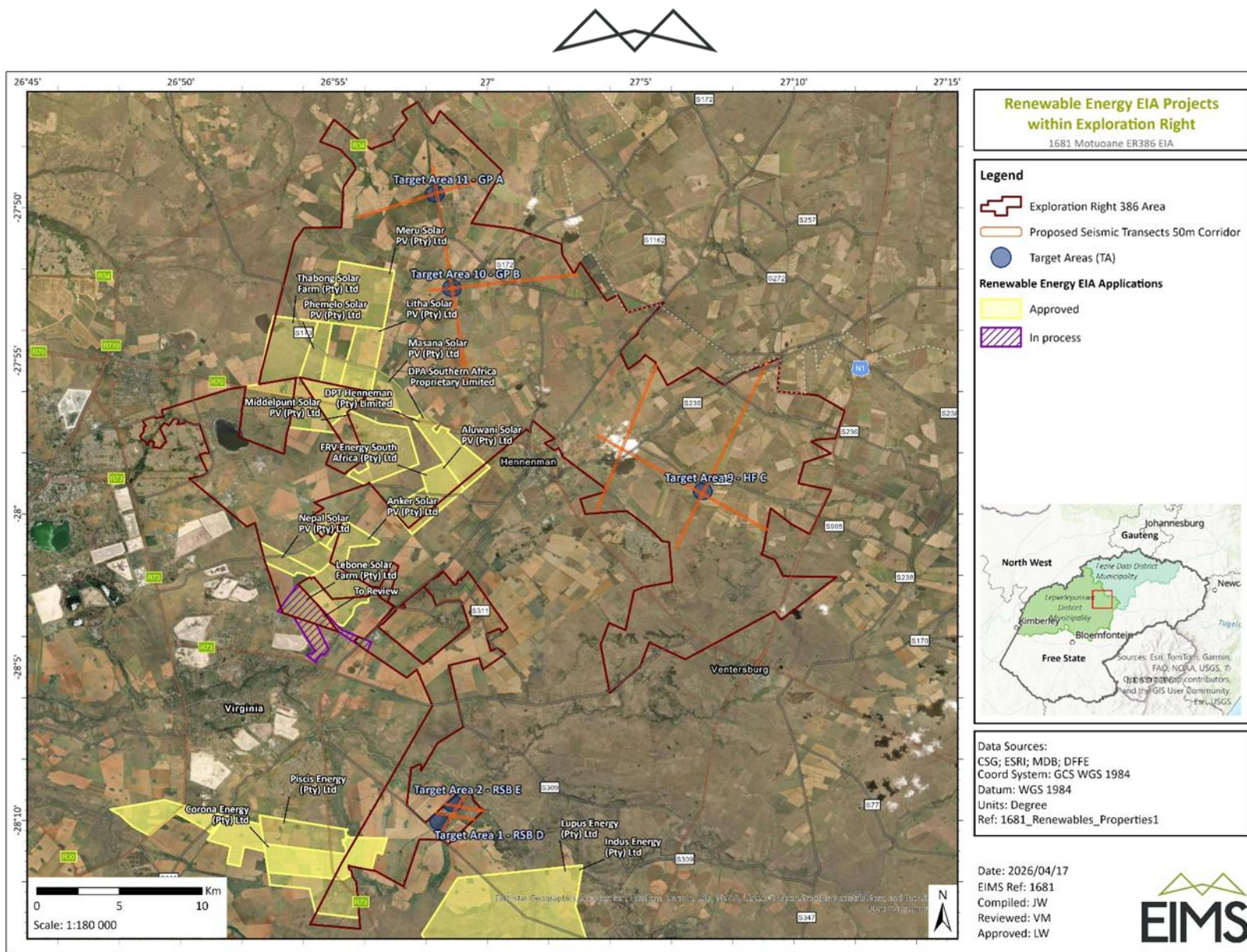
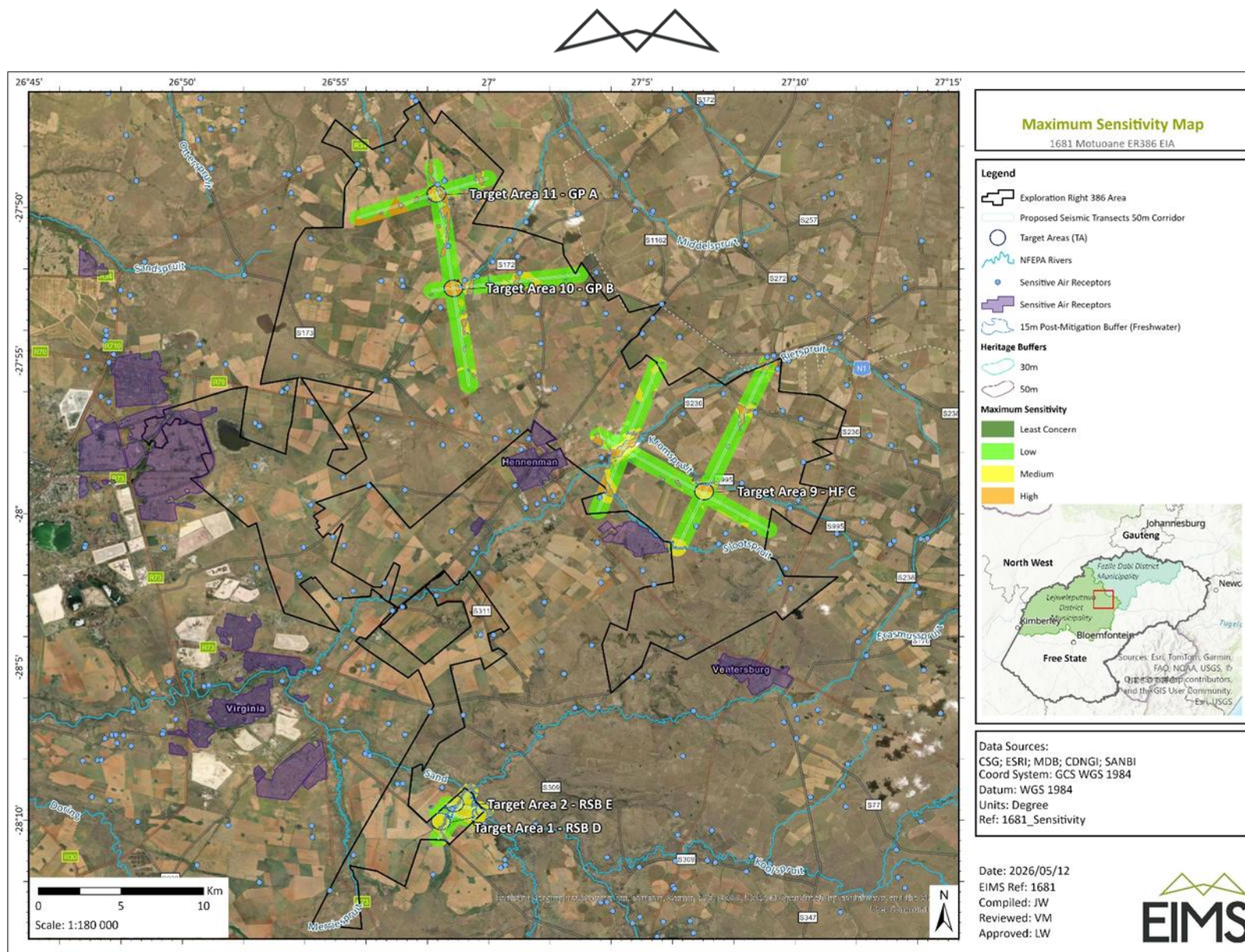
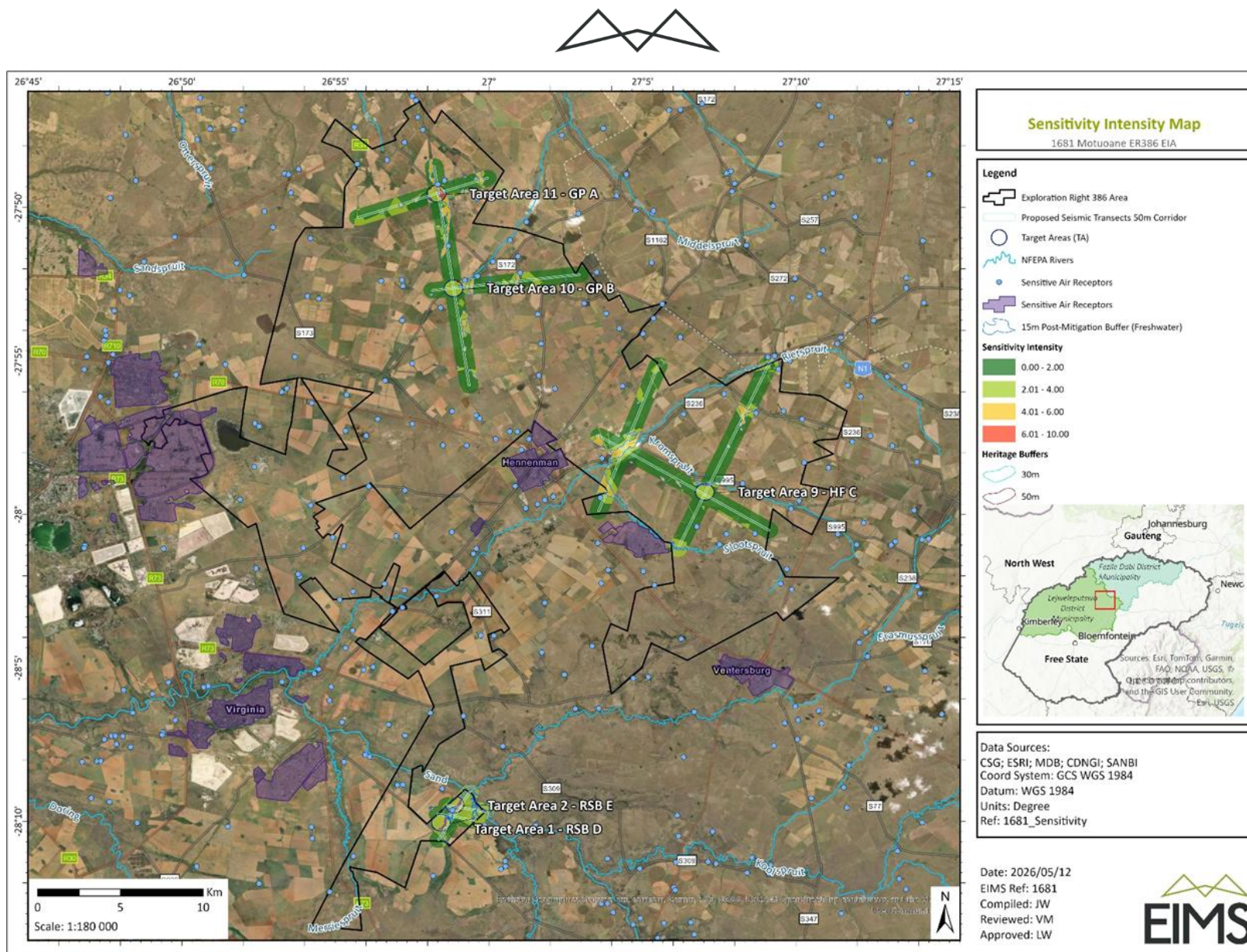


Figure 2: Locality map indicating the renewable energy developments within ER386.





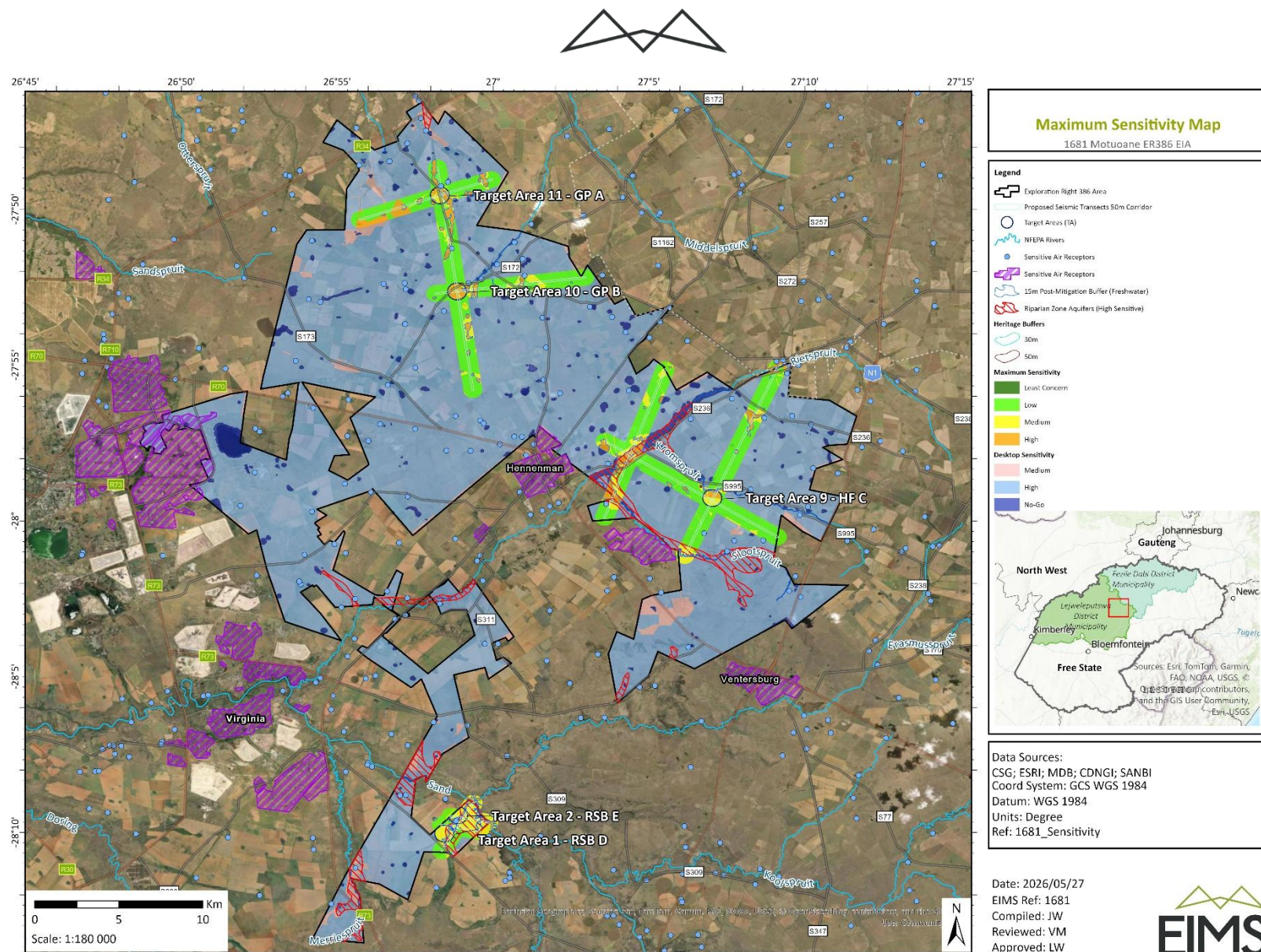


Figure 5: Desktop Sensitivity Map to be used to identify EMPr process / procedure for activities outside of the assessed footprint.



2 PURPOSE OF THIS REPORT

An EMPr is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented, and that the positive benefits of the projects are enhanced. This EMPr has been compiled as a guideline, in accordance with the Environmental Impact Assessment Regulations (GN R982 of 2014 as amended) for the requirements of an EMPr, to establish the mitigation and management measures that need to be implemented to avoid, reduce and minimise potential environmental impacts arising out of any of the phases applicable to the proposed additional exploration activities. As previously indicated, an EMPr is a working document that should be updated on a regular basis, as and when necessary. The EMPr thus supports an on-going proactive mitigation approach and duty of care to the environment. The EMPr shall allow for risk minimization and will ensure legal compliance. This EMPr will also allow the user to make minor amendments to ensure continual revision and improvement of risk mitigation through the continual re-assessment of risks associated with the exploration activities.

This document represents the specifics and stipulated level of compliance required for the proposed exploration activities for the Approved Exploration Right for hydrocarbons in the Matjhabeng and Masilonyana Local Municipalities within the Lejweleputswa District Municipality, and the Moqhaka Local Municipality, which is part of the Fezile Dabi District Municipality, in the Free State Province. The EMPr contains the following information:

- A description of the work programme and proposed activities;
- An assessment of the potential positive and negative impacts of the proposed activities; and
- An Environmental Management Plan to manage and/or mitigate potential negative impacts.

The EMPr aims to present management measures that will eliminate, offset or reduce adverse environmental impacts, as well as to provide the framework from environmental monitoring. The primary purpose of the EMPr is to ensure that negative environmental impacts of the proposed project are effectively managed within acceptable limits and that the positive impacts are enhanced. The project locality and sensitivity maps are indicated in **Figure 1** to **Figure 4**.



3 REPORT STRUCTURE

This report has been compiled in accordance with the 2014 NEMA EIA Regulations. A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in **Table 1** below.

Table 1: Report Structure.

Appendix 4 Reference	Description	Section in EMPr
Appendix 4(1)(1)(a):	Details of – i. The EAP who prepared the EMPr; and ii. The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Section 4 Appendix A
Appendix 4(1)(1)(b):	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 5
Appendix 4(1)(1)(c):	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Section 1
Appendix 4(1)(1)(d):	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including – i. Planning and design; ii. Pre-construction activities; iii. Construction activities; iv. Rehabilitation of the environment after construction and where applicable post closure; and v. Where relevant, operation activities.	Section 8
Appendix 4(1)(1)(f):	A description of proposed impact management actions, identifying the manner in which the impact management contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to – i. Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; ii. Comply with any prescribed environmental management standards or practices; iii. Comply with any applicable provisions of the Act regarding closure, where applicable; and iv. Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	Section 8



Appendix 4 Reference	Description	Section in EMPr
Appendix 4(1)(1)(g):	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Section 13.1
Appendix 4(1)(1)(h):	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Section 13.1
Appendix 4(1)(1)(i):	An indication of the persons who will be responsible for the implementation of the impact management actions.	Section 13.1
Appendix 4(1)(1)(j):	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.	Section 13.5
Appendix 4(1)(1)(k):	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).	Section 13.12 & 13.13
Appendix 4(1)(1)(l):	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Section 13.12 & 13.13
Appendix 4(1)(1)(m):	An environmental awareness plan describing the manner in which – i. The Applicant intends to inform his or her Employees of any environmental risk which may result from their work; and ii. Risks must be dealt with in order to avoid pollution or the degradation of the environment.	Section 13.15
Appendix 4(1)(1)(n):	Any specific information that may be required by the competent authority.	Section 14



4 REQUIREMENTS AND DETAILS OF THE EAP

In terms of Regulation 13 of the EIA Regulations (GN R. 982) as amended, an independent Environmental Assessment Practitioner (EAP), must be appointed by the applicant to manage the application. EIMS is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

- Objective and independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the environmental regulations and all other applicable legislation;
- Considers all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

4.1 DETAILS OF THE EAP

EIMS was appointed by D3 Energy to assist in preparing and submitting the application for Environmental Authorisation (EA) and undertaking the required public participation process in support of the proposed activities for the D3 Energy Exploration Right 386 project. EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS is an independent specialised environmental consulting firm offering the full spectrum of environmental management services across all sectors within the African continent. EIMS has successfully completed many hundreds of assignments over the years with an excess of 30 years' experience in conducting EIA's for both the government and private sector. Please refer to the EIMS website (www.eims.co.za) for examples of EIA documentation currently available. In terms of Regulation 13 of the NEMA EIA Regulations (GNR 982) 2014 as amended, an independent EAP, must be appointed by the applicant to manage the application for an environmental authorisation. EIMS and the compiler of this report are compliant with the definition of an EAP as defined in Regulations 1 and 13 of the NEMA EIA Regulations, as well as Section 1 of the NEMA.

The contact details of the EIMS consultant (EAP) who compiled this Report are presented in **Table 2** and the detailed CV is provided in **Appendix A**.

Table 2: Details of the Environmental Assessment Practitioner.

Aspect	Details
EAP:	Mr. Vukosi Mabunda
Tel No:	+27 11 789 7170
Fax No:	+27 86 571 9047
E-mail:	vukosi@eims.co.za
Qualifications	<ul style="list-style-type: none"> • MSc Geography (University of Johannesburg, 2021). • BSc Honours in Geography (University of Johannesburg, 2017). • BSc Life & Environmental Sciences (University of Johannesburg, 2016). • Environmental Law – Short Course (North-West University, 2025). • ISO14001:2015 – Short Course (North-West University, 2025).



Aspect	Details
	<ul style="list-style-type: none"> Environmental Management Systems – Lead Auditor Short Course, North-West University, 2025
Professional Registrations:	<ul style="list-style-type: none"> Registered Environmental Assessment Practitioner with Environmental Assessment Practitioner Association of South Africa – EAPASA (Reg. No: 2019/867). Professional Natural Scientist with the South African Council for Natural Scientific Professions – SACNASP (Reg. No: 134178). Registered Provisional Auditor (SAATCA: #LC5544) ISO 37301:2021 Legal Compliance Management Systems. Registered Provisional Auditor (SAATCA: #LC5544) ISO 14001:2015 Environmental Management Systems

4.2 EXPERTISE OF THE EAP

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS is an independent specialised environmental consulting firm offering the full spectrum of environmental management services across all sectors within the African continent. EIMS has successfully completed many hundreds of assignments over the years with an excess of 30 years' experience in conducting EIA's for both the government and private sector. Please refer to the EIMS website (www.eims.co.za) for examples of EIA documentation currently available.

