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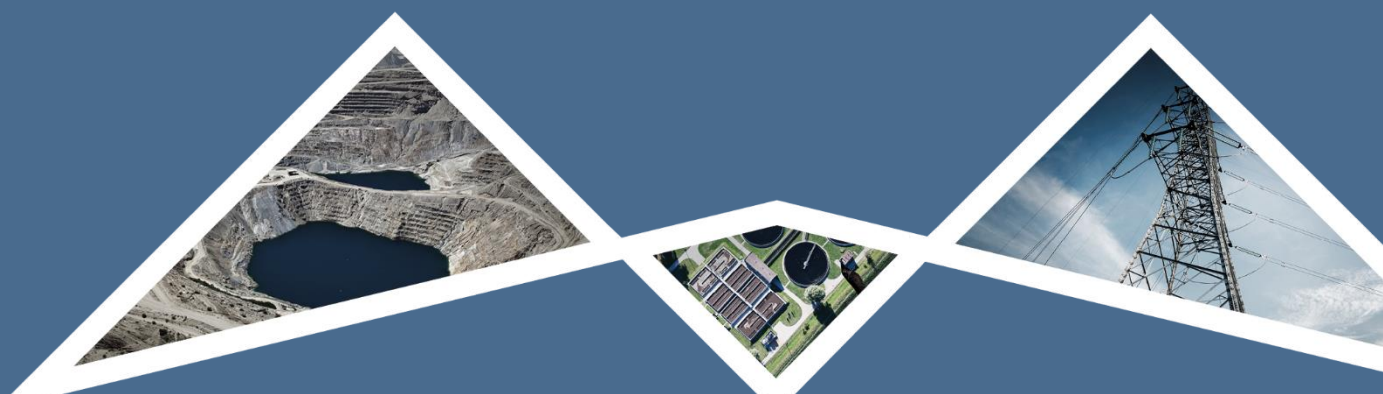
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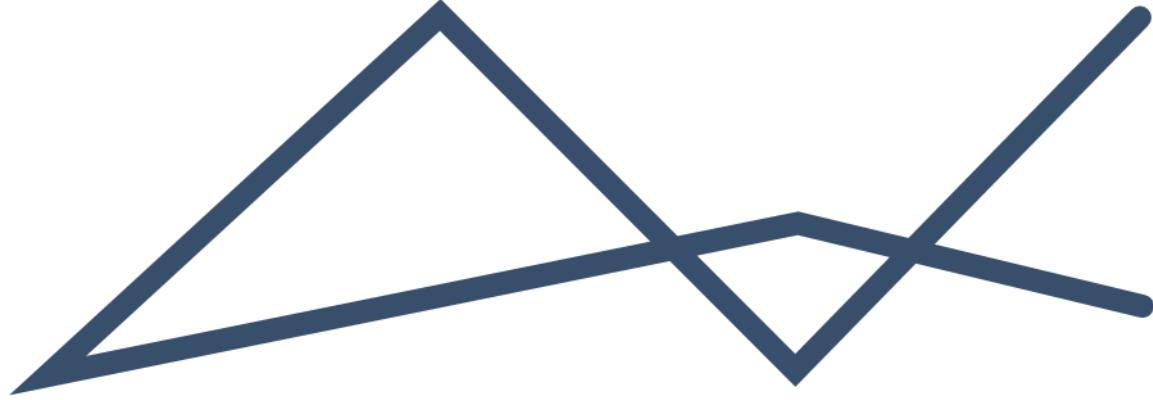
# AMENDED ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

THE PROPOSED EXPLORATION OF HYDROCARBONS AND  
ASSOCIATED GAS ON VARIOUS FARMS NEAR THE TOWN OF  
HENNENMAN, WITHIN FEZILE DABI DISTRICT AND LEJWELEPUTSWA  
DISTRICT MUNICIPALITIES, FREE STATE PROVINCE

EA REFERENCE NUMBER: 12/3/315

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### DOCUMENT CONTROL

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### REVISION AND AMENDMENTS

| REVISION DATE: | REV #      | DESCRIPTION                             |
|----------------|------------|---|
| 2017/01/26     | REVISION 1 | Approved EMPr                           |
| 2024/05/06     | REVISION 2 | Revision 2 for Public Review & Comment  |
| 2024/07/16     | REVISION 2 | Final Revision 2 for Submission to PASA |

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Appendix A: EAPs CV

Appendix B: List of Properties within the Approved Exploration Right

Appendix C: List of Directly Affected Properties by the Proposed Amendment Activities



## List of Abbreviations

|      |   |
|------|---|
| 2D   | Two-dimensional                                       |
| BID  | Background Information Document                       |
| CA   | Competent Authority                                   |
| CBA  | Critical Biodiversity Area                            |
| CLO  | Community Liaison Officer                             |
| CMA  | Catchment Management Agency                           |
| CR   | Critically Rare                                       |
| CSIR | Council for Scientific and Industrial Research        |
| DEA  | Department of Environmental Affairs                   |
| DFFE | Department of Forestry, Fisheries and the Environment |
| DMRE | Department of Mineral Resources and Energy            |
| DWA  | Department of Water Affairs                           |
| DWAF | Department of Water Affairs and Forestry              |
| DWS  | Department of Water and Sanitation                    |
| EA   | Environmental Authorisation                           |
| EAP  | Environmental Assessment Practitioner                 |
| EC   | Electrical Conductivity                               |
| EC   | Environmental Coordinator                             |
| ECA  | Environmental Conservation Act                        |
| ECA  | Environmental Conservation Act                        |
| ECO  | Environmental Control Officer                         |
| EIA  | Environmental Impact Assessment                       |
| EIMS | Environmental Impact Management Services (Pty) Ltd.   |
| ELWU | Existing Lawful Water Use                             |
| EMP  | Environmental Management Plan                         |
| EMPr | Environmental Management Program                      |
| EMS  | Environmental Management System                       |
| EN   | Endangered  |
| EO   | Environmental Officer                                 |
| EPF  | Exploration and Production Forum                      |
| EPRP | Emergency Preparedness and Response Plan              |
| ER   | Environmental Risk                                    |
| ESMS | Environmental and Social Management System            |
| ESO  | Environmental Site Officer                            |
| EWP  | Exploration Work Programme                            |
| GA   | General authorisation                                 |
| GIS  | Geographic Information Systems                        |
| GNR  | Government Notice Regulation                          |



|                |   |
|----------------|---|
| GPS            | Global Positioning System                           |
| Ha             | Hectare   |
| HIA            | Heritage Impact Assessment                          |
| I&AP's         | Interested and Affected Parties                     |
| IDP            | Integrated Development Plan                         |
| IEP            | Integrated Energy Plan                              |
| LC             | Leachable Concentration                             |
| MAE            | Mean Annual Evaporation                             |
| MAP            | Mean Annual Precipitation                           |
| MPRDA:         | Mineral and Petroleum Resources Development Act     |
| 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        |
| NGDB           | National Groundwater Database                       |
| NHRA           | National Heritage Resources Act                     |
| NHRA           | National Heritage Resources Act                     |
| NT             | Not threatened                                      |
| PASA           | Petroleum Agency South Africa                       |
| PPP            | Public Participation Process                        |
| Pri. Sci. Nat. | Professional Natural Scientist                      |
| Ptn            | Portion   |
| RE             | Remaining Extent                                    |
| SAHRA          | South African Heritage Resources Agency             |
| SAHRIS:        | South African Heritage Resources Information System |
| SANS           | South African National Standards                    |
| TC             | Total concentration                                 |
| TDS            | Total Dissolved Solids                              |
| TOPS           | Threatened and Protected Species                    |
| VU             | Vulnerable  |
| WMA            | Water Management Area                               |
| WRC            | Water Research Commission                           |
| WUL            | Water Use Licence                                   |
| SAHRA          | South African Heritage Resources Agency             |
| SAHRIS         | South African Heritage Resources Information System |
| SANBI          | South African National Biodiversity Institute       |
| SCC            | Species of conservation concern                     |



## 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, reduce 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

Motuoane Energy (Pty) Ltd (Motuoane) is the holder of the exploration right for hydrocarbons, issued in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA, as amended) to the Petroleum Agency South Africa (PASA) in 2016. The approved exploration area is located over an area of approximately 149 377 hectares (ha), covering various farms near the town of Hennenman, within the Free State Province, extending north from approximately Theunissen, northeast towards Kroonstad, and east of Virginia and Hennenman (**Figure 1**). In accordance with the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) an application for Environmental Authorisation (EA) through a Scoping and EIA was submitted to PASA in 2017 in support of the application for the exploration right. The EA issued in July 2017 (ref: 12/3/315) also approved the EMPr (Revision 1 date 26 January 2027). However, the EA only made provision for 3 drilling wells, and it did not include any seismic survey. As the applicant proposes to undertake an addition of ten (10) new exploration boreholes (13 drilling wells in total including the initial 3 which were approved), and approximately 30 km of new onshore seismic transects (**Figure 2**), an EA Amendment process has been initiated. **Subsequently, the originally approved EMPr (Revision 1) is amended through this Report (EMPr Revision 2) to cater for additional mitigation measures associated with the additional exploration activities which the applicant is required to comply with.**

The existing EA authorises the following listed activities:

- Listing Notice 1, Activity 27;
- Listing Notice 2, Activity 18; and
- Listing Notice 3, Activity 12.

It must be noted that onshore seismic surveys listing (Listing Notice 1, Activity 21C) was not listed at the time of the original EA and EMPr Application, nor were onshore seismic's originally envisaged and included in the EIA. The applicant (Motuoane) proposes to expand their exploration activities to include 10 new additional drilling wells and also to undertake onshore seismic surveys within an area of approximately 30 km. All of the proposed additional activities fall within the existing approved Exploration Right area and EA extent. There will be no additional areas or petroleum resources added to the exploration right.

The applicant wishes to amend the approved EA to include the following:

- Undertaking of 13 exploration boreholes;
- Undertaking of approximately 30 km seismic surveys; and
- Updating the approved EMPr.

