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SCOPING REPORT FOR THE PROPOSED EXPLORATION RIGHT APPLICATION FOR PETROLEUM ON VARIOUS FARMS IN THE MAGISTERIAL DISTRICTS OF MATATIELE AND MT FLETCHER, EASTERN CAPE

March 2016

SUBMITTED FOR ENVIRONMENTAL AUTHORISTAION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998) IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY AN APPLICATION IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (ACT 28 OF 2002) (AS AMENDED)

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EXECUTIVE SUMMARY

1) Introduction

Rhino Oil and Gas Exploration South Africa (Pty) Ltd (hereafter referred to as "Rhino Oil and Gas") has lodged an application for an exploration right (ER) in terms of section 79 of the Minerals and Petroleum Resources Development Act, 2002 (MPRDA) to the Petroleum Agency South Africa (PASA).

In May 2015 PASA accepted the application titled 'Exploration Right for Petroleum on various Farms in the Magisterial District of Matatiele and Mt Fletcher, Eastern Cape' (12/3/295 ER). Minerals included in the ER application are oil, gas, condensate, coal bed methane, helium and biogenic gas.

Rhino Oil and Gas is proposing to undertake a 3-year, early-phase exploration programme for oil and gas resources. The application only includes work aimed at determining the presence of a petroleum resource and approval is not being sought for any work to determine the commercial viability of any such resource. The initial exploration work programme is restricted to various non-invasive and remote techniques, as well as the drilling of a maximum of 10 core boreholes and up to a maximum of 125 km of seismic survey lines.

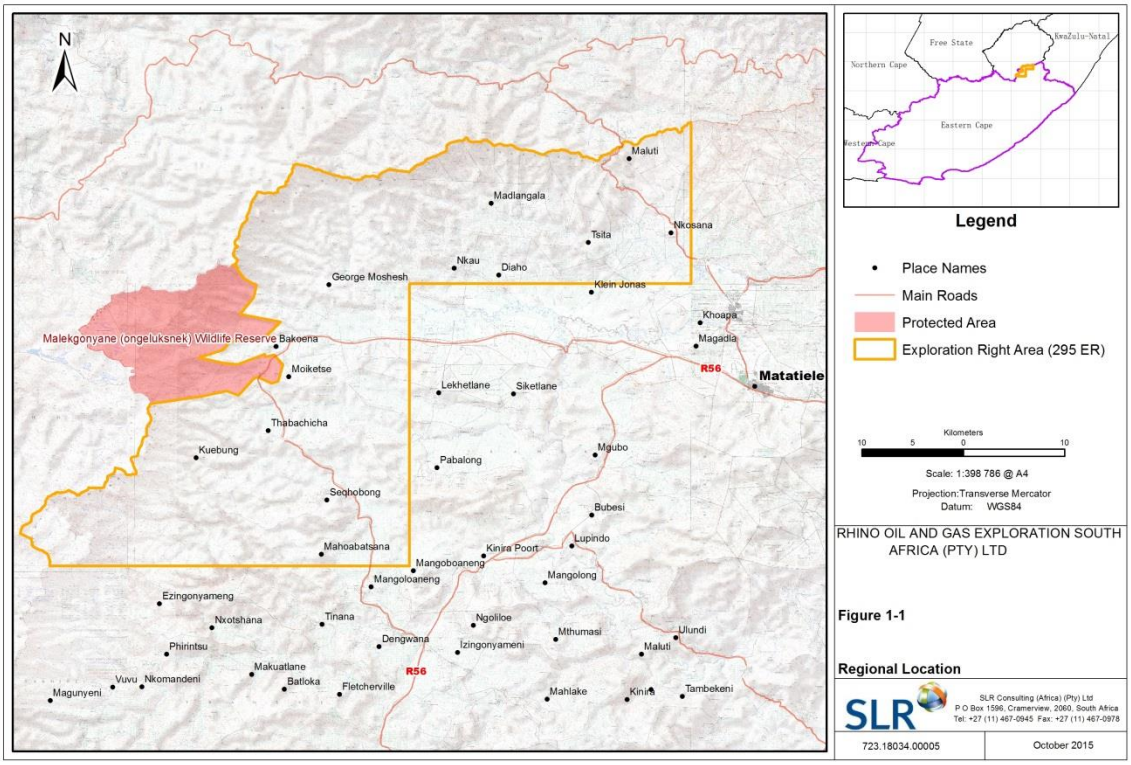
No permeability testing, pressure testing or hydraulic fracturing (commonly referred to as "fracking") is proposed as part of the current exploration work programme. If a resource were to be identified for more advanced exploration, further approvals would be required in terms of the MPRDA before these activities could be undertaken. Such approval would require environmental authorisation in terms of NEMA which would require a separate EIA process.