In terms of Regulation 13 of the EIA Regulations (GN R. 982) as amended, an independent EAP, must be appointed by the applicant to manage the application. EIMS is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

- Objective and independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the environmental regulations and all other applicable legislation;
- Considers all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

This EMPr was prepared by Vukosi Mabunda, a Registered EAP employed by EIMS. His CV is included in **Appendix A**. Vukosi Mabunda is currently a Senior Environmental Assessment Practitioner (EAP) & Geographic Information Systems (GIS) Consultant with over eight (8) years' working experience. Vukosi is a Registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA). He is one of the few dual registered professionals with the South African Council for Natural Scientific Professions (SACNASP) as a Professional Environmental Scientist and Geospatial Scientist. Vukosi is also one of the few dual registered auditors, currently registered with the South African Auditor & Training Certification Authority (SAATCA) as a Registered Provisional Auditor for ISO 37301:2021 Legal Compliance Management Systems (one of four registered auditors) and Registered Provisional Auditor for ISO 14001:2015 Environmental Management Systems (one of forty-four registered auditors). Vukosi has dual professional background in Geographic and Environmental Sciences having academic qualifications which focused on these disciplines as well as relevant work experience. Vukosi's highest qualification is a Master of Science Degree in Geography obtained from the University of Johannesburg in 2021. Vukosi has recently completed short courses on Environmental Law, ISO 14001:2015 Environmental Management Systems and ISO 14001:2015 Environmental Management Systems Lead Auditor from the North-West University in March 2025 and October 2025 respectively.



Vukosi has experience in various environmental assessment projects ranging from Environmental Screening, Basic Assessments, Section 102 Amendments and Scoping & Environmental Impact Assessments processes. Vukosi has also undertaken Water Use Authorisations applications through both the General Authorisation and Water Use Authorisation processes. Vukosi is also an Environmental Auditor and Environmental Control Officer who has experience in various environmental and legal compliance audits assessing compliance against the requirements of Environmental Authorisations, Environmental Management Programmes, Operational Environmental Management Plan, Waste Management License, Atmospheric Emission Licenses, Water Use Authorisations, General Authorisations as well as Legal & Environmental Performance Audits. Vukosi's career highlights include the crucial role in the City of Johannesburg's Revised Bioregional Plan, where he was the lead GIS personnel as well as successfully completing the first Environmental Registration under the Standard for the Development and Expansion of Power Lines and Substations within Identified Geographical Areas Revision 2 in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended in Mpumalanga Province in 2024 in which he also assisted the Provincial Department Officials to understand the Standard, their roles and process of reviewing and making decisions on such applications.

5 DESCRIPTION AND SCOPE OF THE PROPOSED PROJECT

5.1 EXPLORATION RIGHT LOCALITY

The accepted (not yet approved) ER386 is located over an area of approximately 58 000 hectares (ha) / 580km², covering various farms near the towns of Welkom, Virginia, Hennenman and Odendaalsrus, within the Free State Province. The local municipalities in which the proposed exploration area is located are Matjhabeng and Moqhaka Local Municipalities, which are part of the Lejweleputswa and Fezile Dabi District Municipalities, respectively. Noticeable boundaries of ER386 are 28°13'28.95"S; 26°55'2.76"E in the South, 27°57'37.57"S; 26°48'49.15"E in the West, 27°59'13.57"S; 27°11'13.06"E in the East and 27°46'34.45"S; 26°57'44.05"E in the North, the central coordinates are approximately 27°58'23.27"S; 26°59'38.94"E. **Table 3** provides the locality details for the proposed D3 Energy ER386. See **Figure 1** and **Figure 2** for the locality map including the proposed exploration activities. Details of the properties which make up D3 Energy ER386 application area is attached as **Appendix B**.

Table 3: Locality details.

Property Property Name, 21-digit Surveyor General Code and Ownership	D3 Energy ER386 is located on various farms / farm portions, refer to Appendix B for the Locality Map and List of Properties with ER386.
Application Area (Ha)	D3 Energy ER386 is approximately 58 000 ha.
Magisterial District	The project area falls within the Matjhabeng and Moqhaka Local Municipalities, Lejweleputswa and Fezile Dabi District Municipalities.
Distance and direction from nearest towns	<ul style="list-style-type: none"> • 6km east of southern Virginia (Meloding), 7km east of central Virginia, 1.5km northeast of northern Virginia (Saaiplaas); • 6.5km east of central Welkom, adjacent to west Welkom (Thabong); • 1km southeast of Riebeeckstad; • Adjacent to Hennenman.



	<p>The boundaries of ER386 are: 28°13'28.95"S; 26°55'2.76"E in the South, 27°57'37.57"S; 26°48'49.15"E in the West, 27°59'13.57"S; 27°11'13.06"E in the East and 27°46'34.45"S; 26°57'44.05"E in the North, the central coordinates are approximately 27°58'23.27"S; 26°59'38.94"E. Refer to the Locality and list of properties in Appendix B.</p>
Surrounding land uses	<p>The study area can be subdivided into four sections namely, the northern section, southern section, western section, and the eastern section (refer to Figure 1 for the site locality).</p> <ul style="list-style-type: none"> • The northern section is closer to the R34 and located between Odendaalsrus and Kroonstad. There are currently two target areas proposed within this section namely, Target Area 10 (GP B) and Target Area 11 (GP A) and three seismic transects (Transect G1, G2 and G3). This section consists almost primarily of cultivated land with several natural and artificial watercourses. • The eastern section is located immediately north of Ventersburg and bounded by the N1 and Phomolong. This section is primarily dominated by cultivated land, open areas, and game farms. There are distinctive watercourses within this area including the Kromspruit which is immediately to the north of the sole proposed drilling site, Target Area 9 (HF C) 500m assessment area within this section. There are three proposed transects within this section, namely, Transects HF1, HF2 and HF7. Which intersect the Kromspruit, Rietspruit and Slootspruit. • The tip of the southern section is approximately 8.5km south of southern Virginia (Meloding) while the two target areas, Target Area 1 (RSB D) and Target Area 2 (RSB E) are approximately 7km east of southern Virginia. The R73 cuts across this section. Similarly to the northern and eastern sections, the southern section is primarily dominated by cultivated land, open areas and game farms, several natural and artificial watercourses. Although the two target areas within this section, two of the three seismic transects intersect the Sandrivier. There is also a canal that separates the two target areas. • The western section is the section where majority of the exploration activities were previously proposed but have since been removed from the current EA application. This section is within a mining area and adjacent to mining towns. The edges of the residential areas of Saaiplaas, Bronville and Thabong form part of the eastern boundary of this section and ER386. There are currently no proposed drilling sites nor seismic activities within this section. Although this section also consists largely of cultivated land, open areas and minor game farms, several natural and artificial watercourses, it is the most transformed section within the ER comprising of mining activities, residential areas, road, and electrical infrastructure. This section also comprises of several farms which are earmarked for renewable energy developments.

The exploration activities will not take place across the entire study area. The total area to be disturbed by exploration activities will be minimal based on the relatively non-invasive exploration techniques to be undertaken. The currently proposed exploration activities include the drilling of 5 (50m x 50m) core exploration wells whereby the drill sites will be 1.25ha in total, excluding associated access roads. It was necessary at that early phase, to apply for a large area in order to secure the right to assess the existence of petroleum resources and to gain access to existing data.

5.2 DESCRIPTION OF LISTED ACTIVITIES TRIGGERED

In terms of Section 24(2) of NEMA, the Minister and/or any Member of the Executive Council (MEC) in concurrence with the Minister may identify activities which require authorisation as these activities may negatively affect the environment. The NEMA EIA Regulations were promulgated in 2014 and amended in 2021



in terms of Section 24(5) and Section 44 of the National Environmental Management Act (NEMA), Act 107 of 1998 and consist of the following:

- *Regulation 982* provide details on the processes and procedures to be followed when undertaking an Environmental Authorisation process (also referred to as the EIA Regulations);
- *Listing Notice 1* (Regulation 983, as amended) defines activities which will trigger the need for a Basic Assessment process;
- *Listing Notice 2* (Regulation 984, as amended) defines activities which trigger an Environmental Impact Assessment (EIA) process. If activities from both R 983 and R 984 are triggered, then an EIA process will be required; and
- *Listing Notice 3* (Regulations 985, as amended) defines certain additional listed activities for which a Basic Assessment process would be required within identified geographical areas.

The above regulations were assessed to determine whether the proposed project will trigger any of the above listed activities, and if so, which Environmental Authorisation Process would be required. The triggered listed activities presented in **Table 4** and the applicant will require an Environmental Authorisation (EA) in terms of GNR 984 Listing Notice 2 of the NEMA EIA Regulations 2014 as amended. A Scoping and EIA process is required in line with all the requirements of the NEMA EIA Regulations, 2014, as amended.

Table 4: Relevant NEMA listed activities relevant to the proposed development.

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
GNR 983 Activity 21C	Any activity including the operation of that activity associated with an onshore seismic survey which requires an exploration right in terms of section 79 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice or in Listing Notice 3 of 2014, required to exercise the exploration right, excluding (a) any desktop study, (b) any arial survey, and (c) a hydraulic fracturing activity which is included in activity 20A in Listing Notice 2 of 2014, in which case that activity applies	The proposed activities include the undertaking of onshore seismics / telluric survey over 70km long around known structures and possible drill locations.
GNR984, Activity 18²	Any activity including the operation of that activity which requires an exploration right in terms of section 79 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or in Listing Notice 3 of 2014 required to exercise the exploration right, excluding (a) any desktop study; (b) any arial survey; (c) any onshore seismic survey which is included in activity 21C in Listing Notice 1 of 2014, in which case that activity applies; (d) a hydraulic fracturing activity which is included in activity 20A, in which case activity 20A of this Notice applies; and (e) the processing of a petroleum resource, including the beneficiation or	The proposed activities include the undertaking of up to five (5) Diamond Core / Percussion Drilling activities for hydrocarbons, which requires an exploration right in terms of section 79 of the MPRDA

² It is the EAPs reading and understanding of the NEMA EIA Regulations as confirmed with the Department that once GNR984 Activity 18 is triggered and applied for, there is no actual need to apply for the other associated listed activiteis as GNR984 Activity 18 LA covers all other triggered Listed Activities in GNR983, GNR984 and GNR985. However, to ensure that the resultant EA and EIA has considered relevant associated activities, these have been listed for completeness.



	refining of gas, oil or petroleum products, in which case activity 5 of this Notice applies	
Other NEMA EIA Regulations, 2014 as amended applicable listed activities to be assessed in the EIA		
GNR 983 Activity 27	Clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan	The proposed activities will require the Clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation for up to five (5) 50m x 50m drilling pads and access roads where necessary.
GNR 985 Activity 12	The clearance of an area of 300 square meters or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (b). Free State: i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	The proposed activities will require the clearance of an area of 300 square meters or more of indigenous vegetation for up to five (5) 50m x 50m drilling pads and access roads where necessary.

There are currently no additional listed activities and/or water uses identified for the project. However, should the final drilling / surveying location be within the regulated area for a watercourse as per DWS regulations, then the applicant must apply for a Water Use Authorisation for the triggered Section 21 activity of the National Water Act.

5.3 PROJECT DESCRIPTION

This section provides a detailed description for the proposed ER386 project. Most of the key information presented in this chapter was obtained from the applicant. The aim of the project description is to describe the proposed activities planned to take place at the D3 Energy ER386. Furthermore, the project description is designed to facilitate the understanding of the proposed project related activities which are anticipated to lead to the potential impacts identified and assessed in the EIA Report, and for which management measures have been, or will be designed. Important project aspects, and their respective locations, are indicated in **Table 5**. The exploration activities include both non-invasive and invasive activities. As both the target areas (drilling) and seismic transects are pre-liminary at this stage (defined based on existing data that was available to inform the Environmental Works Programme) and will only be finalized after review of available background information, bigger footprints were assessed around each target area and seismic transect to allow for adjustments of final target area and seismic transect. 500m was assessed around each TA and 25m around each seismic transect.

Onshore natural gas exploration is inherently progressive and iterative, comprising phased activities that are implemented in a structured and adaptive manner. Each phase generates data that informs the need for, and design of, subsequent phases, including the refinement of locations, methods, and scope of further exploration.



Initial activities establish a preliminary understanding of subsurface conditions and resource potential, while later phases are progressively defined based on the results of earlier investigations. As such, the full spatial extent and intensity of exploration activities are not fixed upfront but evolve over time in response to new information.

In this context, the EIA adopted an approach that assesses impacts associated with preliminary and reasonably foreseeable exploration activities within a defined envelope (as described herein), while remaining sufficiently flexible to accommodate changes as the exploration programme progresses. The purpose of the EIA was therefore to ensure that environmental impacts are appropriately identified, assessed, and managed on an ongoing basis, allowing environmental considerations to inform decision-making throughout the exploration lifecycle.

Table 5: Details of main project aspects.

Aspect	Details		Latitude	Longitude
Drilling Site (Target Area)	Target Area 1: RSB D – 500m Buffer Drilling Area		28°10'2.21"S	26°58'26.26"E
	Target Area 2: RSB E – 500m Buffer Drilling Area		28° 9'26.86"S	26°58'52.57"E
	Target Area 9: HF C – 500m Buffer Drilling Area		27°59'16.03"S	27° 7'1.82"E
	Target Area 10: GP B – 500m Buffer Drilling Area		27°52'38.16"S	26°58'50.81"E
	Target Area 11: GP A – 500m Buffer Drilling Area		27°49'32.99"S	26°58'17.68"E
Seismic Transect	Transect G1 (13.5km long) - 50m corridor	G1 Start point	27°48'39.11"S	26°58'12.51"E
		G1 Endpoint	27°55'46.58"S	26°59'21.34"E
	Transect G2 (7.5km long) - 50m corridor	G2 Start point	27°50'20.21"S	26°55'46.11"E
		G2 Endpoint	27°49'1.96"S	26°59'58.28"E
	Transect G3 (8km long) - 50m corridor	G3 Start point	27°52'41.75"S	26°58'10.21"E
		G3 Endpoint	27°52'10.53"S	27° 2'57.40"E
	Transect H1 (12km long) - 50m corridors	HF1 Start point	28° 1'7.36"S	27° 6'9.01"E
		HF1 Endpoint	27°55'3.47"S	27° 9'10.29"E
	Transect H2 (9.5km long)- 50m corridor	HF2 Start point	27°59'53.41"S	27° 3'34.59"E
		HF2 Endpoint	27°55'7.17"S	27° 5'30.54"E
	Transect H7 (11km long) - 50m corridor	HF7 Start point	27°57'25.83"S	27° 3'35.90"E
		HF7 Endpoint	28° 0'31.28"S	27° 9'8.00"E
	Transect RSB1 (3.5km long) - 50m corridor	G3 Start point	28°10'35.47"S	26°58'22.20"E
		G3 Endpoint	28° 9'4.72"S	26°59'21.22"E
	Transect RSB2 (2km long) - 50m corridor	G3 Start point	28° 9'45.45"S	26°58'20.75"E
		G3 Endpoint	28° 9'57.70"S	26°59'33.85"E
	Transect RSB3 (2km long) - 50m corridor	G3 Start point	28° 9'27.69"S	26°58'39.14"E
		G3 Endpoint	28° 9'40.51"S	26°59'51.37"E



5.4 NON-INVASIVE EXPLORATION

5.4.1 BACKGROUND DATA COLLECTION AND DATA MANAGEMENT

Affected landowners will be identified and contacted in preparation for the ground exploration activities. Existing gas emitting boreholes will be sought if they exist, photographed, measured, and analysed. Meetings will be set up with mining companies in the vicinity to see if they have had any experience with gas and gas emitting boreholes. Any gas emitting boreholes found will then be mapped and analysed.

In order to acquire information from the existing gas wells, wellhead control and measurement equipment will be designed and installed to measure pressure, flow rate and collect gas samples for analysis. In addition, existing gravity/magnetic data will be obtained and analysed. Any available cores and cuttings from previous mining/exploration activities will also be analysed. The need to undertake additional aerial gravity/magnetic surveys can only be determined once all available existing data has been reviewed and analysed, however if required, a risk assessment is to be prepared prior to undertaking this activity and compliance with the mitigation measures put forward in this EMP which will be binding on the Applicant once approved by the CA. Geophysical data will be acquired and reprocessed where practical so as to analyse and interpret the data. Surface mapping (surface geological features and outcrops) of the various parts of the exploration area will also be undertaken during this phase. Data from surface mapping along with initial data gathered will be analysed and geological maps prepared. Reservoir studies using magnetic, geological, and geophysical data will be conducted.

5.4.2 PREPARATIONS FOR SEISMIC SURVEYS

D3 Energy will search available records (e.g. Council for Geoscience, PASA) for seismic data that was acquired on the ER in the past. If no data is available, D3 Energy will either acquire its own seismic or telluric data on the ER, following proper environmental protocols and with the written permission of the landowner. Background information from the drilling programme as well as existing wells where conditions permit, and geological maps, will be used to identify the final seismic transect routes within the approved area. A team will be assembled to effectively prepare and plan the transect routes. The team / applicant will identify and contact landowners in preparation for activities. The team's plan will detail the period of surveying, the access routes, transects path to be followed, temporary site camp and laydown area, among other aspects which will be used to inform and prepare the applicant for environmental compliance audits. Once all preconstruction requirements are in place, the team will mobilize to undertake the seismic surveys which should last for a couple of weeks if weather conditions permit.

5.4.3 GEOLOGICAL AND GEOPHYSICAL LOGGING

Geological and geophysical logging will be undertaken using samples collected from the drilling programme, as well as from existing wells where feasible. The samples will be analysed for the presence of hydrocarbons as well as to determine the physical properties of the rocks. This analysis will allow for the determination of the lithology and associated properties as well as the presence of hydrocarbons. Geophysical logging and surface structures data (surface geological features and outcrops) will be integrated into maps.

5.4.4 SEISMIC SURVEYS

Seismic surveying along the transects through a vibroseis technique will be undertaken by a small team (approximately 15 personnel) by deploying an array of energy sources from a small-sized Seismic Vibrator and an array of sensors or receivers (geophones) on the identified area of interest (**Figure 6**). A single Seismic Vibrator consisting of a vibrating baseplate that is placed on the ground will be used. The vibrating plate emits a low frequency signal (4-80 Hertz (Hz)) into the ground, called a sweep. The vibroseis vehicle moves slowly along the pre-determined lines (transects) using GPS for navigation. It stops, emits a signal 8-20 seconds long, moves approximately 10 meters ahead, stops, emits a signal and so on until all the transects have been traversed (**Figure 6**). Several small geophones will be used to convert the ground movements or seismic waves from the



seismic vibrator into voltage, which will be recorded at a nearby recording station (**Figure 6**). The team will then generate and analyse the 2-D sub-surface geological network and identify areas of interest for further exploration. The outcome of the seismic survey will be used to inform preferable drilling locations.

Although the vibroseis technique is the likely method to be undertaken for the seismic activities. There are also potential alternatives to the vibroseis known as the Propelled Energy Generators (PEGs), more commonly referred to as the Accelerated Weight Drop Seismic (AWD) as well as Magnetotellurics Survey (MT) which D3 Energy may consider over, or in conjunction with, the vibroseis. AWD are light weight, highly portable seismic energy sources designed for a multitude of applications within the fields of geology, geophysics, civil engineering, and more. AWD systems utilize simple and effective elastomer band technology to propel the hammer to a high velocity. The AWD is comprised of two easily manageable components for fast and efficient installation and de-installation in the field. The AWD's lightweight, streamlined design also affords its users economy in shipping. The AWD-40Kg is designed to easily mount on trucks, bakkie, trailers, and all-terrain vehicles (**Figure 6**). AWD is a variant of seismic source of the "weight drop" type. The hammer is equipped with an inclined platform, allowing it to be installed at an angle of 45 degrees, and a special stop, adding stability in an upright position, what allows to perform survey on shear waves (**Figure 6**). The source AWD-40PS is mounted on a compact lightweight frame equipped with reliable wheel blocks. The source can be used on a rugged terrain. The total weight of the source without battery pack is less than 120 kg. The energy of a single impact reaches 1000J.

Magnetotellurics (MT) is a passive geophysical technique that uses naturally occurring electromagnetic fields to image the subsurface electrical resistivity structure by measuring the Earth's natural time-varying electric and magnetic fields. The MT method utilizes naturally occurring, broadband electromagnetic waves over the earth's surface to image subsurface resistivity structure. The electromagnetic waves originate from regional and worldwide thunderstorm activity and from the interaction of solar wind with the earth's magnetosphere. Due to the remote nature of the sources and the high refractive index of the earth relative to air, the electromagnetic waves are assumed to be planar and to propagate vertically into the earth. However, the scattering of electromagnetic waves by subsurface structure can be arbitrary in polarization, necessitating a tensor description (Wannamaker *et al.*, 2005). Accordingly, two components of electric field (E_x and E_y) and three components of magnetic field (H_x , H_y and H_z) are measured. The frequencies of the waves (signals) range from about 1 Hz to a fraction of milli Hertz, which allows to image a wide depth range. A detailed account of the MT method is given in Vozoff (1991).