In addition to the above, it must be noted that the surveying and exploration techniques to be employed as per the Exploration Works Programme (EWP) include approved and additional non-invasive and invasive exploration methods including:

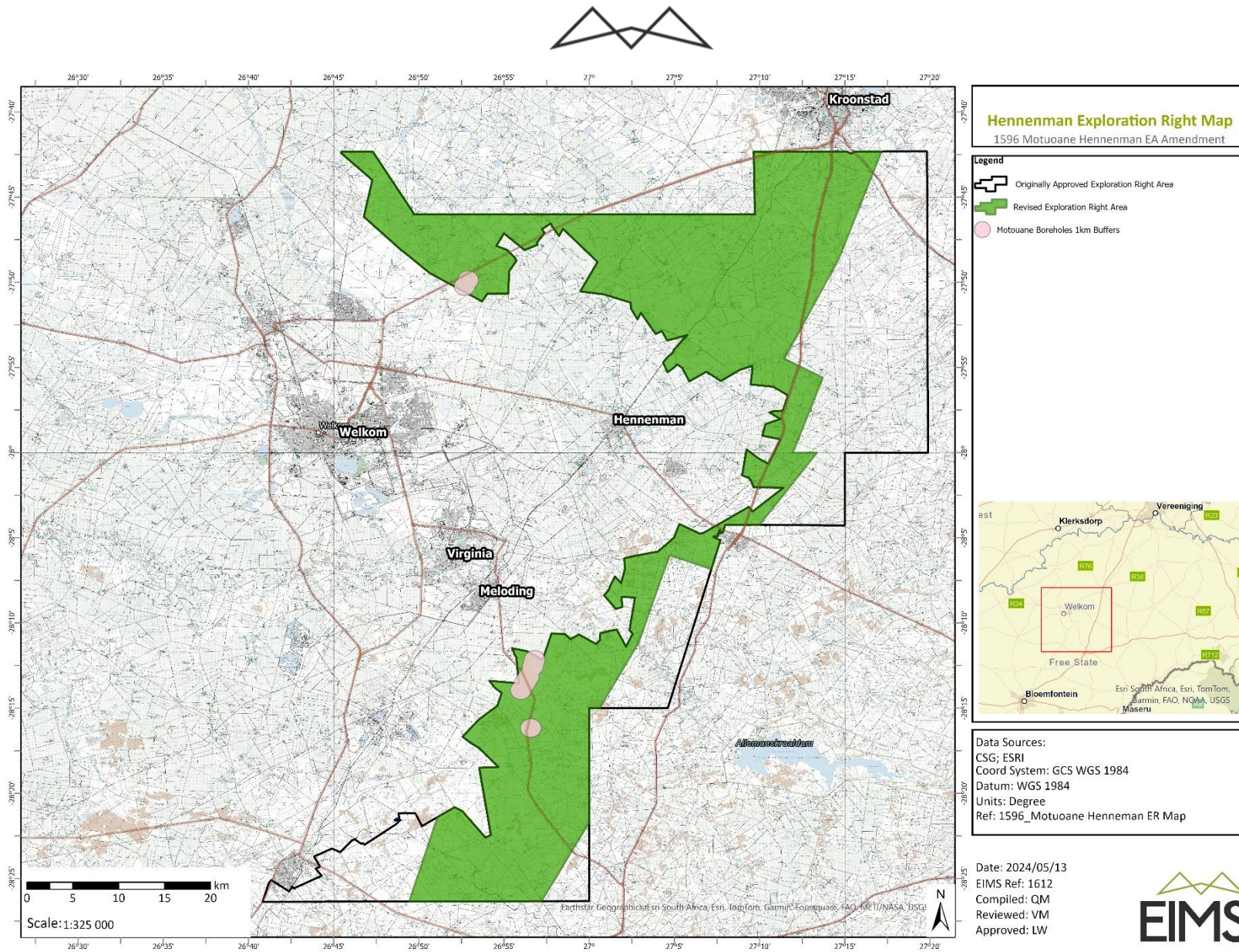
- Non-invasive exploration:
  - Background Data Collection and Management;
  - Preparation for Seismic Surveys.
  - Geological and Geophysical Logging; and
  - Onshore Seismic surveys.
- Invasive Exploration:
  - Geotechnical Investigations; and
  - Well Drilling.



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 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).

In accordance with the Regulation 13 of the EIA Regulations (GN R982 of 2014) as amended, the holder of the exploration right compiled and submitted an EMPr in line with the requirements for an EMPr in terms of the 2014 EIA Regulation 982. The EMPr was submitted as part of the application for an EA and was subsequently approved by the competent authority the Department of Mineral resources and Energy (DMRE) through the Petroleum Agency of South Africa. The EA application and EMPr were approved, and an EA WAS issued in July 2017 (ref: 12/3/315). An EMPr is a live document and must be implemented to strictly enforce environmental compliance during all phases of the project. However, and EMPr is also amendable as and when necessary to ensure required environmental compliance is feasible and reasonable. Changes to the EMPr, which are environmentally defensible, shall be submitted to the Competent Authority (EA Condition 5.1.5). **It is important to note that the provisions of the approved EMPr (Revision 1) including recommendations and mitigation measures in the EIR dated January 2017, specialist' studies, and the conditions of the EA remain effective for the activities undertaken (i.e. the two recently completed drilling activities) and/or which have commenced until such time that this Amended EMPr (Revision 2) is authorised. Once, and if, the amendment is approved by the competent authority, then the original EMPr (Revision 1) will be superseded by this EMPr (Revision 2) which will be applicable to the Exploration Right.**







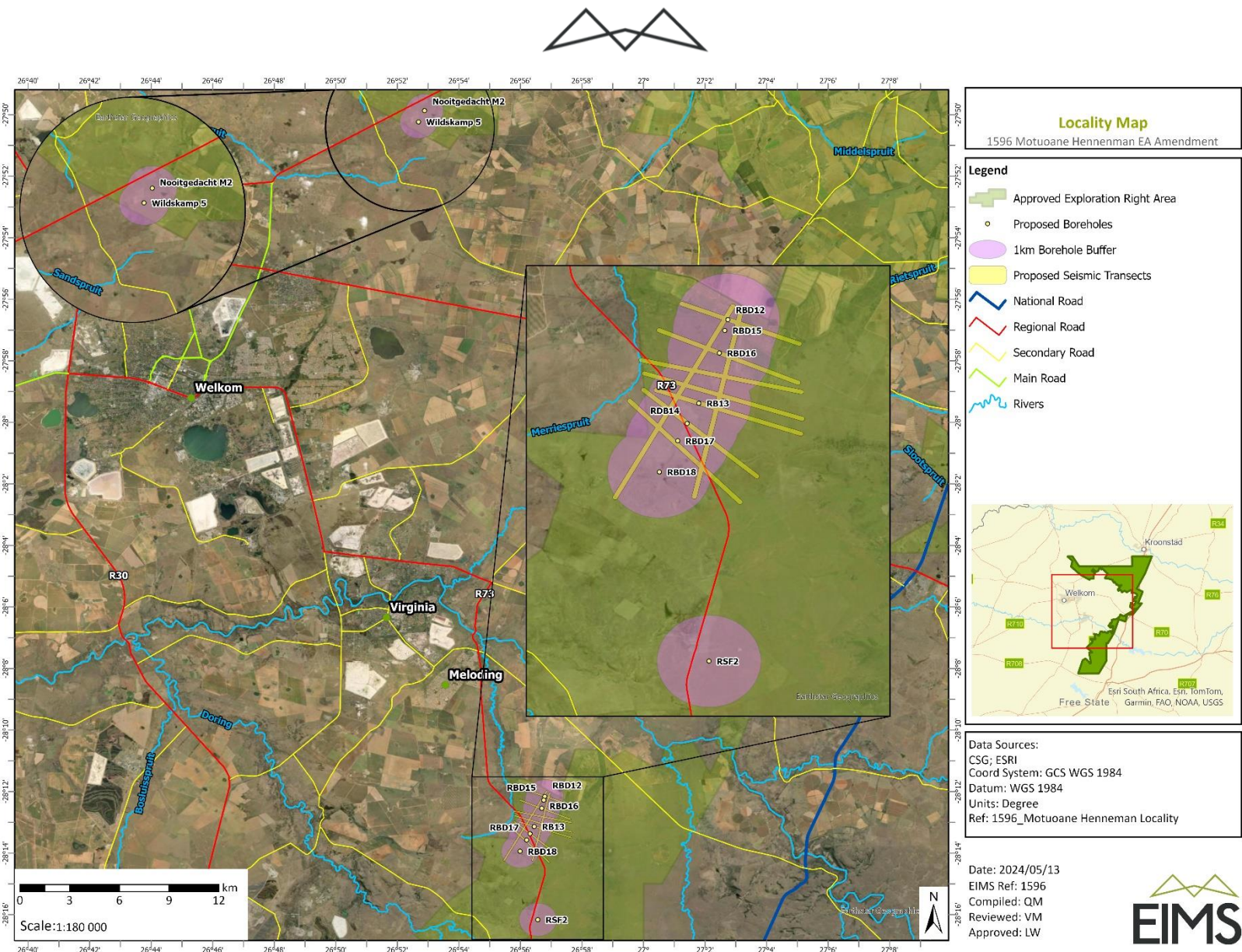


Figure 2: Site Locality Map for EA Amendment Activities.



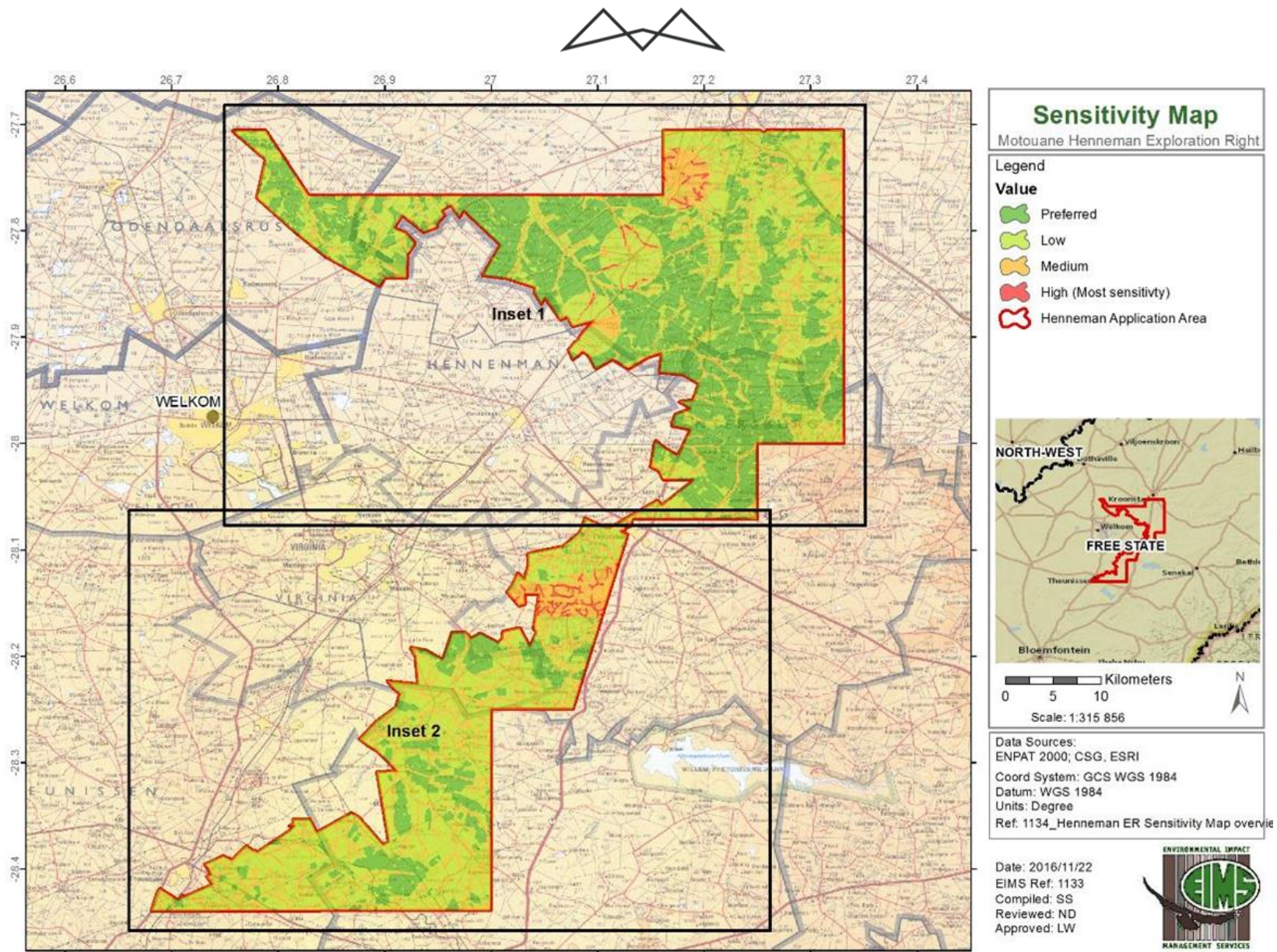


Figure 3: Site Sensitivity Map for the Exploration Right (EIMS, 2017).