Rhino Oil and Gas is a South African registered subsidiary of Rhino Resources Ltd which has a number of exploration right applications under consideration by PASA. Rhino Oil and Gas had previously held a Technical Co-operation Permit (TCP) for the Eastern Cape 295 ER area. Through the current application, Rhino Oil and Gas intends to secure an exploration right. The MPRDA requires that the applicant submit the relevant environmental reports required in terms of Chapter 5 of the National Environmental Management Act, 107 of 1998 ("NEMA") as amended.

Rhino Oil and Gas appointed SLR Consulting (Pty) Ltd (hereafter referred to as "SLR") as the independent environmental assessment practitioner (EAP) responsible for undertaking the environmental assessment and conducting the public participation process. An application for environmental authorisation was submitted to PASA on the 12th of November 2015. PASA accepted the application and

confirmed that a Scoping and Environmental Impact Assessment (EIA) process is required in terms of the EIA Regulations 2014.

Within an EIA process, the purpose of the Scoping Report (this document) is to identify the potential environmental issues and impacts associated with the proposed exploration activities and to agree on the level of assessment (plan of study) for the EIA. This Scoping Report has been prepared to record the method and findings of the scoping process undertaken to date. The Scoping Report is being distributed for a 30-day review and comment period from 7 March 2016 to 11 April 2016 (including provision for 3 public holidays). Any comment on the Scoping Report should be submitted to SLR. These comments will be used to update the Scoping Report which will then be submitted to PASA for acceptance.



Regional setting of the Exploration Right Application Area

2) **Project Description**

Rhino Oil and Gas proposes to undertake early-phase exploration for oil and gas resources which may be located within suitable geological strata. The exploration right application area includes ~ 10 000 properties over an area of ~ 1 500 000 ha. A map showing the locality and setting of the application area is provided above. In broad terms the exploration right application area lies in the northern region of the Eastern Cape. It is bound by the Lesotho boundary to the west, from near Qachas Nek to approximately 20 km north of Mt. Fletcher in the south. The area lies to the west of the R56 road between Matatiele and Mt. Fletcher with the Maria-Linden Mission being just inside the boundary. In terms of Section 48 of the

MPRDA, the extent of the exploration right application area excludes all properties with protected area status under the National Environmental Management Protected Areas Act, 2003 as well as properties zoned for urban/residential use in the towns within the exploration right application area.

The proposed early-phase exploration activities do not, at this stage, extend beyond the acquisition of data to determine the existence of a resource that may or may not warrant further exploration. The primary motivation for the current application is to obtain the data required to clearly define geological structures across the exploration right application area. The results of the proposed exploration programme would serve as a basis for planning of further exploration, which would require further approval/environmental authorisation.

The 3-year exploration work programme proposed by Rhino Oil and Gas includes:

YEAR 1:	- improved mapping of subsurface structure and stratigraphy - detection of structural features and traps - enhance source rock geochemistry database
YEAR 2:	- geochemical database compilation - apatite fission track analysis - define the locations (routes) for the site activities
YEAR 2/3:	- aerial full tensor gradiometry gravity survey (maximum total survey size of 4000 square kilometers) - drill tests on identified structures
YEAR 3:	- purchase existing seismic data - 2D seismic acquisition.

Through an analysis of existing (historical) borehole and seismic data retrieved during the TCP programme, and from studying published field data, in combination with the information derived from Year 1 and 2, Rhino Oil and Gas would identify preliminary locations/routes for the proposed field activities. These include:

- a full tensor gradiometry gravity (“FTG”) survey from a light aircraft. The survey measures slight variations in the Earth's gravitational field in order to image subsurface structures;
- a maximum of 10 stratigraphy core holes, proposed across the entire area. In this a rock core would be removed, placed into sample trays and sections of interest are subject to laboratory analysis for petrologic, structural and mineralogical properties. These boreholes, and the equipment used to drill them, are of the same type and scale as used for water boreholes present on most farms and prospecting boreholes used for other minerals; and
- up to 125 km of two-dimensional (2D) survey comprising a number of separate lines to give coverage of the majority of the proposed exploration area. During a seismic survey low frequency, long wavelength acoustic waves are generated through the use of an energy source (Vibroseis truck or explosive shot). The resultant seismic waves, and the reflection of these off

different substrates, are recorded at the surface in geophones placed in a linear alignment. Analysis of the return waves provides information about rock types and possible gases or fluids in rock formations.