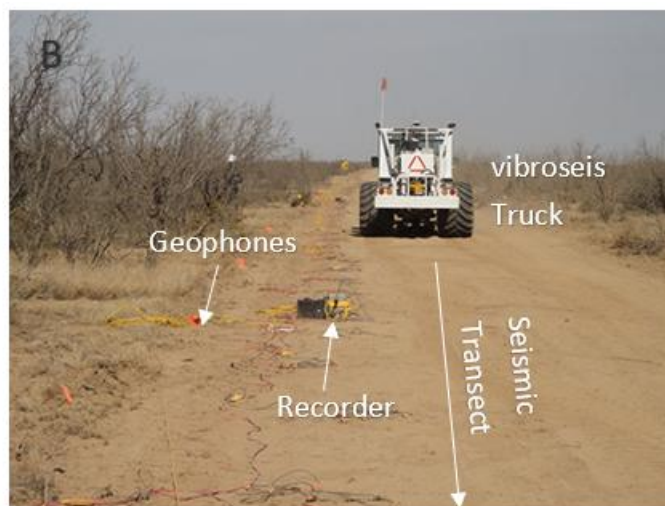
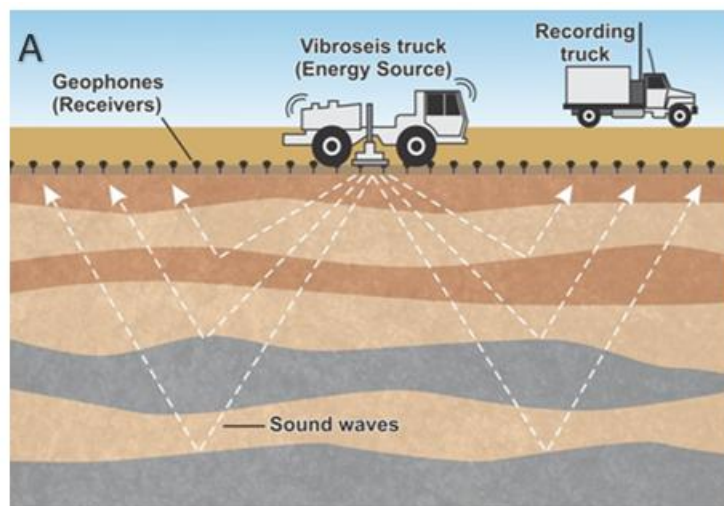


Figure 6: Seismic surveying process and potential impacts. (A) Showing an animated vibroseis process, (B) Showing a real life vibroseis process, (C) Showing minimal dust generated from the process, (D) Showing minimal vegetation impact associated with a new access path (transect route), (E) Showing the weight drop alternative method and (F) showing magnetotelluric survey



5.5 INVASIVE EXPLORATION ACTIVITIES

5.5.1 GEOTECHNICAL INVESTIGATIONS

Once the seismic, geological and geophysical data has been analysed this information will delineate the areas susceptible for further geotechnical investigations. As the non-invasive exploration will define the locations for further exploration drilling. Drilled explorations wells will be evaluated based on gas flow, pressure, and gas composition, prior to deciding to either complete the well as a production well or to suspend or abandon it. The information from the seismic survey and drilling will be used to map the geology of the area.

5.5.2 WELL WORKOVER AND INTERVENTION

The proposed activities to be undertaken as part of the exploration activities including identifying existing blowers within the ER, undertaking well workover and intervention if necessary. Well intervention and workover are both remedial operations performed on gas wells to maintain or enhance production, but they differ in scope and the level of intervention required. Well intervention is a broader term encompassing any operation to access the wellbore for maintenance, repair, or production enhancement, often using tools and equipment lowered into a live well with the wellhead in place. Workover, on the other hand, typically involves more extensive operations, including removing the wellhead tree and potentially replacing the production tubing string after killing the well³.

5.5.2.1 WELL WORKOVER

Well workover stands as a comprehensive operation within the gas industry, strategically undertaken on existing wells to rejuvenate or amplify their production capabilities. This process encompasses substantial interventions and the deployment of significant equipment to address a spectrum of issues, ultimately aiming to improve the overall performance of the well. Well workovers become imperative when a well experiences a decline in production or encounters mechanical challenges that necessitate remedial action. The process of well workover will be one or a combination of the following:

a. Restoring Flow:

Well workovers are often initiated with the goal of restoring or enhancing production rates. This may involve the removal of obstructions, thorough cleaning of the wellbore, or the repair of damaged equipment. By addressing these impediments, operators can optimize the well's functionality and boost production.

b. Changing Completion Design:

Modification of the well's completion design is a common facet of well workovers. This may entail actions such as replacing tubing, installing new downhole equipment, or optimizing the artificial lift system. These adjustments are geared towards improving the efficiency and effectiveness of the well's completion design.

c. Sidetracking Operations:

Some well workovers encompass sidetracking, a process that involves drilling a new borehole from an existing wellbore. This technique is employed to access additional reservoir zones, effectively bypass damaged sections, or maximize recovery from the reservoir. Sidetracking adds a layer of flexibility to well workovers, allowing operators to strategically tap into untapped resources.

5.5.2.2 WELL INTERVENTION

Well intervention in the context of gas wells refers to a set of activities aimed at diagnosing, maintaining, or enhancing the performance of a well without resorting to major workovers. These interventions are crucial for optimizing production, addressing specific issues, and ensuring the continued functionality of the well. Unlike major workovers, which involve substantial interventions, interventions are generally minor in nature and focus

³ In the oil and gas industry, killing a well (often referred to as a "well kill") is a critical safety operation used to permanently or temporarily stop the flow of formation fluids (oil, gas, or water) from the reservoir into the wellbore.



on improving well productivity (flow) and efficiency. The process of well intervention will be one or a combination of the following:

a. Well Logging and Diagnostics:

Well logging and diagnostics involve the deployment of specialized tools and instruments downhole. These tools gather data on reservoir properties, wellbore conditions, and fluid characteristics. The collected data aids in reservoir evaluation and helps optimize production strategies by providing insights into the well's current status.

b. Maintenance and Servicing:

Maintenance and servicing interventions encompass routine activities aimed at preserving the well's functionality. This includes cleaning the wellbore to remove debris and scale, replacing damaged or worn-out equipment, and addressing minor mechanical issues. Regular maintenance is essential to prevent larger problems and maintain the well's efficiency over time.

The exploration activities **exclude** any well stimulation activities, such as hydraulic fracturing or 'fracking'.

5.5.2.3 PROCESS FOR IMPLEMENTATION

Onshore well interventions and workovers can lead to various environmental, health, and safety impacts. These include water and air pollution, risks to worker health and safety, and potential impacts on surrounding communities. Mitigation strategies involve implementing best management practices, employing advanced technologies, and ensuring robust emergency response plans. The process to be followed will include:

- Assessment of existing conditions and process required: D3 Energy will first assess the conditions and issues of each existing blower (gas emitting well) with the ER. If the well is found to be suffering from significant gas flow decline, blocked completions, or severe casing damage, a workover is likely to be undertaken. However, if less critical issues like instrumentation malfunction, scale buildup, or needing to perform diagnostics, a well intervention is the more efficient, cost-effective, and likely the option to be undertaken.
- Development of an emergency response plan: an emergency response plan will be developed including spill response, fire prevention protocols, and blowout response.
- Training and personal protective equipment: providing comprehensive training on safety procedures, emergency response, and the use of personal protective equipment (PPE) will be undertaken.
- Preventing blowouts: maintaining well control through hydrostatic pressure management, utilizing robust Diverter systems, and implementing thorough planning and risk assessment, as well as implementation of early detection systems and well-defined kill procedures for mitigating potential blowouts.
- Equipment maintenance: regularly inspecting and maintaining equipment to prevent malfunctions.
- Closed-loop systems: implementing closed-loop drilling systems and using covered tanks with secondary containment to minimize spills and leaks.
- Chemical management: proper handling, storage, and disposal of chemicals.
- Casing and plugging of the wells: additional steel casing and cement barriers to prevent leaks as well as plugging at the end of exploration to prevent groundwater seepage.
- Rehabilitation: each well site will be rehabilitated to support the existing land-use.

5.5.3 WELL DRILLING

Using the data gathered during the preceding background review and surveying, up to five (5) exploration boreholes will be sited. The proposed drilling process entails the construction of exploration wells using a two-string telescopic casing design. The well construction is outlined below and illustrated in **Figure 7**:

- The Spud casing will be set and cemented to case off the unconsolidated material to approximately 6m True Vertical Depth (TVD);



- Drilling will be continued past the unconsolidated material to approximately 80mTVD, conductor casing will be cemented from shoe to surface;
- The hole is then drilled ahead and into the Ventersdorp Lavas below the base of the Karoo at approximately 450 m TVD; Intermediate casing will be run and cemented to surface;
- Integrity of this section will be tested by running a Cement Bond Log (CBL) and the pressure tested prior to drilling out the casing shoe. After installing and cementing a casing string, the drilling crew drills out the bottom of that casing (the “shoe”), and then performs a Formation Integrity Test (FIT) to confirm that the surrounding formation can safely withstand drilling pressures before continuing deeper; and
- The next section (open hole section) will be percussion drilled through the primary target, the Ventersdorp Supergroup, to a depth \pm 650 m TVD. This section TVD maybe called earlier if significant gas flows are encountered.

The proposed activities will involve the drilling of a well within each of the assessed 500m buffer areas (Target Areas). Each exploration well will have an overall depth of up to 650m and a maximum diameter of 350mm, commencing with a 323mm width spud hole section drilled to 6m total vertical depth (TVD), followed by 254mm width conductor hole section drilled to 80m TVD, then an intermediate hole section of 203mm width drilled to 450m TVD and finally an open hole section of 144mm width drilled up to 650m TVD. The actual hole and casing sizes and configurations will vary depending on the specific geological characteristics and functional requirements. Each borehole will be steel cased and have cement barriers to prevent leaks as well as plugged at the end of exploration to prevent groundwater seepage (**Figure 8D**).

Drilling activities are estimated to be one to two weeks per hole during which time there will be a truck mounted drill rig, a service truck, and a light duty vehicle on site. Intermittent use of a Tractor-Loader-Backhoe (TLB) may be used during site establishment and demobilisation. In order to establish the gas contents a mobile desorption laboratory may be established.

The construction of each drill pad will disturb an area of up to 50 x 50 m (**Figure 8B**). Within the disturbed area, the drill rig and drilling rods will be located. **Impermeable, lined and fenced-off sumps (4m² and 1.5m deep) will be used to circulate wastewater and temporary store the drill cuttings and for the cement mixing.** These sumps are compulsory for well cementing, the pits safely catch cement returns, equipment wash water, and cement slurry overflows. As the proposed drilling process is air drilling, which is a technique that uses compressed air, nitrogen, or gases instead of conventional liquids (like drilling mud) to cool the drill bit and lift rock cuttings out of the wellbore (no chemicals), no drilling chemicals will be contained within the sumps. **The Safety Data Sheet (SDS), formerly known as Material Safety Data Sheet (MSDS) for the chemicals which will be present on the sumps is available on request.** Exploration trays, temporary hazardous and general waste storage areas, chemical toilets, and any site offices required will also be placed inside the drill pad area (**Figure 8**). Each drill site will be suitably rehabilitated before drilling continues at the next drill site. Depending on the results of the sampling, each borehole will either be plugged entirely and abandoned or left as is for future monitoring or analysis. Regardless of which of these options is chosen, the borehole will be capped with a steel cap that is engraved with the borehole number according to industry specifications.

Each drill site will be suitably secured before drilling continues at the next drill site. Depending on the results of the sampling, each borehole will either be plugged entirely and abandoned or left as is for future monitoring or analysis. Regardless of which of these options is chosen, the borehole will be capped with a steel cap that is engraved with the borehole number or for future monitoring or analysis a wellhead according to industry specifications



TYPE	OH	CASING	DEPTH
SPUD	323mm	273mm	6m
CONDUCTOR	254mm	217mm	80m
INTERMEDIATE	203mm	140mm	450m
PRODUCTION	114mm	OH	650m

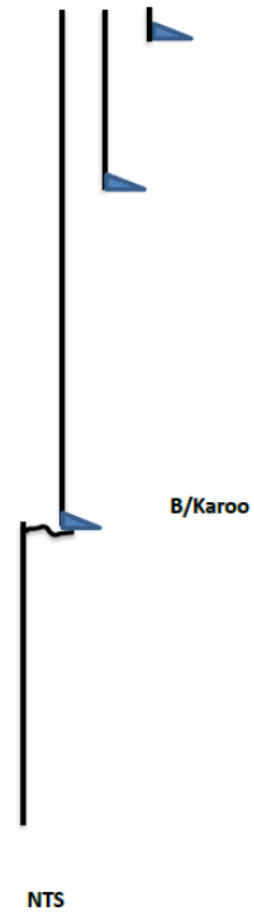


Figure 7: Vertical Well Plan (iKapa Resources, 2024)⁴

⁴ OH = open hole



Figure 8: Exploration drilling and potential impacts. (A) Showing the drilling process and associated infrastructure, (B) Showing the drill pad footprint at one of the active D3 Energy drilling sites, (C) Showing some of impacts associated with drilling activities including controlled vegetation clearance and topsoil stockpiles and (D) Showing the final borehole, steel cased and have cemented to prevent leaks.



5.6 SUPPORTING INFRASTRUCTURE

None of the proposed exploration activities require the establishment of any permanent infrastructure. Sites will be accessed via existing roads or farm tracks as far as possible. Where existing access is not available, access tracks to accommodate a vehicle, approximately 3.5m wide will be created. These are temporary, unsurfaced, and similar to a farm two-spoor track. These will be rehabilitated accordingly at the end of exploration. Existing accommodation in the area will be utilised for staff and not on site.

Specialist contractors will provide equipment for seismic surveys and drilling. The majority of equipment, consumables and even labour for these services is specialised. Contractors and suppliers will be encouraged to source locally as much as is feasible. Electricity, if required, will be provided by on-site generators which must be placed on impermeable surfaces. Water required for the operation of the drilling rig, as well as potable water will be obtained locally, by agreement with landowners or the local municipality. The daily water requirements for drilling operations will be a maximum of 5000 litres per day.

Chemical toilets will be provided for the personnel. The toilets will be supplied and managed by a specialist contractor and the sewage disposed of at the nearest licenced wastewater management facility, or as required by the local authority. All general and hazardous waste generated at the survey and/or drilling site will be separated and stored in containers, before being removed from site and disposed at an appropriate licenced waste disposal facility. The geological material recovered from the drilling will most likely be stored in a shed for analysis and record keeping. Water from the drilling operations will be disposed of in accordance with the provisions of the National Water Act and the National Environmental Management Waste Act (as applicable). It should be noted that it is anticipated that there will be low volumes of mineral residue temporary stored on site based on the proposed activities.

5.7 DECOMMISSIONING AND CLOSURE

The Rehabilitation Plan is provided in **Section 12** of this EMPr. The Plan outlines the closure objectives that are aimed at re-instating the landform, land use, and vegetation units to the same state as before exploration operations take place, unless a specific, reasonable alternate land use is requested by the landowner. As such, the intended end use for the disturbed exploration areas and the closure objectives will be defined in consultation with the relevant landowner. Proof of such consultation shall be submitted together with the Application for Closure Certificate. The overall aim of the rehabilitation plan is to rehabilitate the environment to a condition as close as possible to that which existed prior to exploration. This shall be achieved with a number of specific objectives.

- Making the area safe. i.e.: Decommission exploration activities so as to ensure that the environment is safe for people and animals. This entails refilling excavations, sealing and grouting exploration wells etc.
- Reshape disturbed land to stable and suitable conditions similar to surrounding landscape. Return disturbed land to a capability similar to which existed prior to exploration.
- Recreating a free draining landform. This entails earthworks infilling, reshaping, levelling, etc. to recreate as close as possible the original topography and to ensure a free draining landscape.
- Re-vegetation. This involves either reseeding or allowing natural succession depending on the area, climate etc.
- Storm water management and erosion control. Management of storm water and prevention of erosion during rehabilitation. E.g. cut off drains, berms, etc. and erosion control where required.
- Removal of surface infrastructure. All surface infrastructures within disturbed areas will be removed before rehabilitation commences.



- Verification of rehabilitation success. Entails monitoring of rehabilitation. Each area will be maintained and monitored for a period of three to five years following re-vegetation and, if this monitoring shows that the objectives have been met, an application for closure will be made;
- To demolish and remove salvageable infrastructure, dump unsalvageable material and rubble in the adit, seal the access ways and rehabilitate the adit or box cut;
- To ensure that the areas mined by underground methods do not subside and that it will be safe to conduct normal farming operations above these workings by using appropriate safety factors and designs.
- To close off all entries to the underground workings so that the water table will be restored thereby preventing the ingress of air and preventing spontaneous combustion of the pillars. Any access to the working will also be restricted in accordance with the MPRDA.

Once exploration has been completed, all areas disturbed by exploration activities will be rehabilitated. This will be undertaken in accordance with the rehabilitation and closure plan as required by the Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, GNR 1147, gazetted in November 2015. This includes the determination of the financial provision as well. A closure certification application must be applied for in accordance with section 43 of the Mineral and Petroleum Resources Development Act, 2002.

6 ENVIRONMENTAL MANAGEMENT APPROACH

6.1 GENERAL ENVIRONMENTAL MANAGEMENT APPROACH

The compilation of an EMPr for an activity which is likely to result in significant environmental impacts is typically compiled at the culmination of a thorough investigation into the receiving environment and the identification and assessment of likely environmental impacts (i.e. EIA). This EMPr forms part of a ER386 EA Application. This EMPr aims to comply with the requirement of Appendix 4 of the EIA Regulations (GNR 982). These requirements are systematically addressed in the subsequent sections of this report. The primary objectives of the EMPr are as follows:

- To promote sustainability and describe an action programme to mitigate negative impacts as far as possible;
- To be a practical document that sets out both the goals and actions required in mitigation. Though the term “mitigation” can be broad in definition, it means in this context to “allay, moderate, palliate, temper or intensify.” Mitigation of a negative impact means that its effect is reduced. Mitigation of a positive impact means that its effect is increased or optimised; and
- To indicate responsibilities for the implementation of these action items within the EMPr.

This EMPr shall be deemed to have contractual standing on the basis that its contents and specifically objectives are a detailed expansion of the environmental risks and consequent requirements of the EA (if, and when issued). Where relevant the Applicant is responsible for delegating responsibility for compliance to designated parties (internal or external). Such delegation must be legally binding to the extent relevant.

The objectives and targets in this EMPr are further guided by the NEMA, and specifically by GNR982. Thus, the underlying principles of sustainable development are the ultimate objectives and target of this report. The EMPr has included measures to ensure the development activity complies with the following principles, as instilled in the NEMA, amongst others:

- i. That the disturbance of ecosystems and loss of biological diversity are minimised and remedied;
- ii. That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;



- iii. That waste is avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;
- iv. That a risk-averse and cautious approach is applied, which considers the limits of current knowledge about the consequences of decisions and actions; and
- v. That negative impacts on the environment and on people's environmental rights be anticipated, prevented and remedied.

6.2 ENVIRONMENTAL MANAGEMENT APPROACH ASSOCIATED WITH PROPOSED EXPLORATION ACTIVITIES

This section presents specific environmental management requirements for the proposed activities to be undertaken during the exploration process. Impact and risk management actions that are considered as part of the management system, should be complementary to achieve the most cost-effective and environmentally sound approach, and should be based on the following principles:

- Integrate environmental issues and concerns into business decisions through formal management systems;
- Integrate health and safety of local communities and the environment into a single programme;
- Consider all environmental components and aspects (air, soil, water, ecology and biodiversity) in decision making;
- Prevent and reduce pollution at its source through implementation of pollution control measures;
- Aim at minimising resource inputs;
- Evaluate alternatives that included environmental values based on benefits/risks; and
- Strive for continual improvement of management system.

Based on guidelines by the Oil Industry International Exploration and Production Forum (EPI) (1994), the following components form a crucial part of a management systems:

- a. Leadership and commitment: Commitment and company culture is essential to the success of the system;
- b. Policy and strategic objectives: Principles of exploration actions and aspiration with respect to the health and safety of local communities and the receiving environment;
- c. Organization, resource planning and documentation: Organisation of human management structure, adequate resource planning and possession of all required documentation/authorisation;
- d. Evaluation and risk management: Identification and evaluation of financial, social, economic and environmental risks, and development of management measures to reduce/eliminate risks;
- e. Planning: Planning and conducting exploration/work activities, and prepare emergency responses;
- f. Implementation and monitoring: Performance and monitoring of activities, and implementation of corrective measures when necessary;
- g. Auditing and reviewing: Periodic assessments of system performance, suitability and effectiveness of management measures; and
- h. Review: review of audits by senior management.

Figure 9 presents the proposed exploration activities to be undertaken in each phase of the project, and the potential ground requirements associated with each activity.