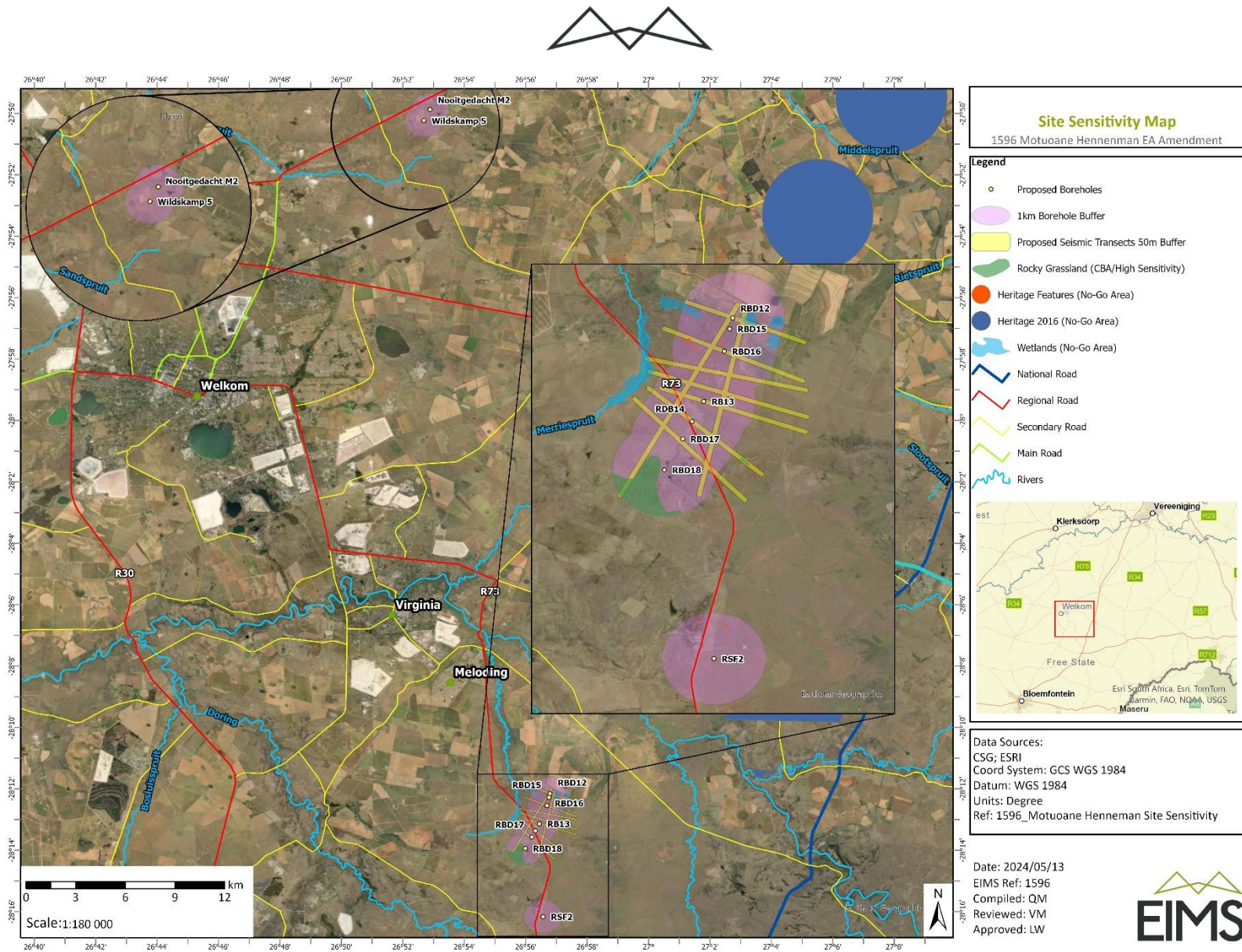


Figure 4: Site Sensitivity Map for the EA Amendment Activities.





## 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<br>Reference     | Description   | Section in EMPr |
|-----------------------------|---|-----------------|
| <b>Appendix 4(1)(1)(a):</b> | Details of –<br>i. The EAP who prepared the EMPr; and<br>ii. The expertise of that EAP to prepare an EMPr, including a curriculum vitae.  | Section 4       |
| <b>Appendix 4(1)(1)(b):</b> | A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.  | Section 5       |
| <b>Appendix 4(1)(1)(c):</b> | 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       |
| <b>Appendix 4(1)(1)(d):</b> | 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 –<br>i. Planning and design;<br>ii. Pre-construction activities;<br>iii. Construction activities;<br>iv. Rehabilitation of the environment after construction and where applicable post closure; and<br>v. Where relevant, operation activities.   | Section 8       |
| <b>Appendix 4(1)(1)(f):</b> | 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 –<br>i. Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;<br>ii. Comply with any prescribed environmental management standards or practices;<br>iii. Comply with any applicable provisions of the Act regarding closure, where applicable; and<br>iv. Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable. | Section 8       |



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

EIMS was appointed by Motuoane to assist in preparing and submitting the original application for Environmental Authorisation (EA) as well as the current Amendment Application to the EA which involves the compilation of an Amendment Report and undertaking the required public participation process in support of the additional proposed activities for the Motuoane Exploration 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](http://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:                     | <a href="mailto:vukosi@eims.co.za">vukosi@eims.co.za</a>   |
| Professional Registrations: | <ul style="list-style-type: none"><li>• Registered Environmental Assessment Practitioner with Environmental Assessment Practitioner Association of South Africa – EAPASA (Reg. No: 134178)</li><li>• Professional Natural Scientist with the South African Council for Natural Scientific Professions – SACNASP (Reg. No: 2019/867).</li></ul> |

### 4.2 EXPERTISE OF THE EAP

This Revised EMPr was prepared by Vukosi Mabunda, a Registered Environmental Assessment Practitioner (EAP) employed by EIMS. His CV is included as **Appendix A** of this report. Mr Vukosi Mabunda is currently a Senior Environmental Assessment Practitioner (EAP) and a Geographic Information Systems (GIS) Specialist with 6 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 SACNASP as a



Professional Geospatial Scientist and Professional Environmental Scientist. Vukosi has dual professional background in Geographic and Environmental Sciences with a Master of Science Degree in Geography obtained in 2021 from the University of Johannesburg. In addition to his experience in Environmental Compliance Monitoring and applications for Water Use License Applications, Vukosi has successfully completed numerous environmental impacts assessments for both linear and footprint developments as indicated in his CV (**Appendix A**).

## 5 DESCRIPTION AND SCOPE OF THE PROPOSED PROJECT

### 5.1 APPROVED EXPLORATION RIGHT / PROJECT LOCALITY

The approved Motuoane Hennenman exploration area is located over an area of approximately 149 377 hectares (ha), covering various farms near the town of Hennenman, within the Free State Province, extending north from approximately Theunissen, northeast towards Kroonstad, and east of Virginia and Hennenman. The approximate centre point of the proposed study area is located at: 28° 5'1.67"S; 27° 8'0.66"E in Ventersburg (see **Figure 1**). The local municipalities in which the proposed exploration area is located includes, Matjhabeng and Masilonyana which are part of the Lejweleputswa District Municipality, and Moqhaka which is part of the Fezile Dabi District Municipality.

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 approved exploration activities include the drilling of 3 (30m x 30m) core exploration wells whereby the drill sites will be 0.27 ha 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.

The proposed exploration right application area is located within 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. Details of the properties which make up the exploration right application area is attached as **Appendix B**.

### 5.2 LOCALITY OF THE AMENDMENT ACTIVITIES

The application is an amendment of the existing and approved EA which covers the exploration right area (footprint) and therefore, landowners within the exploration right are affected. **However, the seismic survey and additional drilling wells are located within a defined area of the exploration right and not throughout the 149 377ha approved exploration right area.** The proposed seismic survey and additional drilling sites are therefore referred to as the directly affected landowners and the amendment application primarily focused on these areas. Furthermore, it must be noted that although preliminary seismic transect and drilling locations are indicated on **Figure 2**, these are not entirely final exact seismic routes and/or drilling locations. There may be a need for localised realignment, or changes based on environmental, geological, and functional criteria and as such, a buffer has been defined and assessed within which these activities can be undertaken / limited to subject to compliance with the specific mitigation measures. Subsequently, a 25 m buffer from the preliminary seismic transect and 1 km buffer from the drilling locations from the preliminary locations of the additional exploration activities has been assessed and in the Amendment Report and relevant additional mitigation measures provided in this revised EMPr.

The total area to be disturbed by the amendment exploration activities will also be minimal based on the relatively non-intensive exploration techniques to be undertaken. The proposed exploration activities include the ~30 km seismic surveys along 9 seismic transects and drilling of 10 (50m x 50m) exploration wells whereby the drill sites will be 0.27 ha in total, excluding associated access roads.

The amendment study area can be subdivided into three sections namely, the far south, the south-central section and far north section. The far south and south-central sections are approximately 20 km and 15 km south of Virginia and can be accessed from the R73. The far north section is approximately 20 km northeast of Welkom and can be accessed from the R34. The proposed seismic activities and majority of the proposed drilling wells (7



of 10) are concentrated within the south-central section with only one drilling activity proposed in the far south and two in the far north sections. Thirteen (13) farms and twenty-five (25) farms portions are directly affected by the proposed amendment. Refer to **Figure 2, Table 3 and Appendix C** for the site locality and property details for the proposed amendment activities sites.

Table 3: Site property details for the proposed amendment activities.

| Item                       | Details   |
|----------------------------|---|
| Farm Portion / Name / Erf  | <p>The originally approved exploration area is located over an area of approximately 95 483ha, covering various farms near the town of Hennenman, within the Free State Province. However, the seismic survey and additional drilling wells are located within a defined area of the exploration right and not throughout the 95 483ha exploration right area. Although the application is an amendment and therefore covers the existing approved footprint, the proposed amendment activities are located within the following farms:</p> <ul style="list-style-type: none"> <li>• Blijdschap Farm 218: Remaining Extent;</li> <li>• Blomskraal Farm 216: Remaining Extent</li> <li>• Detente Farm 744: Remaining Extent, Ptn 1, Ptn 2 &amp; Ptn 3</li> <li>• Erfenis Farm 328: Remaining Extent</li> <li>• Harmonia Farm 282: Remaining Extent</li> <li>• Kriegers Kraal Farm 708: Remaining Extent &amp; Ptn 1</li> <li>• Le Roux Farm 717: Ptn 1</li> <li>• Le Roux Farm 766: Remaining Extent, Ptn 1 &amp; Ptn 2</li> <li>• Nieuwjaarsbosch Farm 113: Remaining Extent</li> <li>• Nooitgedacht Farm 245: Remaining Extent &amp; Ptn 1</li> <li>• Ongegund Farm 321: Remaining Extent &amp; Ptn 1</li> <li>• Palmiet Fontein Farm 229: Remaining Extent, Ptn 1, Ptn 2 &amp; Ptn 3</li> <li>• Siberiasfontein Farm 605: Remaining Extent &amp; Ptn 1</li> <li>• Eureka Farm 2101: Remaining Extent</li> </ul> |
| Distance from closest town | The far south and south-central sections are approximately 20km and 15km south of Virginia while the far north section is approximately 20km northeast of Welkom.   |
| GPS coordinates            | <p>The amendment study area can be subdivided into three sections namely;</p> <ul style="list-style-type: none"> <li>• Far south with central coordinates 28°16'9.84"S; 26°56'34.08"E;</li> <li>• South-central with central coordinates 28°13'8.18"S; 26°56'26.95"E; and</li> <li>• Far north with central coordinates 27°50'4.74"S; 26°52'50.24"E</li> </ul>  |
| Local Municipality         | Matjhabeng, Masilonyana and Moqhaka Local Municipalities  |
| District Municipality      | Lejweleputswa and Fezile Dabi District Municipalities   |

### 5.3 AUTHORIZED ACTIVITIES

In terms of Section 24(2) of NEMA, the Minister and/or any MEC in concurrence with the Minister may identify activities which require authorisation as these activities may negatively affect the environment. Environmental Impact Assessment (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) defines activities which will trigger the need for a Basic Assessment process;
- *Listing Notice 2* (Regulation 984) 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) defines certain additional listed activities for which a Basic Assessment process would be required within identified geographical area.