It is not yet possible to specify the location of or prepare site plans for the proposed field activities as these are dependent on the outcome of the prior phases of exploration, which can only be conducted once the exploration right is approved. It must be noted that the exploration work is phased with results from the early phases informing the need and planning for the later phases. Each later phase would only be undertaken if the early phase results are positive.

3) Hydraulic Fracturing or not?

Rhino Oil and Gas has stated that the ultimate goal for the overall project is to extract hydrocarbons in a commercially viable manner. However, it has indicated that there is currently insufficient information to determine if there is a resource and what techniques might be required for future hydrocarbon extraction. Prior to the early-phase exploration being concluded they are, therefore, not able to provide any information on what the future may hold with regards the extraction of hydrocarbons. In this regard early-phase exploration is a prerequisite to inform further exploration or future production.

What can be stated categorically is that further detailed exploration and future production do not form part of the current ER application. No extraction of hydrocarbons or water, no stimulation of wells or hydraulic fracturing (fracking) is proposed in the 3-year exploration work programme.

If the early-phase exploration were to confirm the presence of a potential resource, then Rhino Oil and Gas would need to seek further approval from PASA for the additional exploration work required to appraise the resource. Any further approval would be subject to an additional environmental assessment process with further public consultation. Approvals are also likely to be required in terms of other legislation.

Similarly, if the later exploration led to the discovery of a commercial resource suitable for development then Rhino Oil and Gas would need to secure a production right from PASA. Hydraulic fracturing could be one of the potential techniques for gas production. An application for a production right has to be subject to an EIA process with further public consultation. Approvals are also likely to be required in terms of other legislation.

4) **Legal Framework**

In terms of Section 79 of the MPRDA, an exploration right cannot be granted until an environmental authorisation has been issued in terms of the National Environmental Management Act, 1998. A Scoping and EIA process is required to be submitted to PASA before an informed decision scan be made on the environmental authorisation. The EIA Regulations 2014 define the requirements for the submission,

processing, consideration and decision of applications for environmental authorisation of listed activities. This Scoping report has been compiled to meet the requirements of the EIA Regulations 2014 and Appendix 2 thereto.

In accordance with the EIA Regulations 2014, all legislation and guidelines that have been considered in the preparation of the Scoping Report are documented. At this stage no additional authorisation requirements have been identified for the proposed exploration work programme.

5) Need and Desirability

Rhino Oil and Gas present its rationale for the proposed exploration in terms of various national plans and policies. They make the case that exploration success would result in long-term benefits for South Africa consisting of access to new energy sources, improved security of supply in the gas-to-liquids industry, major in-country investments in a development project and reduced dependence on the importation of hydrocarbons. Analogues to the benefits derived from the oil and gas industry in the USA are presented.

6) Alternatives Considered

Exploration for oil and gas has advanced such that high-tech, systematic and scientific methods are now used to identify rock formations likely to contain petroleum resources. This has resulted in a significant increase in the success rate of exploration and much less 'unnecessary' disturbance. Rhino Oil and Gas thus presents that the methods proposed (see table above) for this early-phase exploration are in fact the preferred alternatives. A high-level, comparative assessment of the alternatives is presented in the Scoping Report. This includes consideration of locality, types of activities, the design/layout, technology, operational aspects and the no-go alternative. Two borehole drilling (percussion and core) and two seismic survey (shot-hole and vibroseis truck) methods were investigated. It is concluded that the there is little difference, advantage or disadvantage between the alternatives that are available. As a result the early-phase exploration as presented by the applicant is its preferred alternative. It is not possible at this stage to consider locality alternatives for the field activities as the sites cannot be identified until the early phases of exploration are completed. Rhino Oil and Gas is aware that there are many potential restrictions that could prevent them from undertaking certain exploration or production activities at specific sites. It is the role of the EIA to identify all such constraints and restrict or prohibit exploration activities through documented management commitments.

The primary mitigation applied to the early-phase exploration would be to use non-invasive, remote sensing techniques as much as possible in order to refine the information on where to conduct field exploration. Where physical exploration/field activity is proposed the primary mitigation would be the appropriate siting at a locality of low sensitivity. This would be achieved through a site assessment by a suitably qualified environmental scientist. Mitigation would further be achieved by the use of the most appropriate methods to undertake exploration.