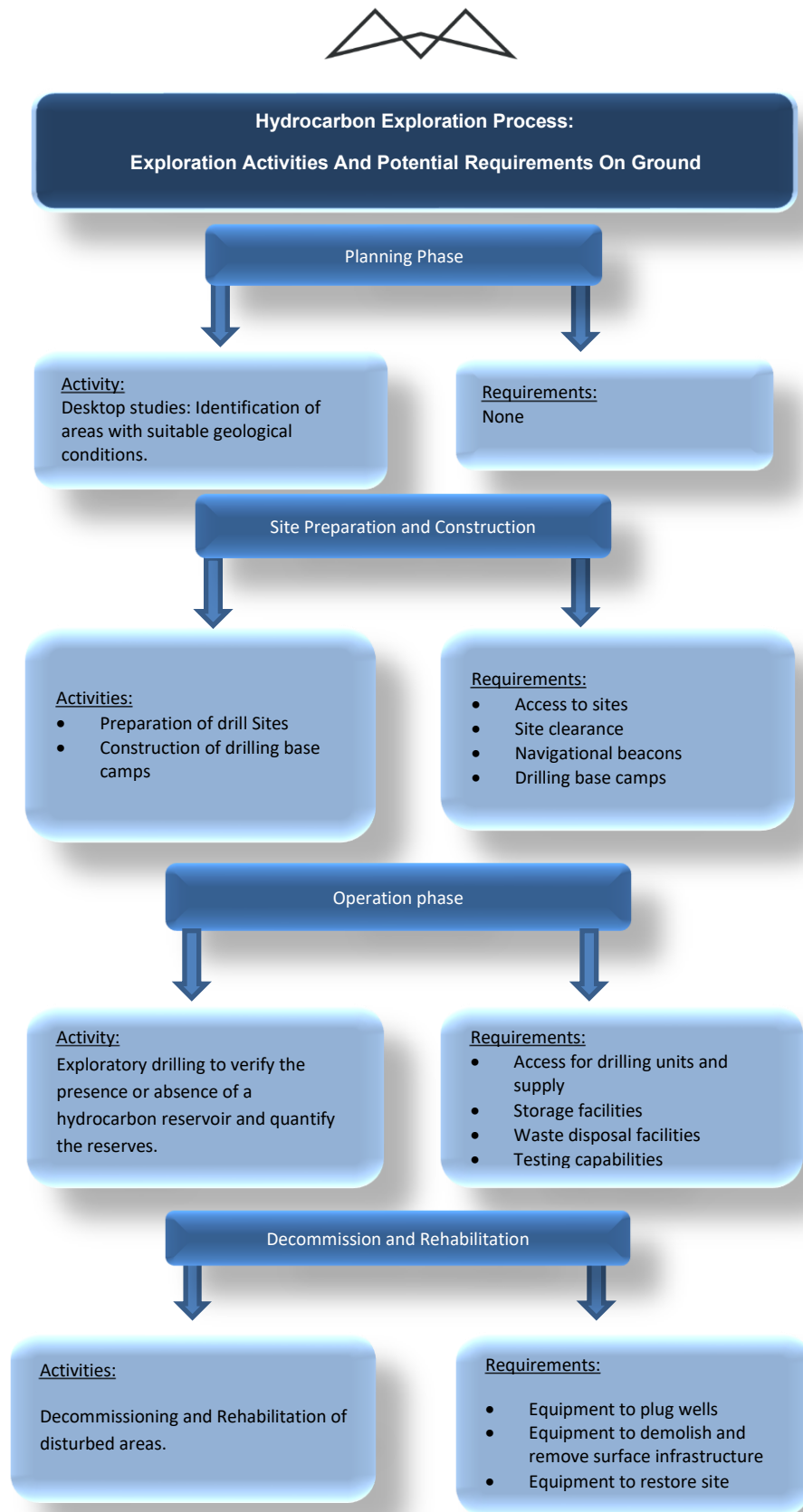


Figure 9: Proposed activities to be undertaken and the potential requirements associated with each phase.



7 ENVIRONMENTAL MANAGEMENT PRINCIPLES

NEMA establishes a general framework for environmental law, in part by prescribing national environmental management principles that must be applied when making decisions that may have a significant impact on the environment. These principles are briefly summarised below.

7.1 HOLISTIC PRINCIPLE

The Holistic principle, as defined by NEMA (Section 2(4) (b)) requires that environmental management must be integrated, acknowledging that all elements of the environment are linked and inter-related and it must take into account the effect of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option (defined below in **Section 7.2**). Holistic evaluation does not mean that a project must be looked at as a whole. It rather means that it must be accepted that there is a whole into which a project is introduced. If the indications are that the project could have major adverse effects, the project must be reconsidered and where appropriate re-planned or relocated to avoid an adverse impact or to ensure a beneficial impact.

7.2 BEST PRACTICABLE ENVIRONMENTAL OPTION

When it is necessary to undertake any action with environmental impacts, the different options that could be considered for the purpose must be identified and defined. The Best Practicable Environmental Option (BPEO) is defined in NEMA as “the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term.” Other guidelines typically used for environmental management in terms of other legislation include BPM which is the Best Practicable Means and BAT which is the Best Available Technology.

7.3 SUSTAINABLE DEVELOPMENT

The concept of sustainable development was introduced in the 1980's with the aim to ensure that the use of natural resources is such that our present needs are provided without compromising the ability of future generations to meet their own needs. The constitution of South Africa is built around the fact that everyone has the right to have the environment protected through reasonable legislative and other measures that secure ecologically sustainable development. The National Environmental Principles included in the NEMA require development to be socially, environmentally and economically sustainable.

7.4 PREVENTATIVE PRINCIPLES

The preventative principle is fundamental to sustainable development and requires that the disturbance to ecosystems and the pollution, degradation of the environment and negative impacts on the environment be avoided, or, where they cannot be altogether avoided, are minimised and remedied.

7.5 THE PRECAUTIONARY PRINCIPLE

The precautionary principle requires that where there is uncertainty, based on available information, that an impact will be harmful to the environment, it is assumed, as a matter of precaution, that the said impact will be harmful to the environment until such time that it can be proven otherwise. The precautionary principle requires that decisions by the private sector, governments, institutions and individuals need to allow for and recognise conditions of uncertainty, particularly with respect to the possible environmental consequences of those decisions. In South Africa, the Department of Human Settlements, Water and Sanitation (then DWAF) adopted a BPEO guideline in 1991 for water quality management and in 1994 in the Minimum Requirements document for waste management.

In terms of DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, the precautionary principle is defined as, “Where a risk is unknown; the assumption of the worst-case situation and the making of provision for such a situation.” Here the precautionary principle assumes that a waste or an identified contaminant of a waste is “both highly hazardous and toxic until proven otherwise.”



In the context of the EIA process in South Africa, the precautionary principle also translates to a requirement to provide sound, scientifically based, information that is sufficient to provide the decision-making authority with reasonable grounds to understand the potential impacts on the environment, the extent thereof and how impacts could be mitigated. If such information is not adequate for this purpose, the relevant authority cannot be satisfied as is required and then the authority should require that further information be collected and provided.

7.6 DUTY OF CARE AND CRADLE TO THE GRAVE PRINCIPLE

In terms of the NEMA Section 28, “Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.”

By way of example, the principle of “duty of care” in terms of waste management emphasises the responsibility to make sure that waste is correctly stored and correctly transported, as it passes through the chain of custody to final point of disposal. This means that waste must always be stored safely and securely. The company removing and disposing of waste also holds the responsibility to hold the relevant licenses, and that waste is transported alongside the necessary paperwork.

“Cradle to Grave” refers to the responsibility a company takes for the entire life cycle of a product, service or program, from design to disposal or termination. In terms of the DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, “any person who generates, transports, treats or disposes of waste must ensure that there is no unauthorised transfer or escape of waste from his control. Such a person must retain documentation describing both the waste and any related transactions. In this way, he retains responsibility for the waste generated or handled.” This places responsibility for a waste on the Generator and is supported by the “Cradle to Grave” principle, according to which a “manifest” accompanies each load of Hazardous Waste until it is responsibly and legally disposed. This manifest is transferred from one transporter to the next along with the load, should more than one transporter be involved. Once the waste is properly disposed of at a suitable, permitted facility, a copy of the manifest must be returned to the point of origin.” Duty of Care offers one strategy to implement sustainable development.

7.7 POLLUTER MUST PAY PRINCIPLE

The “polluter pays principle” holds that the person or organisation causing pollution is liable for any costs involved in cleaning it up or rehabilitating its effects. It is noted that the polluter will not always necessarily be the generator, as it is possible for responsibility for the safe handling, treatment or disposal of waste to pass from one competent contracting party to another. The polluter may therefore not be the generator but could be a disposal site operator or a transporter. Through the ‘duty of care’ principle, however, the generator will always be one of the parties held accountable for the pollution caused by the waste. Accordingly, the generator must be able to prove that the transferral of management of the waste was a responsible action. The polluter pays principle acceding to NEMA dictates that “the cost of remedying pollution, environmental degradation and consequent adverse effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.”

7.8 DUTY OF CARE RESPONSIBILITIES

Section 28 of the NEMA makes provision for duty of care, and remediation of environmental damage. The binding principles are described below:

1. Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, as far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.



(1A) Subsection (1) also applies to a significant pollution or degradation that-

- a) occurred before the commencement of this Act;
 - b) arises or is likely to arise at a different time from the actual activity that caused the contamination; or
 - c) arises through an act or activity of a person that results in a change to pre-existing contamination.
2. Without limiting the generality of the duty in subsection (1), the persons on whom subsection (1) imposes an obligation to take reasonable measures, include an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises on which or in which-
- a) any activity or process is or was performed or undertaken; or
 - b) any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment.
3. The measures required in terms of subsection (1) may include measures to-
- a) investigate, assess and evaluate the impact on the environment;
 - b) inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;
 - c) cease, modify or control any act, activity or process causing the pollution or degradation;
 - d) contain or prevent the movement of pollutants or the cause of degradation;
 - e) eliminate any source of the pollution or degradation; or
 - f) remedy the effects of the pollution or degradation.

7.9 FAILURE TO COMPLY WITH ENVIRONMENTAL CONSIDERATIONS

Within the provisions of the relevant environmental legislation, there are a number of penalties for non-compliance or offences. Below a few extracts are presented for information purposes, however these must not be read in isolation and the reader is reminded that there are other Acts, or sections of Acts, that may be applicable to the relevant project:

- NEMA Section 49B(1): A person convicted of an offence in terms of section 49A(1)(a), (b), (c), (d), (e), (f) or (g) is liable to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years, or to both such fine or such imprisonment- this includes commencing with a listed activity without an EA or the non-compliance with conditions of any EA and associated EMPr;
- NEMA Section 49B(2): A person convicted of an offence in terms of section 49A(1)(i), (j) or (k) is liable to a fine not exceeding R5 million or to imprisonment for a period not exceeding 5 years, and in the case of a second or subsequent conviction to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years, and in both instances to both such fine and such imprisonment;
- NEMA Section 49B(3): A person convicted of an offence in terms of section 49A(1)(h), (l), (m), (n), (o) or (p) is liable to a fine or to imprisonment for a period not exceeding one year, or to both a fine and such imprisonment;
- NWA Section 151 (1c): No person may fail to comply with any condition attached to a permitted water use under this Act;
- NWA Section 151 (2): Any person who contravenes any provision of subsection (1) is guilty of an offence and liable, on the first conviction, to a fine or imprisonment for a period not exceeding five years, or to



both a fine and such imprisonment and, in the case of a second or subsequent conviction, to a fine or imprisonment for a period not exceeding ten years or to both a fine and such imprisonment;

- NEM:BA Section 102 (1): A person convicted of an offence in terms of section 101 is liable to a fine not exceeding R10 million, or an imprisonment for a period not exceeding ten years, or to both such a fine and such imprisonment;
- NEM:WA Section 68 (1): A person convicted of an offence referred to in section 67(1)(b), (c), (d), (e), (f), (i), (j), (k) or (l) or section 67(2)(a), (b), (c), (d) or (e) is liable to a fine not exceeding R5 000 000 or to imprisonment for a period not exceeding five years, or to both a fine and such imprisonment, in addition to any other penalty or award that may be imposed or made in terms of the National Environmental Management Act;
- NEM:WA Section 68 (2): A person convicted of an offence referred to in section 67(1)(b), (c), (d), (e), (f), (i), (j), (k) or (l) or section 67(2)(a), (b), (c), (d) or (e) is liable to a fine not exceeding R5 000 000 or to imprisonment for a period not exceeding five years, or to both a fine and such imprisonment, in addition to any other penalty or award that may be imposed or made in terms of the National Environmental Management Act;
- NEM:WA Section 68 (3): Any person convicted of an offence referred to in section 67(1)(m) is liable to a fine or to imprisonment for a period not exceeding six months or to both a fine and such imprisonment;
- NEM:WA Section 68 (4): A person who is convicted of an offence in terms of this Act and who persists after conviction in the act or omission that constituted the offence commits a continuing offence and is liable on conviction to a fine not exceeding R1 000 or to imprisonment for a period not exceeding 20 days, or to both such fine and such imprisonment, in respect of each day that person persists with that act or omission.

It is recommended that a procedure for non-compliances (i.e. incentives or disincentives for conformance and non-conformance with the EMPr requirements) must be employed to ensure that the EMPr is adequately implemented. The system to be used must be determined before construction commences, included in the tender documents and contracts, and made clear to all project workers. The system may include that the independent Environmental Control Officer (ECO) can be authorized to impose spot fines on the Contractor and/or his subcontractors for any of the defined transgressions. Such fines should be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications and or legal obligations.

8 POTENTIAL IMPACTS IN THEIR RESPECTIVE PHASES

The EMPr includes preventative measures to firstly avoid potential risks and impacts. Where avoidance is not possible, the EMPr provides mitigation measures to control, remedy or modify risks and impacts such as pollution. As this is an amendment to the approved EMPr, it is important to understand which approved mitigation measures are adopted for the additional exploration activities, which measures are no longer relevant and what are new identified mitigation measures. Therefore, the general interpretation of the activities and mitigation measures is indicated in **Table 6**. The updated potential risks and impacts identified for each phase, is summarised in **Table 7** below.



Table 6: Interpretation of identified activities and mitigation measures.

Colour / Text Reference	Colour Coding	Interpretation
xxxx	Black	Existing relevant management and mitigation measures tried and tested for the activities in the same region adopted for the proposed activities
xxxx	Blue	New relevant management and mitigation measures identified as part of the EIA added to the EMPr



Table 7: Potential impacts and risks in their respective phases

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
6.1. General	Project Life Cycle	5 drilling sites and 9 seismic transects. Short term and localized	<ul style="list-style-type: none"> • Demarcation of sensitive areas in consultation with relevant specialists and ECO. • Minimise removal of vegetation as far as possible. • Relocation of protected species. • Implement dust suppression measures in all areas that will be affected by construction activities and where dust will be generated. Dust suppression must also be undertaken during windy and dry weather conditions. • Limit vehicle access. • Compile and Implement alien vegetation management plan due to Category 1b Alien Species on site. • Ongoing identification of risks and impacts. and • Monitoring and review. • The contractor must attempt to restrict noisy activities as far as is possible to times and locations whereby the potential for noise nuisance is reduced. Noise producing activities should be limited to day-time after 07h00 and 17h00 on weekdays. • A suitable qualified Environmental Officer (EO) or Environmental Compliance Officer (ECO) must be appointed prior to the construction / exploration phase. If the final seismic transect route and/or the drilling location changes from the currently proposed areas, but within the assessed footprint and is situated within the high sensitive area, the EO / ECO must undertake final walkdown along the final planned transect route/s and drilling locations in order to ensure that no sensitive vegetation or floral SCC are to be impacted. • The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on the area. • Areas outside the direct project footprint, should under no circumstances be disturbed. • Speed restriction of no more than 20km/h must be implemented for all construction vehicles within the construction site. • Soils and agricultural fields outside the direct project footprint, should under no circumstances be disturbed. 	NEMA MPRDA NEMBA NEMAQA Dust Regulations NWA DWAF Best Practice Guidelines	Throughout project life cycle



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<ul style="list-style-type: none"> Landowner engagement must be undertaken during the project phases to investigate possible scenarios for appropriate compensation of landowners for loss / disturbance of high land capability and/or grazing areas where necessary. No seismic activities nor drilling activities are to be permitted within on wetlands or watercourses (32 m prelitigation and a 15 m post-mitigation buffer). Areas rated as High sensitivity outside of the direct construction / exploration areas should be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent impacts and access to these areas from construction workers and machinery. All laydown, chemical toilets etc. should be restricted to low / medium sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/exploration phase has been concluded. All contractors and employees should wear photo identification cards. Vehicles should be clearly marked as construction vehicles. There must be access control to the entry / exit points of the exploration sites. The financial provision must be updated prior commencement of activities. Should noise become a nuisance (complaints), adequate / viable noise suppression measures must be implemented. All equipment should be kept in line with manufacturers specifications. This should particularly include the regular inspection and, if necessary, replacement of rotary equipment. Any change in the noise emission characteristics of equipment should serve as trigger for withdrawing it for maintenance. Use physical structures such as retaining walls or silt fences on steep or unstable slopes to prevent soil erosion. The Holder should work with the existing and preferred farmers' security group and implement the AgriSA farm access protocol (or equivalent protocol) for everybody that need to access the properties. Maintain regular and proactive communication with landowners to inform them of activities, schedules, and any changes to personnel or site access. Adopt a formal recruitment policy that ensures equal access to employment and training opportunities for women and other marginalised groups. 		



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<ul style="list-style-type: none"> If the drill pads and/or site camps are fenced, the fences must be checked for snares on a daily basis for the duration of the exploration activities. All incidences must be recorded and the ECO must be informed to advise on additional mitigation measures. Anti-poaching toolbox talks should form part of the induction process of all the fencing teams. Any contractor or employee caught poaching should be removed from site. 		
6.2. Site Planning and Preparations	Planning	5 drilling sites and 9 seismic transects. Short term and localized	<ul style="list-style-type: none"> Prior to accessing any portion of land, the Applicant must enter into formal written agreements with the affected landowner. This formal agreement should additionally stipulate landowners special conditions which would form a legally binding agreement. Local residents (landowners and directly adjacent landowners) should be notified of any potentially noisy activities or work and these activities should be undertaken at reasonable times of the day. This work should not take place at night or on weekends; Landowners must be notified beforehand of the activities to be undertaken in their properties and requested to indicate the type and location of services within their properties; There must be a formal procedure in place on how to report incidents to ensure records of all grievances are kept, and responses are given within a certain time; Utilize local labor as far as possible; Have an adequate emergency preparedness plan; If any damage occurs to services / infrastructure, the applicant will be liable to fix it to its original state; Before the project commences, an asset and services baseline of services that may be affected within 50m of the exploration area must be compiled. A copy of the baseline records should be given to each landowner/ service provider, and a master document kept by the applicant; Underground mining companies (if any) within the identified drilling locations must be engaged during the planning phase to ensure the drilling activities do not interfere with underground mining activities. The Developer shall inform all landowners of the commencement of construction activities at least 30 days before commencement. Landowners 	NEMA NEMBA CARA NEMAQA Dust Regulations Road Traffic Act	Throughout Planning Phase



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<p>must be requested to indicate the type and location of services within their properties;</p> <ul style="list-style-type: none"> • Before the project commences, an asset and services baseline of services that may be affected within 10m of the centerline of the seismic transect and 10m from the edge of drilling point must be compiled. A copy of the baseline records should be given to each landowner/ service provider, and a master document kept by the applicant; • A services impact and interruption plan must be developed for sites which intersect existing services in order to minimize and manage potential interruptions should they occur due to an incident. Notice of planned any service interruptions (if any) must be given at least 2 days before the interruption takes place and must be as short as reasonably possible – an SMS or e-mail system can be used for this purpose; and • All residents within 2 km of drilling activities and 1 km of seismic surveys should be informed regarding the exploration activities. Scheduling of activities should be communicated and coordinated with adjacent residents (where applicable). • Signage indicating the channels for logging grievances should be posted at the closest public road boundary and at the site entrance. • The Emergency Response Plan must be updated to contain measures to prevent and react to abnormal events including but not limited to: <ul style="list-style-type: none"> ➤ Blowout Preventers / Diverters ➤ Shut-In Procedures to trigger the Blowout Preventers / Diverters system to physically seal the well and stop the flow of fluids ➤ Emergency Shutdown Systems (ESD) to isolate valves and shuts rig power to prevent escalation into a major incident ➤ High-Efficiency Flare Systems for flaring of excess gas to destroy toxic Volatile Organic Compounds (VOCs) and prevent dangerous emissions ➤ Specific, site-tailored intervention strategies to be deployed to circulate out reservoir influxes and re-establish hydrostatic pressure ➤ A 500-meter danger zone is immediately enforced around the wellhead ➤ Active Spill Prevention, Control, and Countermeasure 		



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<ul style="list-style-type: none"> ➤ Emergency contact numbers of nearby response team with sufficient containment materials and berms to be used to prevent leaked fluids from entering local waterways or soil • A walkdown by a qualified independent ECO must be undertaken at final drilling sites and along final seismic transects as part of the preconstruction survey. The ECO must advise on additional mitigation measures where applicable. • A walkdown by a suitable specialist (ecologist) must be undertaken along final seismic transects as part of the preconstruction survey. The specialist must investigate and/or confirm presence of SCCs. Should any SCCs be identified, the specialist must provide additional mitigation measures to avoid impacts on the identified SCCs. Permits / Licenses must be obtained prior any disturbance and/or relocation of SCCs. • A walkdown by a qualified archaeologist must be undertaken at final drilling sites and along final seismic transects as part of the preconstruction survey. The archaeologist must advise on additional mitigation measures should any heritage features be identified along the seismic transects and/or drilling site. • To prevent conflicts between gas exploration activities and pre-existing or planned renewable energy developments, site-specific agreements must be negotiated with affected landowners and renewable energy developers prior to any on-site activities. • A well design must be developed by a suitably qualified professional (such as a well/ reservoir engineer) and submitted to the PASA for approval prior to commencement of a specific drill site. • The well design shall comply with Good International Industry Practice (GIIP) and must ensure that all installed casing strings and associated cementing are engineered to withstand anticipated worst-case formation pressures and the pressures associated with contingency well control (kill) operations. • Adequate contingency provisions shall be maintained on site or within close proximity, including the availability of base fluids and additives and/or pre-mixed drilling fluids, to enable the rapid preparation and deployment of kill mud where required. 		