The following table presents a summary of the approved listed activities associated with the project.

Table 4: Authorized NEMA EIA listed activities within the approved exploration area.

| Authorised Listed Activity                                 | Description of Activity  |
|--|--|
| <b>Government Notice Regulations (GNR) 983 Activity 27</b> | The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation.  |
| <b>GNR 984 Activity 18</b>                                 | 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.   |
| <b>GNR 985 Activity 12</b>                                 | 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;<br>b. Free State<br>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;<br>ii. Within critical biodiversity areas identified in bioregional plans;<br>iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.<br>v. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland |

## 5.4 PROJECT DESCRIPTION

The project entails surveying and exploration for hydrocarbons and associated gas. Based on the information provided to EIMS, the applicant proposed to undertake the following activities within the approved exploration right area:

- Drilling of a total of 13 exploration boreholes; and
- Undertaking of approximately 30 km seismic surveys.

It must be noted that at the time of revising this EMP, two of the three authorized exploration wells had been sited and drilled. In addition to the above, information on each of the proposed amendments is provided below. It must be noted that the surveying and exploration techniques to be employed as per the Exploration Works Programme include approved and additional non-invasive and invasive exploration detailed below.

## 5.5 NON-INVASIVE EXPLORATION

### 5.5.1 BACKGROUND DATA COLLECTION AND DATA MANAGEMENT

Affected landowners will be identified and contacted in preparation for the ground exploration activities. Existing gas emitting boreholes undertaken as part of the original EA (3 authorised drilling wells) and other 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 and new lines might be flown if required using a light aircraft or drone (this will comply with the necessary South African Civil Aviation Authority (SACAA) restrictions and requirements). 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 the Environmental Management Programme (EMPr) will be binding on the applicant.

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. In addition, analyses on gas samples taken will also be undertaken.

### 5.5.2 PREPARATIONS FOR SEISMIC SURVEYS

Background information from the drilling programme as well as existing wells where conditions permit, and geological maps will be used to identify the final 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 approved by the applicant and team will mobilize to undertake the seismic surveys which should last for a couple of weeks if weather conditions permit.

### 5.5.3 GEOLOGICAL AND GEOPHYSICAL LOGGING

Geological and Geophysical logging, utilizing the samples obtained from the drilling programme as well as existing wells where conditions permit. 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.

### 5.5.4 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. A single Seismic Vibrator consisting of a vibrating baseplate that is connected to the ground will be used. The vibrating plate emits a low frequency signal (4-80 Hz) into the ground, called a sweep. The vibrator 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. 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. 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 is also a potential alternative to the Vibroseis known as the Propelled Energy Generators (PEGs), more commonly referred to as the Accelerated Weight Drop Seismic (AWD) which Motuoane may consider over 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.

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. 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.

## 5.6 INVASIVE EXPLORATION ACTIVITIES

### 5.6.1 GEOTECHNICAL INVESTIGATIONS

Once the seismic, geological and geophysical data has been analysed this information will delineate the areas susceptible for geotechnical investigations. The Motuoane Exploration Area is situated towards the east of de Bron fault. In the northern part of the ER, a major horst structure i.e. de Bron horst is present between the de Bron and Homestead faults respectively. No gold bearing sediments occur in the horst. Detailed drilling defined the eastern limit of this horst structure along the Homestead fault. East of the Homestead fault, gold bearing sediments were intersected again. Two major fault systems, i.e. the Virginia and Ventersdorp faults, occur in the eastern part of the MELA. The displacement again was towards the west. Despite this major north-south striking structures several east-west faults are also present or could be extended into the ER. The east-west structures are the oldest structures in the Witwatersrand basin. Many kimberlite fissures and Karoo age dolerite dykes intruded into the younger strata along these structures. The east-west structures were right laterally displaced by north-south striking structures resulting in a very complex tectonic environment. The Importance of these structures is vested in the presence of methane gas occurrence associated in or in proximity of the structures.

Drilled explorations wells will be evaluated based on gas flow, pressure and gas composition, prior to making a decision to either complete the well as a production well or to suspend or abandon it. Hydrocarbons has been reported from the Welkom Goldfields from conventional mineral exploration boreholes and mine workings since the early 1900's. Hydrocarbons are believed to be derived from the crustal microbial methanogens in fractures within the Witwatersrand that has migrated through the Witwatersrand/Ventersdorp and into the Karoo Dwyka and Ecca Group Vryheid Formations. The anticipated geology and stratigraphy are based on the lithographic log in 0. The underlying geology through which Motuoane Energy No 1 Bloemskraal will be drilled will consist of sedimentary rocks of the Karoo Supergroup followed by the lavas of the Ventersdorp Supergroup. The information from the seismic survey and drilling will be used for map the geology of the area.

### 5.6.2 WELL DRILLING

Using the data gathered during the preceding background review and surveying, ten (10) exploration boreholes will be sited. The proposed drilling process entails the construction of exploration well using a two-string telescopic casing design is outlined below:

- The Spud casing will be set and cemented in 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 percussion drilled ahead and into the Ventersdorp Lavas below the base of the Karoo at approximately 450m 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. A further Formation Integrity Test (FIT) is then performed on drilling out the casing shoe; 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 project will involve the drilling of ten (10) wells within the assessed 1 km buffer drilling sites to a depth of approximately 700m, commencing with a 203mm hole cased with 152mm casing for the loose top material (conductor casing), followed by 122.6mm hole cased with 114mm casing to isolate ground water (surface/intermediate casing) and finally 96mm cased with 89mm casing for the target formation (production casing). The actual 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. Drilling activities are estimated to be one to two weeks per hole during which time there will be a drill rig, a service truck and an LDV on site. Intermittent use of a TLB will be used during site establishment and demobilisation. In order to establish the gas contents a mobile desorption laboratory will be established.

The construction of each drill pad will disturb an area of up to 50 x 50m. Within the disturbed area, the drill rig and drilling rods will be located. Impermeable, lined sumps will be used to circulate and store the drill fluid and mud consisting of drilling foams and Bentonite. Exploration trays, hazardous and general storage, waste storage, chemical toilets, and any site offices required will also be placed inside the drill pad. Each borehole will either be plugged entirely or left as is for future 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.

## 5.7 SUPPORTING INFRASTRUCTURE

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

Equipment for seismic surveys and drilling will be provided by specialist contractors. 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 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 waste disposal facility. The material recovered from the drilling will most likely be stored in a shed for analysis and record keeping. Mineral residues produced during drilling practices will be managed in terms of the MPRDA and appropriate regulations, most notably Regulation 704 (4 June 1999) under the NWA and Regulation 632 on the Planning and Management of Residue Stockpiles and Residue Deposits (July 2015) under the National Environmental Management Waste Act (Act 59 of 2008) (NEMWA). Water from the drilling operations will be disposed of in accordance with the provisions of the National Waster Act and the National Environmental Management Waste Act (as applicable).

## 5.8 DECOMMISSIONING AND CLOSURE

The originally approved rehabilitation plan has been adopted for this revised EMPr as the activities and the area of activities are within the parameters of the approved exploration activities and area. The approved Rehabilitation Plan is provided in **Section 12** of this EMPr. The EMPr shall outline 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 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.

- 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 where applicable, etc.
- 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.
- Verification of rehabilitation success. Entails monitoring of rehabilitation.

All areas disturbed by exploration activities will be rehabilitated once exploration has been completed. [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.](#)

## 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 Part II EA Amendment 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 (EPF) (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 5** presents the proposed exploration activities to be undertaken in each phase of the project, and the potential ground requirements associated with each activity.

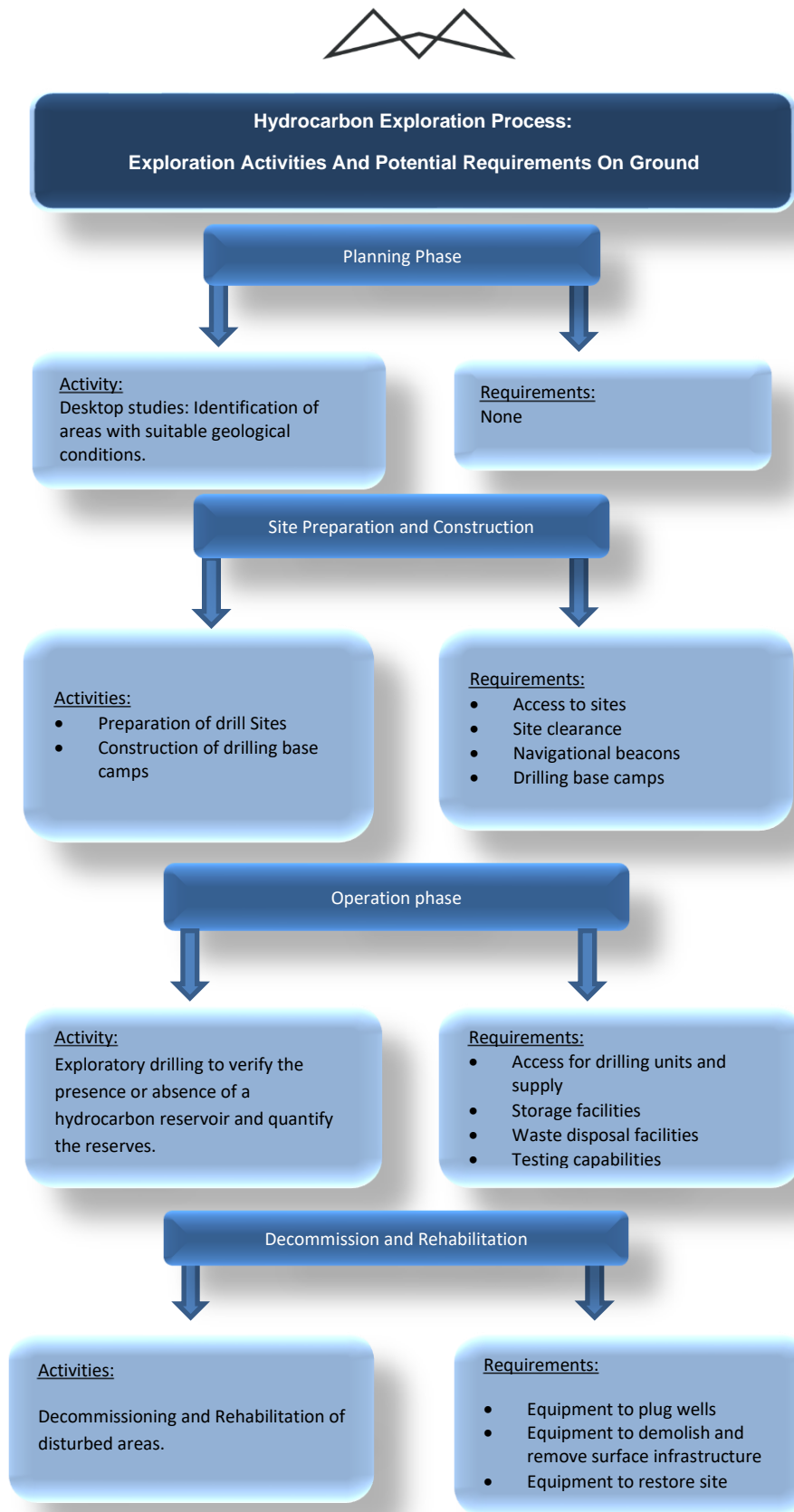


Figure 5: Proposed activities to be undertaken and the potential requirements associated with each phase.