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<ul style="list-style-type: none"> • Co-develop Access and Rehabilitation Agreements outlining duration, extent of disturbance, rehabilitation obligations, biosecurity protocols, and opt-out clauses for landowners. • Prior to commencement on a property, conduct one-on-one meetings with affected landowners to explain the exact scope and timing of exploration activities on the specific property. 		
6.3. Establishment of site infrastructure	Construction / Exploration	<0.27ha. Short term and localized	<ul style="list-style-type: none"> • Minimise physical footprint of construction. Construction / exploration impacts associated with the proposed project must be contained within the footprint of the assessed areas; • Ensure construction is consistent with occupational health and safety requirements; • Minimize vegetation clearance. Existing gravel roads must be used as far as possible, and the closest disturbed areas must be considered for drill pads. Clearance of vegetation must be kept to the required footprint (i.e. 50 x 50 m drill pad). Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed. A vegetation clearance management plan should be compiled prior commencement of activities which at minimum should state how the minimization will be managed based on the affected environmental aspect or phase of the exploration; • Ensure proper and adequate drainage; • Minimise waste and control waste disposal; • Fencing of all drill sites with security access control and warning signs; • Establish waste storage areas for recycling; • Ensure adequate containment of waste to prevent pollution; • Minimise dust generation; • Limit vehicle access to approved access roads; • Prepare contingency plans for spillage and fire risks; and • All construction plant and other equipment must be in a good working order to reduce possible noise pollution. 	NEMA MPRDA NEMBA NEMAQA Dust regulations NWA DWAF Best Practice Guidelines	Throughout construction phase



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
6.4. Storage of construction vehicles	Construction and Operation	Short term and localized	<ul style="list-style-type: none"> Any equipment that may leak, and does not have to be transported regularly, must be placed on watertight drip trays to catch any potential spillages of pollutants. The drip trays must be of a size that the equipment can be placed inside it; Drip trays must be cleaned regularly and shall not be allowed to overflow. All spilled hazardous substances must be collected and adequately disposed of at a suitably licensed facility; and Compacting of soil must be avoided as far as possible, and the use of heavy machinery must be restricted in areas outside of the proposed exploration sites to reduce the compaction of soils. 	NWA DWAF BPG	Throughout construction and operation
6.5. Transportation/ access to and from exploration sites	Construction and Operation	Short term and localized	<ul style="list-style-type: none"> Where possible, drill sites should be located along existing access roads to reduce the requirement for additional access roads; Any new temporary access routes to the drill site should result in minimal disturbance to existing vegetation; All farm gates must be closed immediately upon entry/exit; Under no circumstances may the contractor damage any farm gates, fences, etc.; On-site vehicles must be limited to approved access routes and areas on the site so as to minimize excessive environmental disturbance to the soil and vegetation on site, and to minimize disruption of traffic (where relevant); All construction and vehicles using public roads must be in a roadworthy condition and their loads secured. They must adhere to the speed limits and all local, provincial and national regulations with regards to road safety and transport; Damage caused to public roads as a result of the construction activities must be repaired in consultation with the relevant municipal authorities; and All measures should be implemented to minimize the potential of dust generation. 	NEMA NEMBA CARA NEMAQA Dust Regulations Road Traffic Act	Throughout Construction and Operation
6.6. Storage of hazardous substances	Construction and Operation	Localized and short-term	<ul style="list-style-type: none"> All hazardous substances (e.g. fuel, grease, oil, brake fluid, hydraulic fluid) must be handled, stored and disposed of in a safe and responsible manner so as to prevent pollution of the environment or harm to people or animals. Appropriate 	NWA NEMWA	Throughout Construction and Operation



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<p>measures must be implemented to prevent spillage and appropriate steps must be taken to prevent pollution in the event of a spill; and</p> <ul style="list-style-type: none"> • Hazardous substances must be confined to specific and secured areas, and in such a way that does not pose any danger of pollution even during times of high rainfall. 	DWAF BPG	
6.7. Waste Management	Construction and Operation	Localized and short-term	<ul style="list-style-type: none"> • Waste generated on site must be recycled as far as possible. Recyclable waste must not be stored on site for excessive periods to reduce risk of environmental contamination; • Drill muds, formation water (if encountered), etc. would constitute waste and must be classified and ranked in terms of relevant legislation for correct disposal; and • A Waste Management System must be implemented, and provide for adequate waste storage (in the form of enclosed containers) waste separation for recycling, and frequent removal of non-recyclable waste for permanent disposal at an appropriately licensed waste disposal facility. No waste material is to be disposed of on site. 	DWAF requirements for waste disposal	Throughout Construction and Operation
6.8. Aerial Surveys	Operation	Localized and Short Term	<ul style="list-style-type: none"> • Aerial flying for gravity/magnetic data must be undertaken in accordance with the CAA regulations as well as any reasonable specific requirements of the affected landowners; • Minimum flight height restrictions include 2500ft above nature reserves and 500ft in open areas unless otherwise agreed to with the CAA and the affected landowners; • A risk assessment associated with the aerial surveys must be prepared prior to conducting this activity and must include a flight plan with due cognisance of the noise receptors and risks along the flight paths. 	CAA Regulations	Throughout operation
6.9. Well Drilling and Seismic Surveys	Operation	Localized and Short term	<ul style="list-style-type: none"> • The exploration activities assessed as part of the EIA may only be undertaken within the assessed corridors i.e. 50 corridors for seismic transects and 500m buffers for drilling wells • Construction / drilling should preferably not be conducted during rainy days. If drilling is to be undertaken during rainy days, additional precautionary measures in consultation with the ECO must be implemented to prevent contamination on surface water; 	MPRDA Regulations GN R527 SANS 10103 ECA Noise Regulations NEMAQA Dust Regulations	Throughout operation



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<ul style="list-style-type: none"> • The water quality monitoring results to verify pre and post drilling impacts must be submitted to the DWS; • Dust suppression methods must be applied when necessary to restrict the visual impact of dust emissions; • Any spills of hydrocarbons or fluids used during operation, must be cleaned up immediately; • Excavations should be open for as short period as practically possible and drilling circulation fluid sumps be cleaned out and rehabilitated. Above ground steel or plastic sumps must be used which should include a secondary containment barrier to eliminate possible soil and shallow aquifer contamination; • Construction vehicles and machines must be maintained properly to ensure that oil spillages are kept at a minimum; • Spill trays must be provided if refuelling of drilling rig and vehicles are done on site; • Biodegradable or environmentally friendly drilling fluids (polymers) should be used wherever possible. It is essential that the exploration borehole be flushed once the target depth has been reached. This is preferably done by pumping the drilling fluid out once the drilling fluid breaks down to form thin watery fluid. If the borehole cannot be developed by abstraction of the drilling fluid, e.g. due to full casing to the bottom, then the borehole should be circulated with clean water to enhance break-down of the polymer. Drilling specialists and specialist methodologies should be followed to allow drilling fluids/polymers to be removed from the borehole as far as possible and to prohibit possible bacterial contamination of the borehole and aquifer. The boreholes should be correctly constructed so that no gas leakage occurs; • As part of mitigation of contamination of groundwater, Chapter 8 and Chapter 9 of the MPRDA R. 527 Regulations for petroleum exploration and production should be adhered to wherever these regulations apply to exploration drilling; • After exploration coring has been completed, samples removed and borehole cleaning has been completed, the boreholes should be fully grouted/cemented with the casing left in correct stratigraphic and aquifer zones as described by the 	NWA DWAF BPG NHRA	



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<p>MPRDA Petroleum exploration and production R. 527 Regulations, Chapter 8 and Chapter 9;</p> <ul style="list-style-type: none"> • A Groundwater Monitoring Program must be implemented in nearby private boreholes to establish impacts of groundwater extraction. Baseline data must be obtained on groundwater and surface water quality prior to any drilling commencing; • No exploration boreholes should be drilled in the immediate vicinity of existing private boreholes; • Soils in drilling areas where disturbances will be encountered must be stripped and stockpiled outside affected areas for use after completion of the drilling program. Topsoil must be adequately stripped to the correct depth and stored separately from subsoils; • Cut of trench and berm must be constructed around the drill pad to prevent contaminated surface runoff from entering shallow aquifers and surrounding water resources; • A liner should be placed over the drill pad and drip trays must be used in all areas where hydrocarbons are handled; • On-site vehicles must be limited to approved access routes and areas on the site so as to minimize excessive environmental disturbance to the soil and vegetation on site, and to minimize disruption of traffic; • Workforce should be kept within defined boundaries and to agreed access routes. • Regular monitoring of fugitive emissions must be undertaken throughout the drilling activity up to the decommissioning of the wells. • The holder must comply with the approved PASA Basis of Design Report specifies the engineering design principles and methodology which are applicable to this project. • Should additional seismic surveys and/or drilling wells fall outside of the EA assessed footprint areas, but within ER386, then depending on the final location of the seismic survey / drill site with respect to the locations sensitivity as defined by the sensitivity maps, and in consultation with the ECO and relevant specialists, the following must be undertaken prior to surveying / drilling: 		



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<ul style="list-style-type: none"> ➤ In low sensitive areas, an ECO walkdown (at minimum) must be undertaken by an independent ECO to assess potential impacts and/or provide site-specific mitigation measures as well as identify any additional specialist input requirements prior the commencement of activities. The conditions of the EMPr (as a minimum) must be complied with; ➤ In medium sensitive areas, the respective specialists must be brought to site to assess the final drill site and surroundings (1km radius around the site) and develop site-specific mitigation measures. Furthermore, the conditions of the EMPr must be complied with; and ➤ In high sensitive areas, the respective specialists must be brought to site to assess the final drill sites and surroundings (with relevant buffer zones, e.g. 1km radius for wetlands, etc.) and develop site specific mitigation measures. These measures (site specific EMPr conditions) must be submitted to the PASA for approval prior to commencement with the drilling operations. • Due to the sensitivity of the riparian zone, any development and/or drilling which takes place within the primary porosity aquifer associated with alluvium material deposited in flood plains must be restricted if it cannot be avoided. Pitless drilling must be implemented for drilling within the riparian zone (i.e., Target Areas 1 & 2) to further reduce the risk of contamination from the drill sump. • Drilling localities should be determined in consultation with a suitably qualified hydrogeologist and sited means of a geophysical survey to target lineaments and weathered zones acting as preferred groundwater flow pathways and contaminant transport mechanisms. • Newly established monitoring boreholes should be subjected to aquifer hydraulic parameters testing to supplement and verify existing hydraulic parameters interpreted as part of the first phase drilling and testing run. • Due to limited aquifer characterisation data pertaining to the deep hydrostratigraphical unit, it is recommended that potential water strikes encountered during proposed exploration drilling be recorded along with associated water levels in order to get a better understanding of the deeper aquifer piezometric head and expected behaviour. 		



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<ul style="list-style-type: none"> Geological exploration logs and data recording should include major water strikes and depths, water loss or water make volumes and depths as well as blow yields if applicable. Should water from the deeper, fractured aquifer be encountered, a sample should be collected to be subjected for inorganic testing as well as isotopes ($\delta^{18}\text{O}$, $\delta^2\text{H}$) and radionuclide analysis in order to determine potential risks as well as validate surface water and groundwater interactions Groundwater flow modelling assumptions should be verified and confirmed. The calibrated groundwater flow model should be updated on a biennial (once every two years) basis as newly gathered site characterisation data and monitoring results become available in order to be applied as groundwater management tool for future scenario predictions. The monitoring program and network as set out in this report should be implemented and adhered to. It is imperative that monitoring be conducted to serve as an early warning and detection system. Monitoring results should be evaluated on a bi-annual basis by a suitably qualified person for interpretation and trend analysis and submitted to the Regional Head: Department of Water and Sanitation. A weather station be established on-site in order to keep record of all rainfall events and assess potential climatic changes. The latter should be incorporated into the numerical groundwater flow model update accordingly. 		
6.10. Heritage and Paleontology	life cycle of the project	Long term Regional	<ul style="list-style-type: none"> Should additional seismic surveys and/or drilling wells fall outside of assessed footprint areas, but within the Exploration Right, then depending on the final location of the seismic survey / drill site in relation to known heritage features (less than 500m from a known heritage feature), a public participation process must be implemented during which the Interested & Affected Parties are invited to come forward and state whether they are aware of any sacred water sites (secret or not) located within a 500m radius area from each proposed exploration positions. It is important to note that at this stage the Interested & Affected Parties will not be requested to provide information on the exact location of such sacred sites, only whether such sites are located within a 500 m radius area from the proposed drilling position(s) or not. Care must be taken during the public participation to ensure that the cartographic and location 	NEMA NHRA	Throughout the life cycle of the project



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<p>information presented to the Interested & Affected Parties contain clear enough information for them to confidently recognize the positions of such proposed drilling site(s) should these be located anywhere in proximity to the properties and landscapes they have knowledge of. The presentation of such cartographic information in English, Afrikaans and Sesotho would be paramount:</p> <ul style="list-style-type: none"> ➤ Should an Interested & Affected Party state that such a sacred site is indeed located within 500 m of a proposed drilling position, an experienced team comprising a heritage specialist and Geohydrologist must accompany the Interested & Affected Party to the sacred site for confirmation purposes; ➤ The heritage specialist and Geohydrologist must compile a letter to indicate the findings of their fieldwork i.e. whether such a sacred site was indeed identified within 500 m from the proposed drilling position; ➤ All aspects relating to the location of the sacred site must be kept strictly confidential. At no stage will any information regarding the position of the sacred site (GPS coordinates, property description etc.) be contained in the letter, or in any other report, document or verbal communication; ➤ The confidential manner in which this mitigation will be approached and undertaken with regards to the locations of Sacred Natural Sites, must be clearly communicated to the Interested & Affected Parties from the outset; • No exploration drilling may be allowed within 500 m of a confirmed Sacred Natural Site; • The planning of all additional exploration footprints must take cognizance of the heritage sensitivities depicted on the heritage sensitivity maps. To the extent possible, identified heritage sensitivities must be avoided in the establishment of additional exploration footprints; • As soon as any additional exploration footprints are confirmed, a suitably qualified heritage specialist, with expertise in archaeology, must be appointed. • The appointed heritage specialist will be responsible for undertaking heritage walkthroughs of the additional exploration footprint areas to identify any heritage sites and/or provide additional mitigation measures. ➤ The appointed heritage specialist must compile a report containing the findings of the heritage walkthroughs, assessing the heritage significance of 		



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<p>such identified heritage sites, assessing the impact of the proposed exploration activity(ies) on the identified heritage sites and outlining mitigation measures which may be required.</p> <ul style="list-style-type: none"> ➤ The report aimed specifically at the additional exploration footprints, and must be submitted to SAHRA as well; • The Archaeologist must apply for a valid permit from SAHRA for the collection / removal of fossils if any fossils are identified; • An independent and suitably qualified ECO must be appointed and must train the Contractor to recognise potential heritage features; • An independent and suitably qualified ECO must be appointed and must train the Contractor to recognise potential heritage and / palaeontological features; • All burial grounds and graves should be retained and avoided with a buffer zone of 30m as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of s36 of the NHRA and its regulations as well as the National Health Act and its regulations; and • Should any heritage / palaeontological features be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the ECO shall be notified within 24hours, and a Chance Find Protocol must be implemented. The responsible heritage resources authority (FSPHRA), as well as the South African Police Service (SAPS) must be notified within 72hours. • A 50m buffer around all identified graves must be implemented within which no proposed activities are to take place. 		
6.11. Refuelling	Construction and Operation	Short term and localized	<ul style="list-style-type: none"> • Refuelling may only take place within demarcated areas that is subject to appropriate spill prevention and containment measures refuelling and transfer of hazardous chemicals and other potentially hazardous substances must be carried out so as to minimize the potential for leakage and to prevent spillage onto the soil; • Drip trays should be utilized in relevant locations (inlets, outlets, points of leakage, etc.) during transfer so as to prevent such spillage or leakage. Any accidental spillages must be contained and cleaned up promptly. 	NWA DWAF BPG	Throughout construction and operation



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
6.12. Maintenance and Repair	Construction and Operation	Short term and Localized	<ul style="list-style-type: none"> Trucks, machinery and equipment must be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks. All leaks must be cleaned up immediately using spill kits or as per the emergency response plan. For large spills a hazardous materials specialist shall be utilized; Accidental hydrocarbon spillages must be reported immediately to the ECO and DWS, and the affected soil should be removed, and rehabilitated or if this is not possible, disposed of at a suitably licenced waste disposal facility. 		Throughout Construction and Operation
6.13. Air Quality & Climate Change	Construction and Operation	Short term and Localized	<ul style="list-style-type: none"> A noise complaints register must be kept. If complaints are received, noise sampling should be undertaken at the NSRs and source of noise should be investigated. Channels for logging of complaints should be communicated to all residents within 2 km of the drilling site and 1km of the seismic transects. Reducing methane releases during well testing. Methane emissions must be monitored during well testing to assist with the greenhouse gas quantification. Options for gas capture and reuse/flaring should be investigated and implemented if reasonably practical. In order to ensure lower exhaust emissions from vehicles and machinery, equipment suppliers or contractors should be required to ensure compliance with appropriate emission standards. Also, maintenance and repair of diesel engines should be carried out as prescribed by manufacturer in order to maximise combustion and reduce gaseous emissions. The Grievance Mechanism must be established and maintained throughout the project activities to indicate air quality complaints and responses. Channels for logging of complaints should be communicated to all residents within 600 m of the target areas and 300 m of the seismic transects. If complaints are received, they must be promptly investigated, recorded and addressed. Robust Leak Detection and Repair (LDAR) Programs: <ul style="list-style-type: none"> ➤ Advanced LDAR programs can include visual checks, utilising infrared cameras (optical gas imaging), drones, satellites, and sensors to detect, locate, and quantify methane leaks from wells. ➤ Leading practices recommend frequent (quarterly or even continuous) inspection, particularly for high-emitting components. 	NEMAQA	Throughout Construction and Operation



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<ul style="list-style-type: none"> ➤ Upon detection, leaks must be repaired promptly to minimise fugitive emissions • Ensure all onsite employees receive annual extreme heat training, maintain updated risk assessments, and monitor heat-related incidents with defined performance targets and corrective action timelines. 		
6.14. Well Plugging	Decommissioning	Short term and localized	<ul style="list-style-type: none"> • All drilling sites must be properly sealed to trap gases from escaping. Wells should be plugged to prevent crossflow of gas into aquifers and isolate all potential hydrocarbon / water bearing formations by utilizing placed cement plugs extending at least 30m above and below the reservoir; • All grouting or cement should be “ready-mixed” if possible. Alternatively, any mixing must be completed on a temporary impermeable layer or in a container; • All pouring of cement or grouting should be completed over a temporary impermeable layer to avoid spillage; • Cleaning of the chute of the cement truck, if applicable, should be done over a temporary impermeable layer; and • Prior to well suspension and decommissioning, the required approvals from the designated agency must be obtained; • A decommissioning plan must be prepared and approved by the designated agency; • Cement and liquid concrete are hazardous to the natural environment on account of the very high pH of the material, and the chemicals contained therein. As a result, the contractor shall ensure that: <ul style="list-style-type: none"> • Concrete shall not be mixed directly on the ground; • The visible remains of concrete, either solid, or from washings, shall be physically removed immediately and disposed of as waste, (Washing of visible signs into the ground is not acceptable); and • All excess aggregate shall also be removed. • Proper plugging and abandonment <ul style="list-style-type: none"> ➤ To prevent leaks from abandoned or inactive wells, wells must be plugged in accordance with international best practice and aligned with the approved FRDCP. 	NWA DWAF BPG	Throughout Decommissioning



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			➤ Regular monitoring of plugged wells is necessary to identify and remediate leakage from degraded cement or casing, which is a major source of methane seepage		
6.15. Removal of surface infrastructure	Decommissioning	Small scale and localized	<ul style="list-style-type: none"> • All infrastructure, equipment, and other items used during exploration will be removed from the site. • Compaction of soil must be avoided as far as possible. The use of heavy machinery must be restricted in areas outside of the proposed exploration sites to reduce the compaction of soils 	MPRDA In accordance with Rehabilitation Plan	Decommissioning
6.16. Removal of waste	Construction, Operation and Decommissioning	Small scale and localized	<ul style="list-style-type: none"> • Any general waste, excess or waste material or chemicals, including drilling muds etc. must be removed from the site and must preferably be recycled (e.g. oil and other hydrocarbon waste products). Any waste materials or chemicals that cannot be recycled must be disposed of at a suitably licensed waste facility. A signed copy of service agreement shall be submitted to DWS to demonstrate that indeed provision will be made to render such services; • No empty containers, drums, liner, concrete, foreign sand and stone, scrap materials or any such will remain on site; and • No foreign matter such as rubble or waste material shall be introduced into the hole. 	NWA DWAF BPG	Decommissioning
6.17. Rehabilitation	Rehabilitation	All disturbed areas	<ul style="list-style-type: none"> • Rehabilitation of the disturbed areas must be made a priority. Any disturbed area must be re-habilitated to its pre-disturbed state as defined in the pre-drill survey. Disturbed areas must be rehabilitated to support its post-closure land use, and this must be undertaken within six (6) months post drilling activities; • All debris and contaminated soils must be removed and suitably disposed of; • Contours and natural surrounding must be reformed. • All equipment, fencing and other infrastructure will be removed from site; • Natural drainage patterns must be restored; • The stockpiled topsoil will be returned to the surface of the reinstated areas. For topsoil's with highly enriched seedbanks, additional seeding may not be required, but this would need to be monitored over time. If necessary, seed from the surrounding areas should be used to augment the topsoil seedbank; • During and after rehabilitation ensure that all water ways or areas where storm water naturally flowed are open and free of any impediment; 	MPRDA In accordance with the Rehabilitation Plan	Rehabilitation



Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			<ul style="list-style-type: none"> • All surface infrastructure on site must be removed; • Temporary access routes/roads must be suitably rehabilitated; and • Sites must be monitored by the ECO (including relevant specialist's inputs if necessary) for adequate rehabilitation until the desired rehabilitation objectives have been achieved. • Apply mulch, geotextiles, or cover crops to protect bare soil while vegetation establishes. • Engage wetland specialists or ECO to review rehabilitation success and recommend improvements. 		
6.18. Monitoring	Post-operational	All rehabilitated areas	<ul style="list-style-type: none"> • The post-operational monitoring and management period following decommissioning of exploration activities must be implemented by a suitable qualified independent party for a minimum of one (1) year unless otherwise specified by the competent authority. The monitoring activities during this period will include but not be limited to: • Biodiversity monitoring; • Ground and surface water (including water sample analysis); • Re-vegetation of disturbed areas where required; and • Wetlands. • Provision must be made to monitor any unforeseen impact that may arise as a result of the proposed exploration activities and incorporated into post closure monitoring and management. 	MPRDA Regulations In accordance with Rehabilitation plan	Post-operation

8.1 IMPACT MANAGEMENT ACTIONS AND OUTCOMES

The following table present management actions and outcomes in order to reduce the potential impacts in the respective phases of the project.



Table 8: Summary of the Impact management outcomes

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Site Clearance	<ul style="list-style-type: none"> • Loss or destruction of natural habitats; • Pollution of habitats; • Affect drainage; • Loss of fauna/flora species; 	Topography; Soil; Air Quality; Surface Water; Groundwater; Transportation	Construction	Control through implementation of EMPr mitigation measures	NEMA NEMBA CARA Threatened or Protected Species (TOPS) regulations NEMAQA Dust regulations NWA DWAF best Practice Guidelines
Establishment of base camps and access	<ul style="list-style-type: none"> • Loss or destruction of natural habitats; • Pollution of habitats; • Increased surface water runoff; • Affect drainage; • Loss of fauna/flora species; • Sedimentation; • Dust generation; • Influx of people; and • New access roads. 	Topography; Landform; Soil disturbance; Fauna and Flora; Air Quality; Surface Water; Groundwater; Socio-economics	Construction	Control through implementation of EMPr mitigation measures	NEMA MPRDA NEMBA CARA Threatened or Protected Species (TOPS) regulations NEMAQA Dust regulations NWA DWAF best Practice Guidelines
Storage of construction vehicles	<ul style="list-style-type: none"> • Pollution of surface and groundwater resources from potential hydrocarbon spills; and • Compaction of soils 	Surface water; Groundwater; Soils.	Construction Operation	Control through implementation of EMPr mitigation measures	NWA DWAF best Practice Guidelines
Transportation to and from drill sites	<ul style="list-style-type: none"> • Soil compaction; • Disturbance and Loss of fauna and flora; • Wearing and tearing of existing roads; and • Dust generation from increased traffic. 	Soil disturbance; Fauna and Flora; Air quality.	Construction Operation	Control through implementation of EMPr mitigation measures	NEMA NEMBA CARA Threatened or Protected Species (TOPS) regulations NEMAQA Dust regulations Road Traffic Act



Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Storage of hazardous substances	Potential hydrocarbon spills that could pollute surface and groundwater resources.	Surface water; Groundwater.	Construction Operation	Control through implementation of EMPr mitigation measures	NWA DWAF best Practice Guidelines
Waste Management	Pollution of habitats and surrounding areas.	Pollution	Construction Operation	Control through implementation of EMPr mitigation measures	DWAF minimum requirement for waste disposal
Well Drilling	<ul style="list-style-type: none"> • Vegetation clearance • Removal of topsoil; • Changes in drainage and surface hydrology; • Drainage and soil contamination; • Land use conflict; • Dust generation; • Disturbance of wildlife and communities in close vicinity; • New access roads; • Increased transportation; • Damage to local infrastructure; • Damage to heritage resources; • Influx of people; • Waste water discharge; • Spillage and leaks of hydrocarbons; • Pollution or interplay between groundwater aquifers; • Waste disposal; and • Discharge from well test operations. 	Air Quality; Noise; Heritage; Ecology; Social; Surface water; Groundwater.	Operation	Control through implementation of EMPr mitigation measures	SANS10103 ECA Noise Regulations NEMA MPRDA NEMBA NEMWA NEMAQA Dust regulations NWA NHRA DWAF best Practice Guidelines
Refueling	<ul style="list-style-type: none"> • Potential hydrocarbon spills that could pollute soil or surface and/or groundwater resources. 	Pollution; Surface water; Groundwater	Construction Operation	Control through implementation of EMPr mitigation measures	NWA DWAF best Practice Guidelines
Maintenance and Repair	<ul style="list-style-type: none"> • Potential hydrocarbon spills that could pollute surface and groundwater resources. 	Pollution; Surface water; Groundwater.	Construction and Repair	Control through implementation of EMPr mitigation measures	NWA



Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Well plugging	<ul style="list-style-type: none"> • Pollution of groundwater resources; • Potential pollution of habitats with cement residue that may be exposed to runoff etc. 	Pollution; Groundwater.	Decommissioning	Control through implementation of EMPr mitigation measures	NWA DWAf best Practice Guidelines
Removal of surface infrastructure	<ul style="list-style-type: none"> • Soil compaction; • Pollution of habitats. 	Landform; Topography; Soils.	Decommissioning	Control through implementation of EMPr mitigation measures	MPRDA In accordance with Rehabilitation plan
Rehabilitation	<ul style="list-style-type: none"> • Soil compaction; • Soil and Water contamination; • Erosion; • Change in drainage and surface hydrology; • Loss of habitat; and • Disturbance to wildlife and communities in close vicinity. 	Topography Land use Soil disturbance Ecology Surface water Groundwater	Rehabilitation	Control through implementation of rehabilitation actions	MPRDA In accordance with Rehabilitation plan
Monitoring of rehabilitated sites	<ul style="list-style-type: none"> • Soil compaction; • Soil and Water contamination; • Erosion; • Change in drainage and surface hydrology; • Loss of habitat; and • Disturbance to wildlife; and communities in close vicinity. 	Topography Land use Soil disturbance Ecology Surface water Groundwater	Post-Operation	Control through adhering to monitoring requirements	MPRDA and regulations



9 FINANCIAL PROVISION

Section 24 P of the NEMA requires that an applicant for an environmental authorisation relating to prospecting, mining or production must, before the Minister responsible for mineral resources issues the environmental authorisation, comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts. Therefore, the potential environmental liabilities associated with the proposed activity must be quantified and indicate the method of financial provision in line with the National Environmental Management Act (1998): Regulations pertaining to the financial provision for prospecting exploration, mining and production, (2015).

10 DETERMINATION OF CLOSURE OBJECTIVES

The EMPr includes a rehabilitation plan. The plan outlines the closure objectives which are aimed at re-instating the landform, land use and vegetation units to the same as before exploration activities take place unless a specific, reasonable alternate land use is requested by the landowner. As such, the intended end use for the disturbed exploration areas and the closure objectives will be defined in consultation with the relevant landowner. Proof of such consultation will be submitted together with the Application for Closure Certificate. The overall aim of the rehabilitation plan is to rehabilitate the environment to a condition as close as possible to that which existed prior to exploration. This shall be achieved with a number of specific objectives.

1. **Making the area safe. i.e.:** Decommission exploration activities so as to ensure that the environment is safe for people and animals. This entails refilling excavations, sealing and grouting exploration wells, ongoing monitoring, etc.
2. **Restoration / Revegetation.** This involves either reseeded or allowing natural succession depending on the area, climate, etc.
3. **Storm water management and erosion control.** Management of storm water and prevention of erosion during rehabilitation. E.g. cut off drains, berms, etc. and erosion control where required.
4. **Verification of rehabilitation success.** Entails monitoring of rehabilitation.
5. **Successful closure.** Obtain closure certificate.

11 CLOSURE GOALS AND OBJECTIVES

The closure goals and objectives for the proposed D3 Energy Project are the following:

- Making the area safe. i.e.:
- Reshape disturbed land to stable and suitable conditions similar to surrounding landscape. Return disturbed land to a capability similar to which existed prior to exploration.
- Recreating a free draining landform. This entails earthworks infilling, reshaping, levelling, etc. to recreate as close as possible the original topography and to ensure a free draining landscape.
- Re-vegetation. This involves either reseeded or allowing natural succession depending on the area, climate etc.
- Storm water management and erosion control. Management of storm water and prevention of erosion during rehabilitation. E.g. cut off drains, berms, etc. and erosion control where required.
- Removal of surface infrastructure. All surface infrastructures within disturbed areas will be removed before rehabilitation commences.
- Verification of rehabilitation success. Entails monitoring of rehabilitation. Each area will be maintained and monitored for a period of three to five years following re-vegetation and, if this monitoring shows that the objectives have been met, an application for closure will be made;



- To demolish and remove salvageable infrastructure, dump unsalvageable material and rubble in the adit, seal the access ways and rehabilitate the adit or box cut;
- To ensure that the areas mined by underground methods do not subside and that it will be safe to conduct normal farming operations above these workings by using appropriate safety factors and designs.
- To close off all entries to the underground workings so that the water table will be restored thereby preventing the ingress of air and preventing spontaneous combustion of the pillars. Any access to the working will also be restricted in accordance with the MPRDA.

12 REHABILITATION PLAN

12.1 INTEGRATED REHABILITATION AND CLOSURE PLAN

The main aim in developing this rehabilitation plan is to mitigate the impacts caused by the exploration activities and to restore land back to a satisfactory standard. It is best practice to develop the rehabilitation plan as early as possible so as to ensure the optimal management of rehabilitation issues that may arise. It is important that the project's closure plan is defined and understood from before starting the process and is complementary to the rehabilitation goals. Rehabilitation and closure objectives need to be tailored to the project at hand and be aligned with the EMP. The overall rehabilitation objectives for this project are as follows:

- Maintain and minimise impacts to the ecosystem within the study area;
- Re-establishment of the pre-developed land capability to allow for a suitable post exploration land use;
- Prevent soil, surface water and groundwater contamination;
- Comply with the relevant local and national regulatory requirements; and
- Maintain and monitor the rehabilitated areas.

Successful rehabilitation must be sustainable, and requires an understanding of the basic baseline environment, as well as project management to ensure that the rehabilitation program is a success. This will be undertaken in accordance with the rehabilitation and closure plan as required by the Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, GNR 1147, gazetted in November 2015. This includes the determination of the financial provision as well. A closure certification application will be applied for in accordance with section 43 of the Mineral and Petroleum Resources Development Act, 2002.

12.2 WELL CLOSURE PROCESS

According to Chapter 10 of GN. 446 of 2015 under the MPRDA (2002) a holder may only suspend an exploration well on obtaining the approval of the designated agency. The holder must submit a decommissioning plan, as per the requirements of Section 132 of GN. 446 of 2015 under MPRDA (2002) to the designated agency for approval.

12.2.1 PHASE 1: WELL SAFETY

Abandon wells in a safe and stable condition. The method of plugging and abandonment of each well shall be determined using an internationally recognised guideline such as the British Oil and Gas OP071 "Guidelines for Suspension and Abandonment of Wells, Issue 4, July 2012", as updated, as well as the requirements of Section 132 (2) of GN.446 (2015).

The method shall be designed to ensure that aquifers are isolated and the long-term risk of aquifer or surface pollution is minimised. Table 9 provides an indication of typical procedures that would be followed in abandoning a well.



Table 9: Summary of the typical international requirements for well abandonment.

Isolate all potential hydrocarbon / water bearing formations by utilizing placed cement plugs extending at least 30m above and below the reservoir.
The cement plugs are stacked along the entire length of the wellbore (both in the open hole as well as the upper casing) to ensure efficient redundancy.
All plugs are tagged with the drill string to ensure successful placement.
Integrity of the plugs is confirmed by setting weight down on the upper most plug (using the drill string) as well as a differential pressure test of at least 500 PSI or more.
A surface / shallow cement plug (+/-50m below ground Level) is set, and the well is cut and capped +/-1m below ground level to remove the wellhead and all casing above this point.
The cellar is then collapsed and the surface reinstated and the site rehabilitated.
For Perforated Intervals:
Should the well tests indicate that a production well is not successful, the perforated zone is squeezed off with cement by setting a mechanical plug (cement retainer) just above the zone, stabbing into the retainer and pumping cement into the formation under pressure.
The cement squeeze is then followed by another series of stacked cement plugs above the retainer at pre-determined intervals all the way to surface.
Integrity of the plugs is confirmed by setting weight down on the upper most plug (utilizing the drill string) as well as a differential pressure test of at least 500 PSI or more.
All plugs are tagged with the drill string to ensure successful placement. A surface / shallow cement plug (+/- 50m below ground Level) is set, and the well is cut and capped +/-1m below ground level to remove the wellhead and all casing above this point.
The cellar is then collapsed and the surface reinstated and the site rehabilitated.

12.2.2 PHASE 2: LANDFORM DESIGN, EROSION CONTROL AND RE-VEGETATION

Landform, erosion control and re-vegetation is an important part of the rehabilitation process. Landform and land use are closely interrelated, and the landform should be returned as closely as possible to the original landform. Community expectations, compatibility with local land use practices and regional infrastructure, or the need to replace natural ecosystems and faunal habitats all support returning the land as closely as possible to its original appearance and productive capacity.

This requires the following:

- Shape, level and de-compact the final landscape after removing all of the project infrastructure, dress with topsoil and, where necessary, vegetate with indigenous species. Commission specialists to assist in planning re-vegetation and the management of environmental impact, as required.



- Remove access roads with no beneficial re-use potential by deep ripping, shaping and levelling after the removal and disposal of any culverts, drains, ditches and/or other infrastructure. Natural drainage patterns are to be reinstated as closely as possible.
- Shape all channels and drains to smooth slopes and integrate into the natural drainage pattern.
- Construct contour banks and energy dissipating structures as necessary to protect disturbed areas from erosion prior to stabilisation.
- Promote re-vegetation through the encouragement of the natural process of secondary succession.
- Natural re-vegetation is dependent on de-compaction of subsoils and adequate replacement of the accumulated reserves of topsoil (for example, over the well sites), so as to encourage the establishment of pioneer vegetation.
- Remove alien and/or exotic vegetation.
- Undertake a seeding programme only where necessary, and as agreed with the re-vegetation specialist.

12.2.3 PHASE 3: MONITORING, MAINTENANCE AND RELINQUISHMENTS

The purpose of monitoring is to ensure that the objectives of the rehabilitation programme are met, and that the rehabilitation process is followed.

- Groundwater and Surface Water
 - The post-closure monitoring should take place for five years or until a long-term acceptable trend can be determined.
- Flora
 - The following recommendations have been suggested for post rehabilitation and monitoring of the proposed development area. Biodiversity assessments mid wet season should be undertaken by a qualified ecologist / botanist to monitor the rehabilitation progress with regards to flora.

12.3 POST-CLOSURE MONITORING AND MAINTENANCE

Prior to decommissioning and rehabilitation activities, a monitoring programme shall be developed and submitted to the relevant Ministry for approval, as a part of the Final Rehabilitation Plan. The programme is to include proposed monitoring during and after the closure of the exploration wells and related activities.

It is recommended that the post-closure monitoring include the following:

- Confirmation that any waste, wastewater or other pollutants that is generated as a result of decommissioning will be managed appropriately, as per the detailed requirements set out in the Final Rehabilitation Plan;
- Confirmation that all de-contaminated sites are free of residual pollution after decommissioning
- Confirmation that acceptable cover has been achieved in areas where natural vegetation is being re-established. 'Acceptable cover' means re-establishment of pioneer grass communities over the disturbed areas at a density similar to surrounding undisturbed areas, non-eroding and free of invasive alien plants; and
- Confirmation that abandoned wells are safe and are not resulting in a pollution hazard.

Post-closure monitoring of abandoned well sites shall include continued inspection and testing of water quality from the boreholes situated adjacent to the wells at intervals to be determined in the monitoring programme and agreed with the Designated Authority.

Annual environmental reports will be submitted to the Designated Authority and other relevant Departments for at least three years post-decommissioning. In the case of well sites, the frequency of this reporting period



may be extended to include longer term water quality monitoring, at intervals to be agreed with the Designated Authority.

The monitoring reports shall include a list of any remedial action necessary to ensure that infrastructure that has not been removed remains safe and pollution free and that rehabilitation of project sites are in a stable, weed and free condition.



13 COMPLAINTS MONITORING

13.1 MECHANISMS FOR MONITORING COMPLIANCE

The implementation of proper monitoring programmes shall allow early detection of possible impacts of the project on the environment and enable the implementation of management measure to manage the risk outcomes. The monitoring requirements necessary during the exploration project is defined in the **Table 10** below.

Table 10: Monitoring requirements during the exploration project.

Source Activity	Impacts Requiring Monitoring	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementation
Site preparation	Possession of permits for protected species	Document control	Environmental Site Officer (same as ECO)	Once-off control of documents, site visit and reporting
	Relocation of protected species		Environmental Specialist	
	Alien vegetation management	Site inspections and Reports	Environmental Site Officer Environmental Specialist Independent Environmental Auditor	Monthly Site Visits and Reports
	ECO Walkdown			
	Ecologist Walkdown			
	Archaeological Walkdown	Report review and development of actions plans	Senior Environmental Management	Monthly Reports Annual Performance Assessment
Exploration Activities	Groundwater	Site inspections, checklists and reporting	Environmental Site Officer Environmental Specialist Independent Environmental Auditor	Monthly Site Visits and Reports
	Surface water			
	Alien vegetation management			
	Noise (if any complaints are registered by residents)	Report review and development of corrective action plans	Environmental representatives	Monthly Site Visits and Reports
	Air quality (if complaints are registered)		Surface water specialist	



		Site inspections and audits	Environmental Site Officer Environmental Specialist Independent Environmental Auditor	Monthly Reports Annual Performance Assessment
Decommission and Rehabilitation	Groundwater Surface water Alien vegetation management Noise (if any complaints are registered by residents) Air quality (if complaints are registered)	Site inspections, checklists and reporting	Environmental Site Officer Environmental Specialist Independent Environmental Auditor	Monthly Site Visits and Reports
		Report review and development of corrective action plans	Environmental representatives Surface water specialist	Monthly Site Visits and Reports
		Site inspections and audits	Environmental Site Officer Environmental Specialist Independent Environmental Auditor	Monthly Reports Annual Performance Assessment



13.2 ENVIRONMENTAL ASPECTS THAT REQUIRE MONITORING

A monitoring strategy must be defined to ensure that the effectiveness of mitigation measures can be tracked, and corrective actions identified if necessary. Monitoring is intended to evaluate the effectiveness of environmental management actions as specified in the EMP. Proper monitoring shall ensure early detection of any impacts of the proposed project on the environment and allow for corrective measures to be implemented in order to reduce risk outcomes.

The monitoring of various environmental aspects and the impact on them because of the proposed project shall take place by means of both quantitative and qualitative techniques in order to determine whether or not the requirements of the Environmental Management Programme are being complied with. The importance and value of detailed environmental monitoring networks cannot be overstated.

Environmental monitoring serves as a tool to track compliance, assist with potential liability identification, and mitigation throughout the construction and exploration phases of the proposed project. Where monitoring is specified as a requirement as per **Table 10** the responsible party shall develop a monitoring measurement and reporting procedure that shall outline the following Monitoring objectives:

A detailed description of monitoring measures including:

- Responsibilities;
- Parameters to be measured;
- Monitoring methods to be used;
- Sampling locations;
- Frequency of measurements;
- Detection limits and thresholds;
- Thresholds that need corrective actions; and
- Reporting requirements with defined responsibility in order to ensure early detection of conditions that require corrective actions.

Environmental Aspects to be monitored include:

- Air quality;
- Surface water;
- Groundwater;
- Noise;
- Ecology;
- Wetlands and Aquatic Ecology;
- Waste Management.

Refer to **Section 15.3** for the Monitoring Programmes of respective environmental aspects.

13.3 REHABILITATION MONITORING

The purpose of a Rehabilitation Monitoring Program is to ensure that the management measures, rehabilitation and decommissioning objectives for the management of various environmental aspects, are met and that the rehabilitation process is followed. The frequency of monitoring must be adequate to identify potential gaps in the effectiveness of the management plans. A rehabilitation programme must be implemented during the exploration and decommissioning phases of the exploration activities. The following identified aspects require monitoring during the exploration and decommissioning phase:



- Erosion and sedimentation status of disturbed areas;
- Surface drainage and surface water quality;
- Groundwater quality;
- Successful re-vegetation and basal cover proportions;
- Rehabilitation effectiveness;
- Fauna and flora re-colonization; and
- Control of invasive vegetation species.

To achieve the primary objective, management infrastructure must be designed and operated with the following objectives in mind (DWAF, 2008):

- Visual impacts of disturbed areas should be minimized by restoring the landform to a condition suited to the surrounding landscape;
- Management of invasive/alien vegetation;
- Restoration of native vegetation covers and ecology;
- Minimize the area of vegetation clearing for exploration activities;
- Ensure that water management measures take into account and fit into the broader regional water management context;
- Ensure that water of different quality (clean and dirty water) is kept separate and managed separately if possible. This implies minimizing the contact between water of different qualities to minimize potential deterioration of water quality;
- Address water pollution issued at sources; and
- The need for long-term monitoring must be reduced.

13.4 ROLES AND RESPONSIBILITIES

This section provides an overall organisational structure for the EMP on the project and defines the responsibilities and authority of the various organisations and individuals involved in the project. The project structure and associated personnel shall be sufficient to ensure that the required standards of environmental performance are met. The roles and responsibilities of various organisations and individuals are summarized in **Table 11** below:



Table 11: Summary of the Roles and Responsibilities.

Role	Responsibility	Report to
Independent Environmental Control Officer (ECO) (same as Environmental Site Officer)	<ul style="list-style-type: none"> • Liaise with the Environmental Coordinator on specialist environmental issues and non-compliances; • Liaise with specialist consultants when necessary; • Liaise with Landowners when necessary; • Liaise with Community/Tribal Authorities regarding environmental issues that could potentially affect the surrounding communities; • Be thoroughly familiar with existing information on the immediate environment and sensitivities as described in the Scoping and EIA Reports; • Be thoroughly familiar with the specifications and conditions set out in the EMP with which sub-contractors are obliged to comply to; • Perform management actions required to monitor performance of sub-contractors according to specifications in the EMP; • Report non-compliances by contractors to the Applicant Representative in order to instruct necessary actions required to ensure that contractors rectify non-compliances as rapidly and effectively as possible; 	<ul style="list-style-type: none"> • Applicant or Authority Representative • Field Superintendent.