## 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 5**. The updated potential risks and impacts identified for each phase, is summarised in **Table 6** below.

Table 5: Interpretation of identified activities and mitigation measures.

| Color / Text Reference | Color Coding | Interpretation  |
|------------------------|--------------|---|
| xxxx                   | Black        | Original approved mitigation – Adopted for the Amended EMPr.                    |
| xxxx                   | Dark Blue    | Original Approved mitigation moved to a new EMPr section for ease of reference. |



|                |                      |  |
|----------------|----------------------|--|
| xxxx           | Dark Gold            | Change / update of an approved mitigation measure.   |
| <u>xxxx</u>    | Dark Gold Underlined | Change / update of an approved mitigation measure and moved to a new EMPr section for ease of reference. |
| xxxx           | Blue                 | New / Additional mitigation / aspect to the EMPr.  |
| <del>xxx</del> | Strikethrough        | Approved mitigation no longer relevant / feasible and subsequently removed from amended EMPr.            |



Table 6: 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. <del>Site clearance</del><br>General | Project Life Cycle | 10 drilling sites and 9 seismic transects. Short term and localized | <ul style="list-style-type: none"> <li>• Demarcation of sensitive areas in consultation with relevant specialists and ECO;</li> <li>• Minimise removal of vegetation as far as possible;</li> <li>• Relocation of protected species;</li> <li>• 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;</li> <li>• Limit vehicle access;</li> <li>• Compile and Implement alien vegetation management plan due to Category 1b Alien Species on site;</li> <li>• Ongoing identification of risks and impacts; and</li> <li>• Monitoring and review;</li> <li>• <u>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 week days;</u></li> <li>• 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;</li> <li>• The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on the area;</li> <li>• Areas outside the direct project footprint, should under no circumstances be disturbed;</li> <li>• Speed restriction of no more than 20km/h must be implemented for all construction vehicles within the construction site;</li> <li>• Soils and agricultural fields outside the direct project footprint, should under no circumstances be disturbed;</li> </ul> | NEMA<br>MPRDA<br>NEMBA<br>NEMAQA<br>Dust regulations<br>NWA<br>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"> <li>• 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;</li> <li>• 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);</li> <li>• 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;</li> <li>• 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;</li> <li>• All contractors and employees should wear photo identification cards;</li> <li>• Vehicles should be clearly marked as construction vehicles;</li> <li>• There must be access control to the entry / exit points of the exploration sites;</li> <li>• The financial provision must be updated prior commencement of activities.</li> </ul> |   |                                |
| <b>6.2. Site Planning and Preparations</b> | Planning | 10 drilling sites and 9 seismic transects. Short term and localized | <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• Utilize local labor as far as possible;</li> <li>• Have an adequate emergency preparedness plan;</li> </ul>  | NEMA<br>NEMBA<br>CARA<br>NEMAQA<br>Dust Regulations<br>Road Traffic Act | Throughout Planning Phase      |



| Activities                                | Phase                      | Size and Scale of Disturbance     | Mitigation Measures   | Compliance with Standards | Time Period for Implementation |
|---|----------------------------|-----------------------------------|---|---------------------------|--------------------------------|
|   |                            |                                   | <ul style="list-style-type: none"> <li>• If any damage occurs to services / infrastructure, the applicant will be liable to fix it to its original state;</li> <li>• 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;</li> <li>• 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.</li> <li>• The Developer shall inform all landowners of the commencement of construction activities at least 30 days before commencement. Landowners must be requested to indicate the type and location of services within their properties;</li> <li>• 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;</li> <li>• 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</li> <li>• The custodian for sensitive species 15 (Endangered Wildlife Trust (EWT)) must be informed of the presence of the species. A walkdown by a suitable specialist (EWT) should be done in the area surrounding the drilling two northern wells (Wildskamp 5 and Nooitgedacht M2) prior to any activities, mainly to confirm that SCCS are not present or will be harmed.</li> </ul> |                           |                                |
| 6.3. Establishment of site infrastructure | Construction / Exploration | <0.27ha. Short term and localized | <ul style="list-style-type: none"> <li>• Minimise physical footprint of construction. Construction / exploration impacts associated with the proposed project must be contained within the footprint of the assessed areas;</li> </ul>  | NEMA<br>MPRDA             | Throughout construction phase  |



| Activities                                   | Phase                      | Size and Scale of Disturbance | Mitigation Measures   | Compliance with Standards   | Time Period for Implementation        |
|--|----------------------------|-------------------------------|---|---|---------------------------------------|
|  |                            |                               | <ul style="list-style-type: none"> <li>• Ensure construction is consistent with occupational health and safety requirements;</li> <li>• 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). <i>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;</i></li> <li>• Ensure proper and adequate drainage;</li> <li>• Minimise waste and control waste disposal;</li> <li>• Fencing of all drill sites with security access control and warning signs;</li> <li>• Establish waste storage areas for recycling;</li> <li>• Ensure adequate containment of waste to prevent pollution;</li> <li>• Minimise dust generation;</li> <li>• Limit vehicle access to approved access roads;</li> <li>• Prepare contingency plans for spillage and fire risks; and</li> <li>• <i>All construction plant and other equipment must be in a good working order to reduce possible noise pollution.</i></li> </ul> | NEMBA<br>NEMAQA<br>Dust regulations<br>NWA<br>DWAF Best Practice Guidelines |                                       |
| <b>6.4. Storage of construction vehicles</b> | Construction and Operation | Short term and localized      | <ul style="list-style-type: none"> <li>• 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;</li> <li>• 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</li> <li>• 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.</li> </ul>   | NWA<br>DWAF BPG   | Throughout construction and operation |



| Activities   | Phase                      | Size and Scale of Disturbance | Mitigation Measures  | Compliance with Standards   | Time Period for Implementation        |
|--|----------------------------|-------------------------------|--|---|---------------------------------------|
| <b>6.5. Transportation/ access to and from drill sites exploration sites</b> | Construction and Operation | Short term and localized      | <ul style="list-style-type: none"> <li>• Where possible, drill sites should be located along existing access roads to reduce the requirement for additional access roads;</li> <li>• Any new temporary access routes to the drill site should result in minimal disturbance to existing vegetation;</li> <li>• All farm gates must be closed immediately upon entry/exit;</li> <li>• Under no circumstances may the contractor damage any farm gates, fences, etc.;</li> <li>• 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);</li> <li>• 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;</li> <li>• Damage caused to public roads as a result of the construction activities must be repaired in consultation with the relevant municipal authorities; and</li> <li>• All measures should be implemented to minimize the potential of dust generation.</li> </ul> | NEMA<br>NEMBA<br>CARA<br>NEMAQA<br>Dust Regulations<br>Road Traffic Act | Throughout Construction and Operation |
| <b>6.6. Storage of hazardous substances</b>                                  | Construction and Operation | Localized and short-term      | <ul style="list-style-type: none"> <li>• 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 measures must be implemented to prevent spillage and appropriate steps must be taken to prevent pollution in the event of a spill; and</li> <li>• 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.</li> </ul>   | NWA<br>NEMWA<br>DWAF BPG  | Throughout Construction and Operation |
| <b>6.7. Waste Management</b>   | Construction and Operation | Localized and short-term      | <ul style="list-style-type: none"> <li>• 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;</li> <li>• 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</li> </ul>  | DWAF requirements for waste disposal<br>Minimum for waste               | 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"> <li>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.</li> </ul>   |  |                                |
| <b>6.8. Aerial Surveys</b>                    | Operation | Localized and Short Term      | <ul style="list-style-type: none"> <li>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;</li> <li>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;</li> <li>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.</li> </ul>   | CAA Regulations  | Throughout operation           |
| <b>6.9. Well Drilling and Seismic Surveys</b> | Operation | Localized and Short term      | <ul style="list-style-type: none"> <li>The additional exploration activities (9 seismic transects and 10 drilling wells) assessed as part of the EA Amendment may only be undertaken within the assessed corridors i.e. 50 corridors for seismic transects and 1km corridors for drilling wells</li> <li>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;</li> <li>Should additional seismic surveys and/or drilling wells fall outside of the EA Amendment assessed footprint areas, but within the Exploration Right, 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: <ul style="list-style-type: none"> <li>In low sensitive areas, the conditions of the EMPr must be complied with;</li> <li>In medium sensitive areas, the respective specialists must be brought to site to assess the final seismic survey / drill site and surroundings (1km radius</li> </ul> </li> </ul> | MPRDA Regulations GN R527<br>SANS 10103<br>ECA Noise Regulations<br>NEMAQA<br>Dust Regulations<br>NWA<br>DWF BPG<br>NHRA | Throughout operation           |





| Activities | Phase | Size and Scale of Disturbance | Mitigation Measures   | Compliance with Standards | Time Period for Implementation |
|------------|-------|-------------------------------|---|---------------------------|--------------------------------|
|            |       |                               | <p>around the site) and develop site specific mitigation measures. Furthermore, the conditions of the EMPr must be complied with; and</p> <ul style="list-style-type: none"> <li>○ In high sensitive areas, the respective specialists must be brought to site to assess the <a href="#">seismic survey</a> / 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 <a href="#">seismic survey</a> / drilling operations;</li> <li>● The water quality monitoring results to verify pre and post drilling impacts must be submitted to the DWS;</li> <li>● Dust suppression methods must be applied when necessary to restrict the visual impact of dust emissions;</li> <li>● Any spills of hydrocarbons or fluids used during operation, must be cleaned up immediately;</li> <li>● 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;</li> <li>● Construction vehicles and machines must be maintained properly to ensure that oil spillages are kept at a minimum;</li> <li>● Spill trays must be provided if refuelling of drilling rig and vehicles are done on site;</li> <li>● 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</li> </ul> |                           |                                |



| Activities | Phase | Size and Scale of Disturbance | Mitigation Measures  | Compliance with Standards | Time Period for Implementation |
|------------|-------|-------------------------------|--|---------------------------|--------------------------------|
|            |       |                               | <p>contamination of the borehole and aquifer. The boreholes should be correctly constructed so that no gas leakage occurs;</p> <ul style="list-style-type: none"> <li>• 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;</li> <li>• 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 MPRDA Petroleum exploration and production R. 527 Regulations, Chapter 8 and Chapter 9;</li> <li>• 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;</li> <li>• No exploration boreholes should be drilled in the immediate vicinity of existing private boreholes;</li> <li>• 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;</li> <li>• 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;</li> <li>• A liner should be placed over the drill pad and drip trays must be used in all areas where hydrocarbons are handled;</li> <li>• 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;</li> <li>• Workforce should be kept within defined boundaries and to agreed access routes.</li> </ul> <p><u>Well Construction Standards</u></p> |                           |                                |



| Activities | Phase | Size and Scale of Disturbance | Mitigation Measures  | Compliance with Standards | Time Period for Implementation |
|------------|-------|-------------------------------|--|---------------------------|--------------------------------|
|            |       |                               | <ul style="list-style-type: none"> <li>• All wells must be cased according to current industry standards published by the API “5CT Specification for Casing and Tubing” and the casing thread compound and its use must confirm to the current API RP 5A3;</li> <li>• A casing installed must have a minimum yield pressure designed to withstand at least 1.2 times the maximum pressure to which the casing may be subjected during drilling operations;</li> <li>• Installation of casings and cement seals in exploration wells are important to manage impacts on groundwater quality. Surface casing must be set to a depth of 60m below the base of the deepest fresh water or at least 100m above the top of expected petroleum bearing zones, whichever comes first, and cemented to the surface;</li> <li>• The minimum yield pressure must be based upon engineering calculations as listed in the API “TR 5C-3 Technical Report on Equations and Calculations for Casings, Tubing and Line Pipe used as Casing and Tubing, and Performance Properties Tables for Casing and Tubing”;</li> <li>• Casing may not be pitted, patched, bent, corroded or crimped;</li> <li>• Casing may not have threads which are worn or damaged;</li> <li>• Casing that has been reconditioned and that has not passed the approved hydrostatic pressure and drift test pursuant to API “5CT Specification for Testing and Tubing” may not be used;</li> <li>• The Applicant/ drill contractor must contact the designated agency (PASA) at least 2 days prior to setting a casing to enable an authorized person to be present when the test is done;</li> </ul> <p><u>Conductor Casing</u></p> <ul style="list-style-type: none"> <li>• Conductor casing must be set and cemented to a surface in order to stabilize unconsolidated sediments, isolate shallow aquifers that provide or are capable of providing fresh groundwater for water wells and springs in the vicinity of the well, and provide a base for equipment to divert shallow natural gas;</li> </ul> <p><u>Surface Casing</u></p> |                           |                                |



| Activities | Phase | Size and Scale of Disturbance | Mitigation Measures  | Compliance with Standards | Time Period for Implementation |
|------------|-------|-------------------------------|--|---------------------------|--------------------------------|
|            |       |                               | <ul style="list-style-type: none"> <li>• Surface casing for exploration or production wells must be set to a depth of 60m below the base of the deepest fresh water or at least 100 metres above the top of expected petroleum bearing zones, whichever comes first, and cemented to a surface;</li> <br/> <li><u>Intermediate Casing</u></li> <li>• Intermediate casing must be set to protect unexpected fresh water found below the surface casing shoe;</li> <li>• Intermediate casing used to isolate fresh water must not be used as the production string in the well in which it is installed;</li> <li>• When intermediate casing is installed to protect fresh water, it must be set at least 30 meters below the base of the unexpected deepest fresh water and must be cemented to the surface;</li> <li>• In instances where intermediate casing is set solely to protect fresh water encountered below the surface casing shoe and cementing to the surface is technically infeasible and may result in lost circulation or both, cement must be brought to a minimum of 180 meters above the shallowest fresh water zone encountered below the surface casing shoe;</li> <li>• The location and depths of petroleum bearing zones or fresh water zones that are open to the wellbore above the casing shoe, must be confirmed by coring, electric logs, testing or such data from an offset well on the same well pad and must be reported to the designated agency (PASA);</li> <br/> <li><u>Centralisers</u></li> <li>• Casing must be centralised in each segment of the wellbore to provide sufficient casing standoff and foster effective circulation of cement to isolate critical zones including aquifers, flow zones, voids, lost circulation zones and hydrocarbon production zones;</li> <li>• Surface casing must be centralised at the shoe, above and below a stage collar or diverting tool, and through fresh water zones;</li> <li>• In non-deviated holes, a pipe centraliser must be placed every fourth joint from the cellar cement shoe to the ground surface or to the bottom of the cellar;</li> </ul> |                           |                                |



| Activities | Phase | Size and Scale of Disturbance | Mitigation Measures   | Compliance with Standards | Time Period for Implementation |
|------------|-------|-------------------------------|---|---------------------------|--------------------------------|
|            |       |                               | <ul style="list-style-type: none"> <li>• Centralisers must be in accordance with the standards of API “10 D, Specification for Bow-Spring Casing Centralizers and all rigid centralizers”, API “10 TR 4 Considerations Regarding Selection of Centralizers for Primary Cementing Operations”, and API RP “10D-2, Recommended Practice for Centralizer Placement and Stop-Collar Testing”;</li> <br/> <li>• <u>Cement requirements and compressive tests</u></li> <li>• The Applicant/ drilling contractor must notify the designated agency (PASA) at least 2 days before commencing with cementing of casing operations to enable an authorised person to be present;</li> <li>• Cementation of casing must be done by the pump and plug method with a minimum of 25% excess cement and appropriate loss circulation material, unless another amount of excess cement is approved by the designated agency (PASA);</li> <li>• Cement placed into the well bore must be cement that is manufactured to meet the standards of API “10 A Specification for cements and material for well cementing” or ASTM “C150/C150M Standard Specification for Portland Cement” and foamed cement slurry must be prepared to minimise its free water content in accordance with API “RP 10B-4 Recommended Practice On Preparation and Testing of Foamed Cement Slurries at Atmospheric Pressure”;</li> <li>• The Applicant must conduct tests for cement mixtures for which published performance data is not available on representative samples of the basic mixture of cement and additives used, by using distilled water or potable tap water for preparing the slurry;</li> <li>• Cement mixture tests must be conducted using the equipment and procedures established in the current API “RP 10 B 2 Recommended Practice for Testing Well Cements” and API “RP 10B-4 Recommended Practice on Preparation and Testing of Foamed Cement Slurries at Atmospheric Pressure”;</li> <li>• Test data showing competency of a proposed cement mixture to meet the requirements of the current API “API RP 10 B 2 Recommended Practice for Testing Well cements” must be submitted to the designated agency (PASA) for approval prior to the cementing operation;</li> </ul> |                           |                                |



| Activities | Phase | Size and Scale of Disturbance | Mitigation Measures  | Compliance with Standards | Time Period for Implementation |
|------------|-------|-------------------------------|--|---------------------------|--------------------------------|
|            |       |                               | <ul style="list-style-type: none"> <li>• The Applicant/ drilling contractor must perform cement compressive strength tests on casing strings and if it does not conform to standards it must be redone;</li> <li>• After the cement is placed behind the casing, the Applicant/ drilling contractor must wait for the cement to set until the cement achieves a calculated compressive strength of at least 500psi (3447.38 kPa) before the casing is disturbed in any way, including installation of a blow-out preventer;</li> <li>• The cement must have a compressive strength of at least 1,200 psi (8273.71 kPa), and the free water separation must be no more than 6 millilitres per 250 millilitres of cement, tested in accordance with the current API TR 10TR3;</li> <li>• The Applicant/ drilling contractor must, in co operation with specialist contractors, prepare suitable programmes for cement placement operations, including monitoring of the effectiveness of placement as part of the operations planning, contingency plans and procedures to cover the possibility of a failure to meet the cementation design objectives;</li> <li>• A holder must run a radial cement bond evaluation log and monitor the annular pressure to verify the cement bond on all casing strings and must carry out remedial cementing if the cement bond is not adequate for drilling ahead;</li> <li>• A copy of the cement job log for a cemented casing string in the well must be maintained in the well file and be submitted to the designated agency (PASA);</li> </ul> <p><u>Casing string tests</u></p> <ul style="list-style-type: none"> <li>• After the setting and cementing of a casing string, except the conductor casing, and prior to further drilling, the casing string must be tested with fresh water, mud, or brine to at least the maximum anticipated treatment pressure but no less than 0.22 psi per foot (1.512 kPa per 0.3048 meter) of casing string length or 1,500 psi (10 342.12 kPa), whichever is greater, for at least 30 minutes with less than a 5% pressure loss;</li> <li>• The pressure test must not exceed 70% of the minimum internal yield and if the pressure declines more than 5%, or if there are other indications of a leak, corrective action must be taken before conducting further drilling operations;</li> </ul> |                           |                                |



| Activities | Phase | Size and Scale of Disturbance | Mitigation Measures  | Compliance with Standards | Time Period for Implementation |
|------------|-------|-------------------------------|--|---------------------------|--------------------------------|
|            |       |                               | <ul style="list-style-type: none"> <li>• The Applicant/ drilling contractor must notify the designated agency at least 2 days prior to conducting a pressure test to enable an authorised person to be present when the test is done;</li> </ul> <p><u>Formation Pressure Test Integrity</u></p> <ul style="list-style-type: none"> <li>• After a successful casing string test, the drilling contractor must conduct a formation pressure integrity test below the surface casing and below all intermediate casing;</li> <li>• The Applicant/ drilling contractor must notify the designated agency (PASA), at least 2 days prior to conducting a formation pressure integrity test, to enable an authorised person to be present when the test is done;</li> </ul> <p><u>Blowout Prevention</u></p> <ul style="list-style-type: none"> <li>• Blowout prevention equipment must be installed that meets the current API Std 53 for blowout equipment after setting the casing to shut-off a wellhead which must be supported and secured to prevent stresses on all connections;</li> <li>• The Applicant/ drilling contractor may be exempted from installing blowout prevention equipment only if written approval from the designated agency (PASA) is obtained. Furthermore, it would need to be shown that the conditions under which the drilling operations are being conducted do not require the installation of blowout preventer equipment. The Applicant would need to provide reliably operating well control equipment it intends to install in order to control kicks, prevent blowouts and to safely carry out all well operations;</li> <li>• Lines, valves and fittings between the blowout preventer and the remote actuator must be flame resistant and must have a working pressure rating higher than the maximum anticipated well heads surface pressure;</li> <li>• Blowout prevention equipment must be in good working condition at all times;</li> <li>• When blowout prevention equipment is installed, tested, or in use, a competent person must be present at the well site and that person must have a current well control certification from an accredited training programme that is acceptable to the designated agency (PASA);</li> </ul> |                           |                                |