Role	Responsibility	Report to
	<ul style="list-style-type: none"> Record keeping of monitoring for the purpose of audits; Assist Environmental Coordinator in preparation of monthly reports that shall be presented at monthly meetings and distributed to the following individuals: Sub-contractors; Applicant Representative; Environmental Coordinator; and Drilling Manager. Prepare monthly compliance reports containing a brief description of non-compliances with EMP specifications, responsible party, result/consequence and corrective actions taken; Prepare the Rehabilitation Plan in conjunction with the Environmental Coordinator and specialist Consultants and ensure that the Rehabilitation Plan is implemented. 	
Environmental Coordinator (EC)	<ul style="list-style-type: none"> Provide support to the ECO by means of regular site visits (preferably on a monthly basis) during the duration of the project, and assist with the compilation of the most effective and structured monitoring reporting strategy according to the EMP conditions; 	<ul style="list-style-type: none"> Applicant Representative



Role	Responsibility	Report to
	<ul style="list-style-type: none"> • Prepare monthly monitoring reports in conjunction with the ECO; • Report and discuss non-compliances with the Applicant Representative and steps to be taken to rectify non-compliance issues; • Prepare the Rehabilitation Plan in conjunction with the ECO; • Participate in monthly site visits; • Assist with internal and external audit reports; • Prepare the project close-out report. 	
Specialist Consultants	<ul style="list-style-type: none"> • Provide specialist input and advise with regard to impact management; • Prepare integrated reports on environmental aspects of the project; • Monitor the impacts of the proposed activities on the environment with particular emphasis on areas of environmental sensitivity; • Audit compliance by contractors with the environmental standards as and when necessary, and prepare ad-hoc audit reports documenting the effectiveness of environmental management actions; 	<ul style="list-style-type: none"> • ECO • Environmental Coordinator



Role	Responsibility	Report to
Community Liaison Officer (CLO)	<ul style="list-style-type: none">• Act as guides and advisors to Contractors in respect of the EMP on communication and local community issues during the project duration;• Support communication requirements of the EMP;• Assist in consultation with village leaders for recruitment of temporary workers from the affected villages;• Maintain open communication channels with affected landowners;• Support the development of a transparent communication structures with communities;• Inform communities about upcoming activities and progress on project;• Arrange occasional site visits for District Government community leaders and senior community leaders when necessary.	<ul style="list-style-type: none">• Contractor• ECO• Environmental Coordinator• Applicant
Applicant Representative/ Field Superintendent	<ul style="list-style-type: none">• Instruct rectifications on non-compliances reported by the ECO and EC.	<ul style="list-style-type: none">• Single communication channel for the ECO and EC.



13.5 TIME PERIOD FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS

The time periods for implementation of the impact management actions are provided in **Table 10** above.

13.6 THE EMPR PERFORMANCE ASSESSMENT

According to Regulation 55 of the MPDRA regulations compliance with the EMPr must be monitored on a continuous basis. This requirement shall be accomplished through the continuous monitoring of compliance undertaken by the EO and ECO. The performance assessment will focus on the following Key Aspects:

- Compliance with the Approved EMPr; and
- Appropriateness and validity (technical content) of the EMPr.

An EMPr performance assessment report shall be submitted to the Petroleum Agency of South Africa (PASA) on an annual basis (each year of exploration and before applying for closure). The holder of the exploration right may appoint an independent qualified person for the monitoring and to compile a report, but the responsibilities remain the holder's. The performance assessment will include:

- The period when the performance assessment was conducted;
- The scope of the assessment;
- The procedures used for conducting the assessment;
- Interpreted information gained from monitoring the EMPr (e.g. ECO reports);
- Evaluation criteria used during the assessment; and
- Results of the assessment are to be discussed and mention must be made of any gaps in the EMPr and how it can be rectified.

13.7 REVIEW AND REVISION OF THE EMPR

It is important to note that this EMPr is made legally binding on the applicant at such time as the EA is granted and the EMPr is approved by the decision-making authority. Since this is an exploration project, the overarching legislation is the MPRDA, and it is important to note that in accordance with Section 102 of the MPRDA, no EMPr may be amended or varied without the written consent of the minister. It is however also important to consider that the EMPr is a dynamic document which may require such alteration and /or amendment as the project evolves.

The Applicant in consultation with the ECO should be responsible for ensuring that the registration and updating of all relevant EMPr documentation is carried out. It shall be the responsibility of the Applicant / Contractor to ensure that all personnel are performing according to the requirements of this procedure and to initiate the revision of controlled documents, when required by changes in process or operations and shall notify the ECO of such changes.

It is recommended that a risk assessment protocol must be developed and implemented by the ECO which shall be utilised to evaluate the environmental risk associated with the potential proposed alterations and/or amendments. The results of the risk assessment must then be included in the submission to the competent authority for the amendment process. It is important to note that if alterations and/or amendments are required, these may only be affected with written approval from the competent authority and in accordance with the then-in-effect relevant legal processes. Subsequently, as part of the EIA, a risk assessment has been compiled as part of Appendix G of the EIA Report.

13.8 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

Management of operational risk is a key consideration for exploration projects operating within the social and economic context of South Africa. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. Operational risks and impacts are usually



managed through the implementation of the Environmental and Social Management System (ESMS) and Safety, Health and Environmental (SHE) system. A formal, effective ESMS is an important requirement for establishing and maintaining effective environmental management and should be undertaken during the planning phase of the Project. As such the Applicant shall be required to appoint a suitably qualified specialist to develop the ESMS to be implemented on the exploration well sites and within the exploration area in general. Adequate resources (people, financial and technical) need to be made available to ensure effective establishment, implementation, maintenance and continual improvements of the ESMS. The roles and responsibilities for these key environmental personnel should be clearly defined and communicated throughout the organisation. The ESMS should include the requirement to constantly monitor environmental performance and assess the adequacy of environmental resources provided for the exploration project. If required, D3 Energy would need to procure further environmental resources to ensure the successful implementation of the ESMS and EMPr. The development and implementation of an ESMS is a requirement in terms of compliance with international standards of best practise such as the IFC Performance Standards and Equator principles.

13.9 ESMS FRAMEWORK

The D3 Energy ER386 ESMS will be based on:

- Motuoane's corporate vision;
- South African legal requirements; and
- Mining/ exploration best practice.

The ESMS to be developed for the D3 Energy ER386 Project should incorporate and provide for:

- A project specific Environmental Policy;
- Organisational capacity and competency;
- The ESMS shall identify roles and responsibilities of key role players;
- The ESMS shall incorporate a mechanism for ongoing identification of risks and impacts;
- Integration of the ESMS with the SHE management system may be undertaken to form a holistic SHE risk management system;
- The ESMS shall comprise appropriate management plans and procedures to ensure effective operational control;
- The ESMS shall provide for emergency response and also make provision for emergency protocols;
- Effective communication (both internal and external) is a key requirement for successful implementation of the ESMS and an appropriate communication procedure to this effect shall be developed;
- The ESMS shall involve engagement between the client, its workers, landowners and local communities directly affected by the project (the affected communities) and where appropriate, other stakeholders. It is therefore imperative that there is integration between Stakeholder Engagement procedures and the ESMS;
- The ESMS shall make provision for ongoing compliance monitoring, performance assessment and external audits; and
- The ESMS shall make provision for internal auditing and continual improvement which should be incorporated into internal management review processes. The ESMS should provide for setting and reviewing objectives and targets to demonstrate continual SHE improvements associated with the project.



Ultimately an effective ESMS should provide for effective management of social and environmental risks and impacts whilst maintaining legal compliance and meeting international standards of best practise where these are feasible and appropriate.

13.10 DOCUMENT CONTROL

A formal document control system should be established during the development of the ESMS. The document control system must provide for the following requirements:

- Documents are approved for adequacy prior to use;
- Review and update documents as necessary and re-approve documents;
- Ensure that changes and the current version status of documents are identified;
- Ensure that relevant versions of applicable documents are available at points of use;
- Ensure that documents remain legible and readily identifiable;
- Ensure that documents of external origin necessary for the ESMS are identified and their distribution controlled; and
- Prevent unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

13.11 RECORD KEEPING

It is essential that an official procedure for control of records be developed to ensure records required to demonstrate conformity to environmental and social standards are maintained. D3 Energy is, therefore, required to develop and maintain a procedure for the identification, storage, protection, retrieval, retention and disposal of records as part of the ESMS. Records must be legible, identifiable and traceable.

13.12 AUDITING AND REPORTING PROCEDURES

D3 Energy shall develop an auditing and reporting procedure, for conveying information from the compliance monitoring activities and to ensure that management is able to take rapid corrective action should certain thresholds be exceeded. The sections below present a framework for the development of the necessary procedures. Different reporting mechanisms may include:

- Inspections;
- Accidents and emergencies;
- Measuring performance indicators and interpreting and acting on the indicators;
- Records of monitoring activities to test the effectiveness of mitigation measures and impact controls, as well as for compliance auditing purposes; and
- Training programmes and evidence of appropriate levels/amount of skills/capacities created.

All monitoring and auditing must be accompanied by applicable records and evidence (e.g. delivery slips, photographic records, etc.). All reports must be retained and made available for inspection by the ECO, the Applicant and /or the Relevant Competent Authorities. All reports shall be signed by the relevant parties to ensure accountability. The applicant must use the audit report findings to continually ensure that environmental protection measures are working effectively on site through a system of self-checking. The EMP should be viewed as a dynamic document aimed at continual environmental performance improvement.

The following auditing and reporting shall be required throughout the construction phase:

- Daily Compliance Reports: These reports must be prepared by the designated Independent ECO and must aim to monitor and report on-site environmental performance;



- **Monthly Compliance Audits:** These audits must be undertaken by the ECO and must aim to monitor and report on compliance with the requirements of the relevant authorisations, licences and permits, the approved EMPr; and
- **Quarterly Audit Reports:** The ECO must compile quarterly compliance reports (audits) which are to be submitted to the applicant for his review and correction of non-compliance issues. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified.

13.13 RESPONDING TO NON-COMPLIANCES

Non-compliance will be identified and managed through the following four key activities including;

- **Inspections** of the site and activities across the site;
- **Monitoring** of selected environmental quality variables;
- **Audits** of the site and relevant documentation as well as specific activities; and
- **Reporting** on a regular basis.

An environmental non-conformance and incident register must be prepared and maintained by the ECO throughout the lifespan of the exploration phase in order to monitor environmental concerns, incidents, and non-conformances. The register must include details of date, location, description of the non-compliance or Incident, applicable environmental commitment/standard, corrective action taken, adequacy of corrective action, date rectified, etc.

Non-compliance with the EMPr or any other environmental legislation, specifications or standards shall be recorded by the ECO in the non-conformance register. This register shall be maintained by the ECO and will be sent to the Applicant and Contractor on a regular basis (at least monthly), and the Applicant shall ensure that the responsible party takes the necessary corrective actions. Non-conformances may only be closed out in the register by the ECO upon confirmation that adequate corrective action has been taken. The register should be utilised to measure overall environmental performance.

13.14 ENVIRONMENTAL INCIDENTS

For the purposes of this project, an environmental incident can be divided into three levels, i.e. major, medium and minor. All major and medium environmental incidents shall be recorded in the incident register. Minor incidents do not need to be reported but require immediate rectification on site. Definitions and examples of environmental incidents are provided in **Table 12** below.

Table 12: Description of incidents and non-conformances for the purpose of the project

Non-Conformance	Any deviation from work standards, practices, procedures, regulations, management system performance etc. that could either directly or indirectly lead to injury or illness, property damage, damage to the workplace environment, or a combination of these.
Major Environmental Incident	<p>An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread, long-term, irreversible significant negative impact on the environment and/or has a high risk of legal liability.</p> <p>A major environmental incident usually results in a significant pollution and may entail risk of public danger. Major environmental incidents must be reported to the authorities. The ECO shall make the final decision as to whether a particular incident should be classified as a Major incident.</p> <p>An example of a Major environmental incident would be a significant spillage (e.g. 500 litres) of fuel into a watercourse.</p>



Medium Incident Environmental	<p>An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread or localised, short term, reversible significant negative impact on the environment and/or has a risk of legal liability.</p> <p>A medium environmental incident may be reported to the authorities, can result in significant pollution or may entail risk of public danger. The impact of medium environmental incidents should be reversible within a short to medium term with or without intervention. The ECO shall make the final decision as to whether a particular incident should be classified as a Medium incident.</p> <p>An example of a Medium environmental incident would be a large spill of fuel (e.g. ~ 50 litres) onto land.</p>
Minor Incident Environmental	<p>An incident or sequel of incidents, whether immediate or delayed, where the environmental impact is negligible immediately after occurrence and/or once-off intervention on the day of occurrence.</p> <p>An incident where there is unnecessary wastage of a natural resource is also classified as a minor environmental incident. An example would be leaking water pipes that result in the wastage of water.</p> <p>A minor environmental incident is not reportable to authorities. An example of a minor incident is day to day spills of fuel or oil onto the ground.</p>

The following incident reporting procedures shall apply to this project:

- All environmental incidents shall be reported to drilling contractor who shall ensure that the appropriate rectification is undertaken;
- The ECO shall record all medium and major incidents in the incident register and advise on the appropriate measures and timeframes for corrective action;
- An incident report shall be completed by party responsible for the incident for all medium and major incidents and the report shall be submitted to the drill site manager and ECO within 5 calendar days of the incident; and
- The ECO shall investigate all medium and minor incidents and identify any required actions to prevent a recurrence of such incidents.

In the event of an emergency incident (unexpected sudden occurrence), including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed, the Applicant shall notify the relevant authorities in accordance with legal requirements (e.g. Section 30 of NEMA and Section 20 of the NWA). In the event of a dispute in terms of the classification of a such an incident, the Applicant shall engage the ECO to advise on the potential reporting requirements in terms of the above.

13.15 ENVIRONMENTAL AWARENESS PLAN AND TRAINING

Training and environmental awareness is an integral part of a complete EMPr. The overall aim of the training will be to ensure that all site staff are informed of their relevant requirements and obligations pertaining to the relevant authorisations, licences, permits and the approved EMPr and protection of the environment.

The applicant and contractor must ensure that all relevant employees are trained and capable of carrying out their duties in an environmentally responsible and compliant manner, and are capable of complying with the relevant environmental requirements. To obtain buy-in from staff, individual employees need to be involved in:

- Identifying the relevant risks;
- Understanding the nature of risks;
- Devising risk controls; and



- Given incentive to implement the controls in terms of legal obligations.

The applicant shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the employees. All training must be formally recorded and attendance registers retained. The environmental training should, as a minimum, include the following:

- General background and definition to the environment;
- The importance of compliance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- Compliance with mitigation measures proposed for sensitive areas;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving compliance with the environmental policy and procedures and with the requirement of the applicant's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences (legal and/or other) of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities; and
- All operational risks must be identified and processes established to mitigate such risk, proactively. Thus, the applicant needs to inform the employees of any environmental risks that may result from their work, and how these risks must be dealt with in order to avoid pollution and/or degradation of the environment.

In the case of new staff (including contract labour) the contractor / applicant shall keep a record of adequate environmental induction training.

13.16 MANNER IN WHICH EMPLOYEES WILL BE INFORMED OF ENVIRONMENTAL RISKS

The specific requirements for environmental training include:

- Site Environmental Induction Training: All site staff and employees will receive induction training. The induction training must include an environmental management component which will be prepared by the ECO and presented where possible by the ECO. The training material must include general environmental awareness and an overview of the EMPr and EA requirements. The Induction Training Material must be reviewed and approved by the ECO; and
- Informal training of all staff on site is also required on an on-going basis through informal discussions, on-site supervision and through facilitation of day to day activities. Such training must be given or otherwise facilitated by the ECO.

13.17 MANNER IN WHICH RISKS WILL BE DEALT WITH TO AVOID POLLUTION OR DEGRADATION

D3 Energy will be required to develop an ESMS which provides a mechanism for ongoing assessment of operational risks and impacts associated with their activities and any new activities that may arise. The impacts and risks identified will be managed through the framework of internal procedures which specify the mechanisms and actions required to effectively manage the risks and impacts on the ground. Where any unexpected events occur that have the potential to result in environmental damage, these shall be managed through the emergency response procedure. The framework for the emergency response procedure is provided below.



13.18 EMERGENCY RESPONSE PLAN

D3 Energy must identify potential emergencies and develop procedures for preventing and responding to them. There are several options for dealing with high priority impacts and risks, as the paradigm has two components, probability and consequence. The design of control measures rest on the understanding the cause and effect. Best practise is to intervene with the ultimate factors where feasible, rather than treat the outcomes. Emergency response therefore has the option of reducing probability, or reducing the consequence, reducing the probability is the preferred option. Below are some common emergency preparedness approaches:

- Threat consequence if and when the risk eventuates, when the risk becomes an issue;
- Combine reducing the probability and treating the consequence;
- Offset environmental losses by investing in other assets;
- Not manage some of the risks because there are too many; and
- Make provision to manage residual impacts or issues that arise because of shortcomings in risk identification and rating, avoidance and mitigation or because a rare event has occurred.

Residual impacts are those impacts that despite reducing the probability and consequence might still occur. In these cases, parties will have to be compensated, pollution cleaned up and damage to the environment remediated.

The Applicant shall be required to develop and implement an Emergency Preparedness and Response Plan prior to commencing work. The Emergency Preparedness and Response Plan should be based on a baseline Hazard and Risk Assessment and should provide for the following as a minimum:

- Risk assessment (identification of areas where accidents and emergency situations may occur, communities and individuals that may be impacted);
- Response procedures;
- Provision of equipment and resources;
- Designation of responsibilities;
- Communication and reporting (including that with potentially Affected Communities);
- Periodic training to ensure effective response; and
- Periodic review and revision, as necessary, to reflect changing conditions.

The Applicant must ensure that the Emergency Preparedness and Response Plan makes provision for environmental emergencies, including, but not limited to;

- Fire Prevention;
- Fire Emergency Response;
- Spill prevention;
- Spill Response;
- Contamination of a water resource;
- Accidents to employees; and
- Use of hazardous substances and materials, etc.

The Applicant and Contractor must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the lifespan of the project.



The Emergency Response Plan must be updated to contain measures to prevent and react to abnormal events including but not limited to:

- Blowout Preventers / Diverters
- Shut-In Procedures to trigger the Blowout Preventers / Diverters system to physically seal the well and stop the flow of fluids
- Emergency Shutdown Systems (ESD) to isolate valves and shuts rig power to prevent escalation into a major incident
- High-Efficiency Flare Systems for flaring of excess gas to destroy toxic Volatile Organic Compounds (VOCs) and prevent dangerous emissions
- Specific, site-tailored intervention strategies to be deployed to circulate out reservoir influxes and re-establish hydrostatic pressure
- A 500-meter danger zone is immediately enforced around the wellhead
- Active Spill Prevention, Control, and Countermeasure
- Emergency contact numbers of nearby response team with sufficient containment materials and berms to be used to prevent leaked fluids from entering local waterways or soil

13.18.1 FIRE PREVENTION AND CONTROL

Fires represent a significant risk to exploration activities, and require special attention in the Emergency Response Plan. The contractor/Applicant must take all reasonable measures to ensure that fires are not started as a result of activities on site. No smoking is allowed near containers with flammable contents or at areas that are highly flammable (directly near the drill rig in case of methane release). Smoking is only permitted at areas designated for smoking. No open fires are permitted on site and no burning of waste is to be allowed on site. The contractor/Applicant shall ensure that there is sufficient firefighting equipment available on site at all times. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities. The contractor/Applicant is to ensure that he/she has the contact details of the nearest fire station in case of an emergency. Appropriate and correctly serviced equipment must be available for all activities that are likely to generate fire.

It is further anticipated that firebreaks may be required around the exploration site perimeter. It is recommended that such fire prevention measures are implemented in consultation with landowners and where necessary that the Applicant coordinate fire prevention efforts with local Fire Protection Agency (FPA).

13.18.2 HEALTH AND SAFETY

The Applicant and Contractor shall make allowance for the supply, erection, maintenance and removal of the information boards. Information boards shall also provide the name of the drill site managers, relevant contact person and contact number. This will ensure that the public access to request information and/or to lodge any complaints. The boards will essentially be to advise the communities of the activities to be undertaken, or being undertaken and to advise of the prohibition of entering demarcated “no-go” areas.

The Applicant and Contractor must ensure that compliance with the Occupational Health and Safety Act (Act No. 85 of 1993) is strictly adhered to. All reasonable measures must be taken to ensure the safety of all site staff and the surrounding community is not compromised. No weapons may be brought onto the property by any person. Where fencing is temporarily affected, temporary security must be provided at all times until the fence is reinstated.

The Applicant and Contractor must ensure that all vehicles using public roads are in a roadworthy condition, that drivers adhere to the speed limits and that their loads are secured and that all local, provincial and national regulations are adhered to.

The Applicant and Contractor must ensure that all accidents and incidents are recorded and reported to the ECO. The Applicant/ contractor must have easy access to all relevant emergency numbers for example, spill



response teams, fire authorities, fire protection associations, medical emergency, nearest emergency rooms (hospitals) to the site, of both private and public hospitals. The Applicant and Contractor must take all reasonable measures to ensure the health and safety of all employees, visitors and the public.

13.18.3 SPILL RESPONSE PROCEDURE

All employees, staff and labourers must be instructed regarding implementation of spill prevention measures and spill response procedures. In the event of a spill, the following general requirements shall apply and the detailed spill procedure to be developed prior to exploration commencing must cater for these requirements;

- Immediately reporting of spills by all employees and/or visitors to the relevant site supervisor and ECO (this requirement must be including in induction training);
- Take immediate action to contain or stop the spill where it is safe to do so;
- Contain the spill and prevent its further spread (e.g. earth berm or oil absorbent materials for spill to land or by deploying booms and/or absorbent material for a spill to water);
- Dispose of any contaminated soil or materials according to appropriate waste disposal procedure (waste from spills of hazardous materials shall be disposed of as hazardous waste at a suitably licensed waste disposal facility);
- The ECO shall record details of the spill in the incident register; and
- Photographic evidence shall be obtained of the spill clean-up.

In the case of large spills, the services of a specialist spill response agency shall be required, who shall advise on appropriate clean-up procedures and follow-up monitoring (if required).

In the event of any spills which are classified as medium or major incidents. The ECO shall record the incident non-conformance and incident register and advice on the appropriate measures and timeframes for corrective action. Environmental incident reports shall be completed and submitted to the drill site manager and Applicant within 5 working days for all medium and major incidents. If there is a requirement to report the incident to the authorities, this shall be done by the Applicant in consultation with the ECO.

The Applicant must also, (as per Section 30 of the NEMA) notify the Director-General (PASA, DWS, DFFE and DMRE), South African Police Services and Local Municipality and any persons whose health may be affected of the nature of an incident including:

- Any risks posed to public health, safety and property;
- Toxicity of the substance or by-products released by the incident; and
- Any step taken to avoid or minimise the effects of the incident on public health and the environment.

The Applicant and Contractor must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the lifespan of the project.

13.18.4 MEASURES TO CONTROL OR REMEDY ANY CAUSES OF POLLUTION OR DEGRADATION

The broad measures to control or remedy any causes of pollution or environmental degradation as a result of the proposed activities taking place are provided below:

- Limit the size of the area to be disturbed as far as is practically possible;
- Contain potential pollutants and contaminants (where possible) at source;
- Handling of potential pollutants and contaminants (where possible) must be conducted in bunded areas and on impermeable substrates;
- Ensure the timeous clean-up of any spills;



- Implement a waste management system for all waste stream present on site;
- Investigate any I&AP claims of pollution or contamination as a result of exploration activities;
- Rehabilitate the exploration sites in line with the requirements of the detailed rehabilitation and closure plan; and
- Implement the impact management objectives, outcomes, and actions, as described in **Section 8.1** above.

It is of critical importance that the broad measures to control or remedy any causes of pollution or environmental degradation are applied during all phases of the proposed exploration activities. This is essential and allows for the exploration to be conducted in a manner that will allow for the decommissioning and rehabilitation goals and objectives to be met.

14 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

In the pre-application consultation, PASA requested the following information to be addressed in the EIA and / EMPr:

- Number and preliminary locations of Seismic Transects;
- Number and preliminary locations of additional drilling site; and
- Inclusion of public meeting details on the initial notifications to I&APs.

The various requirements were addressed adequately as the preliminary seismic transects and drilling locations are indicated in the locality map and project description (**Section 5.1**). The Public Meeting details were indicated in the Newspaper Advert, Site Notices and Notification Letter (refer to Appendix C of the EIA Report).

15 ENVIRONMENTAL MONITORING

15.1 FUNCTIONAL REQUIREMENTS OF MONITORING PROGRAMMES

The purpose of monitoring is not merely to collect data, but to provide information necessary to make informed decisions on managing and mitigating potential impacts. Monitoring therefore serves the following functions:

- Serve as early warning system to detect any potential negative impacts;
- To provide information to feedback into management controls to avoid, prevent or minimise potential negative impacts;
- Provide quantitative data that can serve as evidence for the presence of negative impacts or the lack thereof;
- Allows for trending, modelling and prediction of future conditions or potential impacts;
- Based on the above, the Applicant must ensure that monitoring programmes comprise of the following (at a minimum) in order to obtain valuable environmental data;
- All equipment used in monitoring must be correctly calibrated and serviced regularly;
- Samples required for analysis will be sent to an independent and accredited laboratory;
- Monitoring data must be stored;
- Data must be checked and interpreted and trending undertaken on a quarterly basis;
- Both the data and reports on environmental monitoring must be kept on record and where relevant provided to I&AP's; and



- The general and site specific parameters to be monitored must be identified by an independent specialist, the authorities and where relevant I&AP's.

15.2 LIST OF ASPECTS THAT REQUIRE MONITORING PLANS

The list of aspects that require on-going environmental monitoring includes the following:

- Air quality;
- Surface water (quality/ quantity);
- Groundwater (quality/ quantity);
- Waste Management; and
- Rehabilitation.

This list provided is by no means conclusive and must instead be used as a guideline for the impacts that require monitoring.

15.3 MONITORING PLANS FOR ENVIRONMENTAL ASPECTS

The monitoring of various environmental aspects and the impact on them as a result of the proposed project shall take place by means of both quantitative and qualitative techniques in order to determine whether or not the requirements of the EMPr are being complied with. The importance and value of detailed environmental monitoring networks cannot be overstated.

Environmental monitoring serves as a tool to track compliance, assist with potential liability identification, and mitigation throughout the life of the proposed project. This is achieved through the provision of actual evidence-based monitoring and reporting thereof. In essence, monitoring is a continuous data-gathering, data interpreting, and control procedure that ranges from visual inspection to in-depth investigative monitoring and reporting. These monitoring plans need to be drawn into standalone plans that can be updated and amended as per authority requirements and additional data requirements identified during the exploration activities. These plans need to include the site specific roles and responsibilities for actions.

Where monitoring is specified as a requirement as per Table 10, the responsible party shall develop a monitoring measurement and reporting procedure that shall outline the following:

Monitoring objectives;

A detailed description of monitoring measures including:

- Responsibilities;
- Parameters to be measured;
- Monitoring methods to be used;
- Sampling locations;
- Frequency of measurements;
- Detection limits and thresholds;
- Thresholds that need corrective actions; and
- Reporting requirements with defined responsibility in order to ensure early detection of conditions that require corrective actions.

15.3.1 AIR QUALITY

Due to the nature of the activity, air quality impacts are expected to be low, localised and short-term.



In terms of air quality, the main pollutant of concern during the exploration drilling phase is particulates (dust) and methane releases. As such, the design and implementation of the air quality monitoring program must incorporate the following considerations:

- Monitoring of dust fallout;
- Monitoring of methane during drilling operations; and
- Review and amendment of the monitoring program as required.

15.3.2 SURFACE WATER MONITORING

D3 Energy is required to develop a surface water monitoring program based on the Best Practice Guidelines G3: Water Monitoring Systems (DWAF, 2006). It is recommended that all water containment facilities on site be monitored for water quality and quantity on a monthly basis. The water quality results should meet applicable standards or ensure that water released and associated risks are well understood. Streams or natural drainage lines with flowing water within the catchment of the site (zone of impact) should be monitored on a monthly basis.

A biomonitoring programme is recommended for perennial streams. The programme should be on a bi-annual basis upstream and downstream of the site and include at least macro-invertebrate and habitat integrity assessments, but further assessments may be required, depending on the stream conditions. The main objective of the monitoring program is to effectively monitor the surface water quality in the vicinity of the exploration activities to ensure the protection of surrounding water users. This translated into the following composite objectives:

- To determine the current water quality in the vicinity of the drilling operations and if water quality changes over time. Baseline sampling will be important prior to commencing with exploration;
- Monitor pollution status and assess the impacts, which could possibly lead to pollution prevention; and
- Assess the performance of pollution prevention measures in order to determine if activities comply to license conditions.
- Ensure compliance with the requirements of the relevant legislation;
- Ensure the identification of suitable water quality parameters.

The Surface Water Quality Monitoring Program entails the following:

- Monthly water quality and quantity monitoring of water containment facilities on site, and quality and quantity monitoring of boreholes, streams and natural drainage lines with flowing water within the catchment of the site; and
- Bi-annual monitoring of perennial streams near to the exploration drill-sites.

Details of the proposed monitoring programme are presented in the **Table 13** below. The monitoring programme should be amended according to on-site operations and future permit requirements.

Table 13: Proposed monitoring programme.

Water Type	Details	Monitoring Frequency
Surface Water	Sample point in the wetland area upstream and downstream of the exploration drilling areas; Clean water discharge points (if any);	Monthly water samples
Drinking Water (pipe lines, boreholes)	Any supplied water used for domestic purposes should be monitored for parameters such as total faecal coliform;	Monthly water samples



The following table presents the applicable parameters that should be monitored on a Monthly basis in the Surface Water Quality Monitoring Program:

Table 14: Applicable parameters to be monitored on a monthly basis.

Monthly analysis	
pH at 22°	Chloride (Cl)
Conductivity (mS/m)	Sulphate (SO ₄)
Total Dissolved Solids	Nitrate (NO ₃)
Calcium (Ca)	Fluoride (F)
Magnesium (Mg) (mg/l)	Aluminum (Al)
Sodium (Na)	Manganese (Mn)
Potassium (K)	Iron (Fe)
Total Alkalinity as CaCO ₃	Zinc (Zn)
Bicarbonate (HCO ₃)	Total Petroleum Hydrocarbons (TPH)
Diesel Range Organics (DRO)	

The following table presents the applicable parameters that should be monitored on a bi-annual basis in the Surface Water Quality Monitoring Program.

Table 15: Applicable parameters to be assessed on a bi-annual basis

Bi-annual analysis	
Antimony (Sb)	Nickel (Ni)
Arsenic (As)	Selenium (Se)
Barium (Ba)	Silicon (Si)
Beryllium (Be)	Silver (Ag)
Bismuth (Bi)	Strontium (Sr)
Cadmium (Cd)	Tin (Sn)
Cobalt (Co)	Titanium (Ti)
Lithium (Li)	Vanadium (V)
Mercury (Hg)	Zirconium (Zr)
Molybdenum (Mo)	

15.3.2.1 SURFACE WATER MONITORING LOCATIONS

Prior to exploration and once the target areas for exploration have been determined, a qualified hydrologist must assist in determining suitable surface water monitoring locations near to the exploration areas.



15.3.2.2 SAMPLING PROCEDURE AND METHODOLOGY

The sampling procedure should be in accordance with the following publications:

- SABS ISO 5667 – 1:2008 Guidance on the design of sampling programmes
- SABS ISO 5667 – 2:1991 Guidance on sampling techniques
- SABS ISO 5667 – 3:2006 Guidance on the preservation and handling of samples
- SANB ISO 5667 - 6:2006 Water quality - Sampling Part 6: Guidance on sampling of rivers and streams
- SABS ISO 5667 – 11:2015 Guidance on sampling of groundwater

Samples must be submitted to a SANAS-accredited Laboratory Service. Field observations such as the following must be recorded on field data sheets:

- Coordinates of each surface water sampling point;
- In-situ Electrical Conductivity (EC), pH, Temperature and redox potential (Eh) are measured and recorded for each sampling point; and
- Documenting general characteristics of the water samples such as colour, turbidity and smell.
- Any potential sources of contamination at the sampling points;
- Regular photographs of each sampling point;
- A chain of custody should be filled in at the time of sampling recording the following information;
- Date and time of sampling;
- Coordinates of each sample point (at first sampling event only);
- In-situ measurements for each sampling point, namely pH, electrical conductivity, total dissolved solids and temperature;
- General characteristics of the water samples such as colour, turbidity (murky/clear) and smell, as well as visual observations of the sample site; and
- The chain of custody form shall be completed when the samples are transported and transferred to the laboratory for analysis.

Care should be taken to ensure that the samples taken are sufficiently large enough (1ℓ) to allow the laboratory to run duplicate analysis if required. Samples should be kept cool when stored and transported. Samples for metal analysis should be filtered through a 0.45 µm pore size membrane in the field and preserved with nitric acid.

15.3.3 GROUND WATER MONITORING

The monitoring objectives are to detect and manage the possible impacts of the proposed petroleum exploration on the hydrological environment. The impacts are influenced by the management of the exploration, the physical and chemical composition of the possible contamination source, and the vulnerability of the receiving environment.

The main objective of the monitoring is to:

1. Obtain accurate information of the chemical, micro biological and physical characteristics of the receiving environment before any exploration commences.
2. The timely detection of any changes in the chemical, micro biological and physical characteristics of the receiving environment.
3. The timely detection of any changes in the chemical, micro biological and physical characteristics of the receiving environment due to pollutants released into the environment.



4. To detect any spills at or leakages.
5. To obtain information that can be used to update the environmental management plan.
6. To determine if applicable environmental laws and standards is adhered to.

This will ensure that any possible impacts on the receiving environment are detected and rectified in time. Once the exploration sites have been finalized, the monitoring programme should be finalised for each site and a hydro-census within a 3km radius of each exploration borehole should be performed to identify existing boreholes that can be used for monitoring of each exploration borehole. The following monitoring is recommended:

Groundwater level monitoring

1. Pre-development (pre-drilling) hydraulic heads: Groundwater levels should be measured less than 1 month before the exploration borehole starts drilling, in at least 2 existing boreholes within a 3km radius around the proposed exploration borehole. If active DWS groundwater monitoring boreholes are available within the 3km radius of the exploration borehole, then hydraulic head data from these boreholes can be used as pre-development measurements.
2. During drilling groundwater levels: Groundwater levels should be measured in the close existing boreholes when drilling starts. The groundwater levels should also be measured 1 day after the exploration borehole drilling is completed, in 2 nearby existing boreholes (if available) and in the exploration borehole itself.
3. Post-drilling and grouting (cementing) groundwater levels: Groundwater levels should be measured in selected existing monitoring boreholes, 1 month after drilling has completed. A final groundwater level measurement run can be synchronised with the water quality sampling run, 6 months after drilling has completed.

Groundwater- and surface water-quality monitoring

1. Pre-development groundwater qualities: Once the exploration borehole locations are known, groundwater quality should be sampled at the nearest existing borehole or spring, less than 1 month before drilling starts. This can be synchronised with the groundwater level measurement run. If more than one borehole is within a 1 km radius of the planned exploration borehole, then two boreholes should be sampled and water qualities analysed.
2. Pre-development surface water qualities: If nearby (< 1 km) flowing surface water drainages or springs exist, then the drainage should be sampled downstream of the exploration drilling site, within 1 km distance from proposed drilling pad. Similarly nearby downstream spring should be sampled. This sampling can be synchronised with the less than 1 month before drilling groundwater sampling run.
3. During drilling groundwater quality: Directly after cleaning and purging of the exploration borehole drilling fluid, the exploration borehole groundwater quality should be sampled and its water quality analysed. This is a very important water quality analysis.
4. Post-drilling surface water quality: If nearby (< 1 km) flowing surface water drainages or springs exist, then the drainage should be sampled downstream of the exploration drilling site, within 1 km distance of proposed drilling pad. Similarly nearby downstream spring should be sampled. This sampling run should be conducted directly after drilling and sealing of the borehole has been completed. Furthermore, if springs and nearby (< 1 km) mountain pools in the exploration borehole location exist, these should be sampled 1 month after the drilling and sealing activities were completed, should that be completed in the wet season. This surface water sampling (if applicable) can be synchronised with the groundwater sampling.
5. Post exploration drilling groundwater quality: Selected nearby existing boreholes or springs should be sampled 1 month after exploration drilling has completed. A final groundwater quality sampling run can be conducted at nearby (< 1 km) existing boreholes 6 months after exploration drilling has completed.



6. Groundwater quality deterioration complaints in nearby (< 1 km) existing water supply boreholes, after exploration borehole drilling, should be investigated by confirmative sampling and analysis.
7. Full spectrum initial groundwater constituents should be analysed in the initial sampling run and in the final sampling run. These constituents are listed in Table 8.2 of the attached geohydrological report.
8. Surface water qualities should be analysed for the surface water quality constituents as described in Table 8.2 of the attached geohydrological report.
9. Groundwater quality samples other than initial and final water quality sampling runs, should be analysed for the constituents as shown in Table 8.2 of the attached geohydrological report.

15.3.4 ERADICATION AND MONITORING PROGRAMME

The Biodiversity Company conducted an ecological assessment of the amendment application area, in order to identify potential impacts and recommend management and mitigation measures. Various mitigation measures were recommended to alleviate and/or reduce the potential ecological impacts. Based on findings and recommendations from ecology specialist, D3 Energy is required to implement an Eradication and Monitoring Programme to evaluate the success of mitigation measures for the identified Category 1b Alien Invasive Species and sensitive floral species. The implementation of the Eradication and Monitoring Programme is based on the following objectives:

- Ensure that all required permits, according to National and Provincial legislation, for the removal and relocation of protected species are obtained (if and where necessary);
- To monitor the relocation of protected species in order to establish if the intervention was successful or not;
- To monitor the impacts of exploration activities on sensitive habitats;
- To enforce continual eradication of alien and invasive species; and
- To ensure successful conservation of habitats and species.

15.3.5 WASTE MANAGEMENT PROGRAMME

If the elimination of waste is not achieved through pollution prevention measures, waste management must be accomplished through a waste management plan.

An area specific waste management programme relates directly to the type of waste handling and disposal options to the ecological sensitivities, regulatory requirements and availability of facilities within the area. The implementation of an area specific waste management programme provides assurance in terms of protection of the environment and ongoing compliance with regulatory requirements, and minimisation of the volume and toxicity of waste. A waste management programme should be a living document which requires periodic review and revision in order to allow for changes and identification of new impacts during the course of the project duration.

The following steps form the structure of an area specific Waste Management Programme:

1. Management approval

Management approval and support for the Waste Management Programme should be obtained. Management should be aware of the timing and scope of the plan, and the goals of the management plan should be established with measurable objectives for each goal.

2. Area definition

The management plan should be site-or area specific and should include a description of the geographical area and operational activities addressed.

3. Waste identification



Operations personnel should identify all waste generated within the area defined for each exploration activity. A brief description of each waste type will assist in further management steps.

4. Regulatory analysis

Review national laws and regulations to determine the types of waste for which management practices should be highlighted. Waste types for which the regulations do not adequately define, management requirements should also be addressed.

5. Waste categorisation

The physical, chemical and toxicological properties of each waste type should be identified, and waste should be grouped according to their health and environmental hazards.

6. Evaluation of waste management and disposal options

Waste management options for each waste type should be identified and compiled. Each option should be reviewed by appropriate operations personnel and management. Evaluation should include the following:

- Environmental considerations;
- Locations;
- Limitations;
- Regulatory restrictions;
- Operating feasibility;
- Potential long-term liability; and
- Waste minimisation.

Waste, volume and toxicity reduction, recycling and reclaiming or treatment should be evaluated. Revision of the waste management programme should be made to reflect any minimisation practices implemented.

7. Selection of preferred waste management practices

Select the best practice for the specific operation and location. Life-cycle analysis including use, storage, treatment, transport and disposal should be considered.

8. Implementation of area specific waste management programme

Waste management and disposal options for each waste type should be compiled into one comprehensive waste management plan. Waste management practices should be summarised, including waste description, indicating the chosen waste management and disposal practice.

9. Management plan review and update

Effective waste management is an on-going process. The waste management programme should be reviewed by senior management whenever new management practices and options are identified. A procedure to review and update the waste management programme should be established, and practices modified to reflect changing technologies, needs and regulations.

15.3.6 REHABILITATION MONITORING

The purpose of a Rehabilitation Monitoring Program is to ensure that the management measures, rehabilitation and decommissioning objectives for the management of various environmental aspects, are met and that the rehabilitation process is followed. The frequency of monitoring must be adequate to identify potential gaps in the effectiveness of the management plans. A rehabilitation programme must be implemented during the exploration and decommissioning phases of the exploration activities. The following identified aspects require monitoring during the exploration and decommissioning phase:

- Erosion and sedimentation status of disturbed areas;



- Surface drainage and surface water quality;
- Groundwater quality;
- Successful re-vegetation and basal cover proportions;
- Rehabilitation effectiveness;
- Fauna and flora re-colonization; and
- Control of invasive vegetation species.

To achieve the primary objective, management infrastructure must be designed and operated with the following objectives in mind (DWAF, 2008):

Visual impacts of disturbed areas should be minimized by restoring the landform to a condition suited to the surrounding landscape;

- Management of invasive/alien vegetation;
- Restoration of native vegetation covers and ecology;
- Minimize the area of vegetation clearing for exploration activities;
- Ensure that water management measures take into account and fit into the broader regional water management context;
- Ensure that water of different quality (clean and dirty water) is kept separate and managed separately if possible. This implies minimizing the contact between water of different qualities to minimize potential deterioration of water quality;
- Address water pollution issued at sources; and
- The need for long-term monitoring may be reduced when monitoring results indicate no adverse impacts.

16 UNDERTAKING

The EAP herewith confirms:

- a) The correctness of the information provided in the reports;
- b) The inclusion of comments and inputs from stakeholders and I&AP's;
- c) The inclusion of inputs and recommendations from the specialist reports where relevant; and
- d) That the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein.

I **Vukosi Mabunda**, a Registered EAP (EAPASA Registration Number: 2019/867) employed by **Environmental Impact Management Services (Pty) Ltd** declare that the information provided in this report is correct and relevant to the activity / project, that comments from interested and affected parties have been incorporated into this report that the information was made available to interested and affected parties for their comments.


SIGNATURE OF EAP

03/06/2026
DATE

17 TECHNICAL SUPPORTING INFORMATION

The following specialist reports have been incorporated in this EMPr and provided in full in the EIA Report as:

- Appendix F1: Air Quality Impact Assessment
- Appendix F2: Archaeological and Cultural Heritage Impact Assessment



- Appendix F3: Aquatics and Wetland Impact Assessment
- Appendix F4: Climate Change Impact Assessment
- Appendix F5: Financial Provisions for Closure & Rehabilitation
- Appendix F6: Geohydrological Impact Assessment
- Appendix F7: Noise Impact Assessment
- Appendix F8: Palaeontological Impact Assessment
- Appendix F9: Social Impact Assessment
- Appendix F10: Soils & Agricultural Impact Assessment
- Appendix F11: Terrestrial Biodiversity Impact Assessment.

18 REFERENCES

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