| Activities | Phase | Size and Scale of Disturbance | Mitigation Measures   | Compliance with Standards | Time Period for Implementation |
|------------|-------|-------------------------------|---|---------------------------|--------------------------------|
|            |       |                               | <p><u>Pressure testing of blowout prevention equipment</u></p> <ul style="list-style-type: none"> <li>• The blowout prevention equipment must be tested to 100% of rated working pressure and the annular type blowout preventer must be tested to 1,000 psi (6894.76 kPa) at the time of installation in accordance with current API Std 53 for blowout equipment;</li> <li>• Testing of blowout prevention equipment for a drilling or completion operation must take place prior to drilling below the last cemented casing seat;</li> <li>• The Applicant/ drilling contractor must maintain a record of the pressure tests and submit the record to the designated agency (PASA);</li> <li>• The Applicant/ drilling contractor must notify the designated agency (PASA) at least 2 days prior to conducting a blowout preventer test to enable an authorised person to be present when the test is done;</li> <li>• Blowout prevention equipment that has failed any pressure test must not be used until it is repaired and passes the pressure test;</li> </ul> <p><u>Well Examination</u></p> <ul style="list-style-type: none"> <li>• The Applicant must submit a well examination plan to the designated agency (PASA) before commencing with drilling, which plan must include aspects not limited to the following:               <ul style="list-style-type: none"> <li>• groundwater and aquifer isolation;</li> <li>• fracture containment;</li> <li>• fracturing and flow back or testing programmes and operations; and</li> <li>• independent well examination.</li> </ul> </li> <li>• The designated agency (PASA) may, at the cost of the Applicant, appoint an independent and competent person to undertake well examination.</li> <li>• Well examination must at all times demonstrate that the pressure boundary of the well is controlled throughout the life cycle of the well.</li> <li>• Regular monitoring of fugitive emissions must be undertaken throughout the drilling activity up to the decommissioning of the wells.</li> <li>• 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.</li> </ul> |                           |                                |





| Activities                             | Phase                     | Size and Scale of Disturbance | Mitigation Measures   | Compliance with Standards | Time Period for Implementation           |
|--|---------------------------|-------------------------------|---|---------------------------|--|
| <b>6.10. Heritage and Paleontology</b> | life cycle of the project | Long term Regional            | <ul style="list-style-type: none"> <li>• <u>Should additional seismic surveys and/or drilling wells fall outside of the EA Amendment 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 &amp; 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 &amp; 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 information presented to the Interested &amp; 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;</u> <ul style="list-style-type: none"> <li>➤ Should an Interested &amp; 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 &amp; Affected Party to the sacred site for confirmation purposes;</li> <li>➤ 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;</li> <li>➤ 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;</li> <li>➤ 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 &amp; Affected Parties from the outset;</li> </ul> </li> </ul> | NEMA<br>NHRA              | Throughout the life cycle of the project |



| Activities | Phase | Size and Scale of Disturbance | Mitigation Measures   | Compliance with Standards | Time Period for Implementation |
|------------|-------|-------------------------------|---|---------------------------|--------------------------------|
|            |       |                               | <ul style="list-style-type: none"> <li>• No exploration drilling may be allowed within 500 m of a confirmed Sacred Natural Site;</li> <li>• A buffer area of 200 m wide surrounding the cemetery at HEN 1 and HEN 3 must be kept clear of any exploration footprints, whether it be drilling positions, access roads etc.;</li> <li>• A buffer area of 100 m wide surrounding the farmstead at HEN 2 must be kept clear of any exploration footprints, whether it be drilling positions, access roads etc.;</li> <li>• 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;</li> <li>• As soon as any additional exploration footprints are confirmed, a suitably qualified heritage specialist, with expertise in archaeology, must be appointed. Such additional exploration footprints would include all aspects relating to the exploration work;</li> <li>• The appointed heritage specialist will be responsible for undertaking heritage walkthroughs of the additional exploration footprint areas to identify any heritage sites located there;</li> <li>• The appointed heritage specialist will be responsible for compiling a report containing the findings of the heritage walkthroughs, assessing the heritage significance of 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;</li> <li>• The report would be a subsequent heritage impact assessment aimed specifically at the additional exploration footprints, and must be submitted to SAHRA as well;</li> <li>• No exploration footprints are allowed within a distance of 500 m from the boundaries of the Stone Rampart and Voortrekker Graves at Ventersburg;</li> <li>• Once the drilling sites are final, the applicant should invite a professional palaeontologist to monitor drilling samples for subsurface fossil remains that may be intersected by the drilling process;</li> </ul> |                           |                                |



| Activities                          | Phase                      | Size and Scale of Disturbance | Mitigation Measures  | Compliance with Standards | Time Period for Implementation        |
|-------------------------------------|----------------------------|-------------------------------|--|---------------------------|---------------------------------------|
|                                     |                            |                               | <ul style="list-style-type: none"> <li>• The palaeontologist must apply for a valid permit from SAHRA for the collection / removal of fossils if any fossils are identified;</li> <li>• An independent and suitably qualified ECO must be appointed and must train the Contractor to recognise potential heritage features;</li> <li>• An independent and suitably qualified ECO must be appointed and must train the Contractor to recognise potential heritage and / palaeontological features;</li> <li>• 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</li> <li>• 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.</li> </ul> |                           |                                       |
| <b>6.11. Refueling</b>              | Construction and Operation | Short term and localized      | <ul style="list-style-type: none"> <li>• 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;</li> <li>• 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.</li> </ul>  | NWA<br>DWAF BPG           | Throughout construction and operation |
| <b>6.12. Maintenance and Repair</b> | Construction and Operation | Short term and Localized      | <ul style="list-style-type: none"> <li>• 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;</li> <li>• 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.</li> </ul>   |                           | Throughout Construction and Operation |



| Activities                                     | Phase                                       | Size and Scale of Disturbance | Mitigation Measures   | Compliance with Standards                       | Time Period for Implementation |
|--|---|-------------------------------|---|---|--------------------------------|
| <b>6.13. Well Plugging</b>                     | Decommissioning                             | Short term and localized      | <ul style="list-style-type: none"> <li>• 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;</li> <li>• 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;</li> <li>• All pouring of cement or grouting should be completed over a temporary impermeable layer to avoid spillage;</li> <li>• Cleaning of the chute of the cement truck, if applicable, should be done over a temporary impermeable layer; and</li> <li>• Prior to well suspension and decommissioning, the required approvals from the designated agency must be obtained;</li> <li>• A decommissioning plan must be prepared and approved by the designated agency;</li> <li>• 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"> <li>• Concrete shall not be mixed directly on the ground;</li> <li>• 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</li> <li>• All excess aggregate shall also be removed.</li> </ul> </li> </ul> | NWA<br>DWAF BPG                                 | Throughout Decommissioning     |
| <b>6.14. Removal of surface infrastructure</b> | Decommissioning                             | Small scale and localized     | <ul style="list-style-type: none"> <li>• All infrastructure, equipment, and other items used during exploration will be removed from the site.</li> <li>• 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</li> </ul>  | MPRDA<br>In accordance with Rehabilitation Plan | Decommissioning                |
| <b>6.15. Removal of waste</b>                  | Construction, Operation and Decommissioning | Small scale and localized     | <ul style="list-style-type: none"> <li>• 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.</li> </ul>   | NWA<br>DWAF BPG                                 | Decommissioning                |



| Activities                  | Phase            | Size and Scale of Disturbance | Mitigation Measures   | Compliance with Standards  | Time Period for Implementation |
|-----------------------------|------------------|-------------------------------|---|--|--------------------------------|
|                             |                  |                               | <p>A signed copy of service agreement shall be submitted to DWS to demonstrate that indeed provision will be made to render such services;</p> <ul style="list-style-type: none"> <li>• No empty containers, drums, liner, concrete, foreign sand and stone, scrap materials or any such will remain on site; and</li> <li>• No foreign matter such as rubble or waste material shall be introduced into the hole.</li> </ul>   |  |                                |
| <b>6.16. Rehabilitation</b> | Rehabilitation   | All disturbed areas           | <ul style="list-style-type: none"> <li>• <b>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;</b></li> <li>• All debris and contaminated soils must be removed and suitably disposed of;</li> <li>• Contours and natural surrounding must be reformed.</li> <li>• All equipment, fencing and other infrastructure will be removed from site;</li> <li>• Natural drainage patterns must be restored;</li> <li>• 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;</li> <li>• During and after rehabilitation ensure that all water ways or areas where storm water naturally flowed are open and free of any impediment;</li> <li>• All surface infrastructure on site must be removed;</li> <li>• Temporary access routes/roads must be suitably rehabilitated; and</li> <li>• 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.</li> </ul> | <p>MPRDA</p> <p>In accordance with the Rehabilitation Plan</p>         | Rehabilitation                 |
| <b>6.17. Monitoring</b>     | Post-operational | All rehabilitated areas       | <ul style="list-style-type: none"> <li>• 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:</li> <li>• Biodiversity monitoring;</li> <li>• Ground and surface water (including water sample analysis);</li> </ul>  | <p>MPRDA Regulations</p> <p>In accordance with Rehabilitation plan</p> | Post-operation                 |



| Activities | Phase | Size and Scale of Disturbance | Mitigation Measures  | Compliance with Standards | Time Period for Implementation |
|------------|-------|-------------------------------|--|---------------------------|--------------------------------|
|            |       |                               | <ul style="list-style-type: none"> <li>• Re-vegetation of disturbed areas where required; and</li> <li>• Wetlands.</li> <li>• 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.</li> </ul> |                           |                                |

## 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 7: 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"> <li>• Loss or destruction of natural habitats;</li> <li>• Pollution of habitats;</li> <li>• Affect drainage;</li> <li>• Loss of fauna/flora species;</li> </ul>  | Topography;<br>Soil;<br>Air Quality;<br>Surface Water;<br>Groundwater;<br>Transportation   | Construction | Control through implementation of EMPr mitigation measures | NEMA<br>NEMBA<br>CARA<br>Threatened or Protected Species (TOPS) regulations<br>NEMAQA<br>Dust regulations<br>NWA<br>DWAF best Practice Guidelines          |
| Establishment of base camps and access | <ul style="list-style-type: none"> <li>• Loss or destruction of natural habitats;</li> <li>• Pollution of habitats;</li> <li>• Increased surface water runoff;</li> <li>• Affect drainage;</li> <li>• Loss of fauna/flora species;</li> <li>• Sedimentation;</li> <li>• Dust generation;</li> <li>• Influx of people; and</li> <li>• New access roads.</li> </ul> | Topography;<br>Landform;<br>Soil disturbance;<br>Fauna and Flora;<br>Air Quality;<br>Surface Water;<br>Groundwater;<br>Socio-economics | Construction | Control through implementation of EMPr mitigation measures | NEMA<br>MPRDA<br>NEMBA<br>CARA<br>Threatened or Protected Species (TOPS) regulations<br>NEMAQA<br>Dust regulations<br>NWA<br>DWAF best Practice Guidelines |



| Activity                               | Potential Impact  | Aspects Affected   | Phase                     | Mitigation Type  | Standard to be Achieved   |
|--|---|--|---------------------------|--|---|
| Storage of construction vehicles       | <ul style="list-style-type: none"> <li>• Pollution of surface and groundwater resources from potential hydrocarbon spills; and</li> <li>• Compaction of soils</li> </ul>  | Surface water;<br>Groundwater;<br>Soils.   | Construction<br>Operation | Control through implementation of EMPr mitigation measures | NWA<br>DWAf best Practice Guidelines  |
| Transportation to and from drill sites | <ul style="list-style-type: none"> <li>• Soil compaction;</li> <li>• Disturbance and Loss of fauna and flora;</li> <li>• Wearing and tearing of existing roads; and</li> <li>• Dust generation from increased traffic.</li> </ul>   | Soil disturbance;<br>Fauna and Flora;<br>Air quality.  | Construction<br>Operation | Control through implementation of EMPr mitigation measures | NEMA<br>NEMBA<br>CARA<br>Threatened or Protected Species (TOPS) regulations<br>NEMAQA<br>Dust regulations<br>Road Traffic Act                       |
| Storage of hazardous substances        | Potential hydrocarbon spills that could pollute surface and groundwater resources.  | Surface water;<br>Groundwater.   | Construction<br>Operation | Control through implementation of EMPr mitigation measures | NWA<br>DWAf best Practice Guidelines  |
| Waste Management                       | Pollution of habitats and surrounding areas.  | Pollution  | Construction<br>Operation | Control through implementation of EMPr mitigation measures | DWAf minimum requirement for waste disposal   |
| Well Drilling                          | <ul style="list-style-type: none"> <li>• Vegetation clearance</li> <li>• Removal of topsoil;</li> <li>• Changes in drainage and surface hydrology;</li> <li>• Drainage and soil contamination;</li> <li>• Land use conflict;</li> <li>• Dust generation;</li> <li>• Disturbance of wildlife and communities in close vicinity;</li> <li>• New access roads;</li> <li>• Increased transportation;</li> <li>• Damage to local infrastructure;</li> <li>• Damage to heritage resources;</li> <li>• Influx of people;</li> <li>• Waste water discharge;</li> <li>• Spillage and leaks of hydrocarbons;</li> </ul> | Air Quality;<br>Noise;<br>Heritage;<br>Ecology;<br>Social;<br>Surface water;<br>Groundwater. | Operation                 | Control through implementation of EMPr mitigation measures | SANS10103<br>ECA Noise Regulations<br>NEMA<br>MPRDA<br>NEMBA<br>NEMWA<br>NEMAQA<br>Dust regulations<br>NWA<br>NHRA<br>DWAf best Practice Guidelines |



| Activity                          | Potential Impact  | Aspects Affected  | Phase                      | Mitigation Type  | Standard to be Achieved                         |
|-----------------------------------|---|---|----------------------------|--|---|
|                                   | <ul style="list-style-type: none"> <li>• Pollution or interplay between groundwater aquifers;</li> <li>• Waste disposal; and</li> <li>• Discharge from well test operations.</li> </ul>   |   |                            |  |   |
| Refueling                         | <ul style="list-style-type: none"> <li>• Potential hydrocarbon spills that could pollute soil or surface and/or groundwater resources.</li> </ul>   | Pollution;<br>Surface water;<br>Groundwater   | Construction<br>Operation  | Control through implementation of EMPr mitigation measures | NWA<br>DWAF best Practice Guidelines            |
| Maintenance and Repair            | <ul style="list-style-type: none"> <li>• Potential hydrocarbon spills that could pollute surface and groundwater resources.</li> </ul>  | Pollution;<br>Surface water;<br>Groundwater.  | Construction and<br>Repair | Control through implementation of EMPr mitigation measures | NWA   |
| Well plugging                     | <ul style="list-style-type: none"> <li>• Pollution of groundwater resources;</li> <li>• Potential pollution of habitats with cement residue that may be exposed to runoff etc.</li> </ul>   | Pollution;<br>Groundwater.  | Decommissioning            | Control through implementation of EMPr mitigation measures | NWA<br>DWAF best Practice Guidelines            |
| Removal of surface infrastructure | <ul style="list-style-type: none"> <li>• Soil compaction;</li> <li>• Pollution of habitats.</li> </ul>  | Landform;<br>Topography;<br>Soils.  | Decommissioning            | Control through implementation of EMPr mitigation measures | MPRDA<br>In accordance with Rehabilitation plan |
| Rehabilitation                    | <ul style="list-style-type: none"> <li>• Soil compaction;</li> <li>• Soil and Water contamination;</li> <li>• Erosion;</li> <li>• Change is drainage and surface hydrology;</li> <li>• Loss of habitat; and</li> <li>• Disturbance to wildlife and communities in close vicinity.</li> </ul>  | Topography<br>Land use<br>Soil disturbance<br>Ecology<br>Surface water<br>Groundwater | Rehabilitation             | Control through implementation of rehabilitation actions   | MPRDA<br>In accordance with Rehabilitation plan |
| Monitoring of rehabilitated sites | <ul style="list-style-type: none"> <li>• Soil compaction;</li> <li>• Soil and Water contamination;</li> <li>• Erosion;</li> <li>• Change is drainage and surface hydrology;</li> <li>• Loss of habitat; and</li> <li>• Disturbance to wildlife; and communities in close vicinity.</li> </ul> | Topography<br>Land use<br>Soil disturbance<br>Ecology<br>Surface water<br>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).

**A detailed Final Rehabilitation, Decommissioning and Closure Plan was submitted and approved as part of the EIA Application. The approved Rehabilitation, Decommissioning and Closure Plan has been adopted for this revised EMPr. However, the original financial provision submitted as part EMPr Revision 1 must be updated prior commencement of the additional exploration activities associated with EA Amendment.**

## 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 reseeding 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 Motuoane Hennenman Exploration 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 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.

## 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 8 provides an indication of typical procedures that would be followed in abandoning a well.

Table 8: 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.   |
| <b>For Perforated Intervals:</b>  |
| 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 COMPLAINT 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 management the risk outcomes. The monitoring requirements necessary during the exploration project is defined in the **Table 9** below.

Table 9: Monitoring requirements during the exploration project.

| Source Activity        | Impacts Requiring Monitoring Programme   | 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<br>EWT Walkdown and Mitigation Measures for the two northern wells (Wildskamp 5 and Nooitgedacht M2) | Site inspections and Reports                             | Environmental Site Officer<br>Environmental Specialist<br>Independent Environmental Auditor | Monthly Site Visits and Reports  |
|                        |  | Report review and development of actions plans           | Senior Environmental Management   | Monthly Reports<br>Annual Performance Assessment                       |
| Exploration Activities | Groundwater<br>Surface water<br>Alien vegetation management  | Site inspections, checklists and reporting               | Environmental Site Officer<br>Environmental Specialist<br>Independent Environmental Auditor | Monthly Site Visits and Reports  |
|                        | Noise (if any complaints are registered by residents)<br>Air quality (if complaints are registered)                              | Report review and development of corrective action plans | Environmental representatives<br>Surface water specialist                                   | Monthly Site Visits and Reports  |



|                                 |  |  |   |  |
|---------------------------------|--|--|---|--|
|                                 |  | Site inspections and audits                              | Environmental Site Officer<br>Environmental Specialist<br>Independent Environmental Auditor | Monthly Reports<br>Annual Performance Assessment |
| Decommission and Rehabilitation | Groundwater<br>Surface water<br>Alien vegetation management<br>Noise (if any complaints are registered by residents)<br>Air quality (if complaints are registered) | Site inspections, checklists and reporting               | Environmental Site Officer<br>Environmental Specialist<br>Independent Environmental Auditor | Monthly Site Visits and Reports                  |
|                                 |  | Report review and development of corrective action plans | Environmental representatives<br>Surface water specialist                                   | Monthly Site Visits and Reports                  |
|                                 |  | Site inspections and audits                              | Environmental Site Officer<br>Environmental Specialist<br>Independent Environmental Auditor | Monthly Reports<br>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 9** 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 10** below:



Table 10: Summary of the Roles and Responsibilities.

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



| Role                                  | Responsibility  | Report to  |
|---------------------------------------|---|--|
|                                       | <ul style="list-style-type: none"> <li>• Record keeping of monitoring for the purpose of audits;</li> <li>• Assist Environmental Coordinator in preparation of monthly reports that shall be presented at monthly meetings and distributed to the following individuals:</li> <li>• Sub-contractors;</li> <li>• Applicant Representative;</li> <li>• Environmental Coordinator; and</li> <li>• Drilling Manager.</li> <li>• Prepare monthly compliance reports containing a brief descriptions of non-compliances with EMP specifications, responsible party, result/consequence and corrective actions taken;</li> <li>• Prepare the Rehabilitation Plan in conjunction with the Environmental Coordinator and specialist Consultants and ensure that the Rehabilitation Plan is implemented.</li> </ul> |  |
| <b>Environmental Coordinator (EC)</b> | <ul style="list-style-type: none"> <li>• 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;</li> </ul>  | <ul style="list-style-type: none"> <li>• Applicant Representative</li> </ul> |



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



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





### 13.5 TIME PERIOD FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS

The time periods for implementation of the impact management actions are provided in **Table 9** 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 Part II EA Amendment, a risk assessment has been compiled as part of Appendix F of Amendment Report and this EMPr amendment where necessary.

### 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, Motuoane would need to procure further environmental resources to ensure the successful implementation of the ESMS and EMP. 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 Motuoane Hennenman 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 Motuoane Hennenman Exploration 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. Motuoane 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

Motuoane 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 11** below.

Table 11: Description of incidents and non-conformances for the purpose of the project

|                                     |   |
|-------------------------------------|---|
| <b>Non-Conformance</b>              | 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.  |
| <b>Major Environmental Incident</b> | <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> |



|   |   |
|---|---|
| <p><b>Medium Environmental Incident</b></p> | <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> |
| <p><b>Minor Environmental Incident</b></p>  | <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 EMP. 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 EMP 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**

Motuoane 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

Motuoane 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.





### 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 advise 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 Amendment Application 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 Amendment 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 9, 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

Motuoane Hennenman 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 12** below. The monitoring programme should be amended according to on-site operations and future permit requirements.

Table 12: Proposed monitoring programme.

| Water Type                                    | Details   | Monitoring Frequency  |
|---|---|-----------------------|
| <b>Surface Water</b>                          | Sample point in the wetland area upstream and downstream of the exploration drilling areas;<br>Clean water discharge points (if any); | Monthly water samples |
| <b>Drinking Water (pipe lines, boreholes)</b> | 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 13: Applicable parameters to be monitored on a monthly basis.

| Monthly analysis                      |                             |
|---------------------------------------|-----------------------------|
| pH at 22°                             | Chloride (Cl)               |
| Conductivity (mS/m)                   | Sulphate (SO <sub>4</sub> ) |
| Total Dissolved Solids                | Nitrate (NO <sub>3</sub> )  |
| Calcium (Ca)                          | Fluoride (F)                |
| Magnesium (Mg) (mg/ℓ)                 | Aluminum (Al)               |
| Sodium (Na)                           | Manganese (Mn)              |
| Potassium (K)                         | Iron (Fe)                   |
| Total Alkalinity as CaCO <sub>3</sub> | Zinc (Zn)                   |



|                                      |   |
|--------------------------------------|---|
| <b>Bicarbonate (HCO<sub>3</sub>)</b> | <b>Total Petroleum Hydrocarbons (TPH)</b> |
| <b>Diesel Range Organics (DRO)</b>   |   |

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

Table 14: Applicable parameters to be assessed on a bi-annual basis

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

#### 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, Motuoane 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 monitoring 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 areas specific waste management programme provides assurance in terms of protection of the environment and ingoing 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 plant 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 defined, management requirements should also be addressed.

#### 5. Waste categorisation

The physical, chemical and toxicological properties of each waste types 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

16 July 2024  
DATE

## 17 TECHNICAL SUPPORTING INFORMATION

The following specialist reports have been included as Appendices to this report:

- Appendix F1 of the Amendment Report: Terrestrial Biodiversity Impact Assessment;
- Appendix F2 of the Amendment Report: Wetland Baseline and Risk Assessment;
- Appendix F3 of the Amendment Report: Heritage Impact Assessment; and
- Appendix F4 of the Amendment Report: Palaeontological Impact Assessment.

## 18 REFERENCES

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