7) Public Participation Methods

Public participation is undertaken to inform landowners and other interested and affected parties (I&APs) of the proposed project, in sufficient detail, in order that may contribute meaningfully to the scoping and EIA. The process commenced consultation with landowners and I&APs. The following has been undertaken to date:

- Authority consultation to discuss the legislative requirements and the approach to the EIA;
- Identification of landowners of surveyed properties, and subsequent search for contact details;
- Social scan to identify relevant stakeholders in the area;
- Notification to landowners and stakeholders of the EIA process by means of a letter and Background Information Document (by email, fax or post), where details were known;
- Notices at multiple sites in each of the main towns within the area. The locations included municipal offices, libraries, shops and agricultural co-operatives.
- Press advertisements (on 18 September 2015) in the following papers:
    - Pondo
    - Daily Herald
- Seven meetings were undertaken as part of the scoping process which included a meeting with the local community on 29 September 2015 and a public meeting on 9 November 2015. Meetings with the ward councillors, the Elundini Local Municipality and three of the four local chiefs took place in January 2016. A meeting with the fourth remaining chief is to take place during the course of the EIA.
- A second round of Press advertisements were placed in the East Griqualand Fever on 30 October 2015 notifying readers of the project and inviting them to the public meeting.
- Further meeting are to be set our during the EIA;
- A notice in the government gazette (as set out in Section 47D(c) of NEMA).
- Significant newspaper, TV and social media coverage;
- A notice broadcast on local language community radio;
- Maintenance of a database of registered I&APs; and
- Recording of comments from I&APs.

The issues and concerns raised by I&APs and regulatory authorities during the Scoping phase to date have been compiled into a Comments and Responses table. Copies of all written comments received from I&APs are also included in Appendix 6. Public participation is an ongoing process and will continue throughout the EIA. Comments from I&APs will continue to be received and documented for the duration of the EIA process.

It is acknowledged that it has not been possible to source contact information for all landowners and occupiers, and thus certain landowners and occupiers have not been directly notified. The process to

notify landowners and occupiers is on-going and will continue during the course of the Scoping and EIA process.

8) Results of Public Consultation

Landowners and I&APs have raised many issues with regards to the exploration right application. The overriding finding of the public participation has been that the great majority of I&APs are strongly particular. It is evident that public opinion on whether the project should be approved is a resounding "no". The reasons for the public opposition are varied and in some cases are not explicitly stated or articulated in the submissions. The major themes of the public opposition are the following:

- Concern, even fear, of the future risks that might arise from production should a resource be found;
- Concern that given the money involved, if any hydrocarbon resource is found, it will not be possible to stop production regardless of what the future EIA processes may indicate in terms of risk. Thus the only way to avoid such risks is to not open the door to such projects;
- Hydrocarbon based energy is a flawed concept and countries are moving away from new hydrocarbons in favour of a renewable energy system;
- A deep mistrust of government institutions and the true motives and people behind such an application;
- Significant doubt over government's ability to enforce compliance to the legislation;
- South Africa does not understand Shale Gas risks and the necessary legislative framework to protect the environment is not in place; and
- Lack of understanding of how an exploration programme is undertaken and what is actually being authorised.

Key issues and potential impacts of the project have been identified by the EIA project team with inputs made by I&APs. These are presented, together with responses by the EIA project team, in three sections, namely:

A. Issues material to the overall application and the Scoping and EIA process;
B. Issues related to the proposed work programme and current EIA; and
C. Issues not related to the proposed work programme and current EIA.

Section A: Five key issues material to the application and the Scoping and EIA process arose during the initial consultation process in the last quarter of 2015. SLR submitted these to PASA for consideration and obtained response from PASA. The EIA is being constructed in terms of the guidance from PASA.

Issue 1: Numerous objections are being submitted, many with reasons relating to production and hydraulic fracturing. PASA Response: "*There is no mechanism under NEMA to address objections, however as part of the EIA process the EAP must consider issues raised and engage with respective parties to resolve or provide clarity on issues raised. Section 10 of the MPRDA provides for the Regional*

Mining Development and Environmental Committee to consider and advise the Minister on objections received in respect of applications."

Issue 2: I&APs have demanded that the current EIA process include an assessment of potential production (including fracking) related impacts, even though the application does not cover further exploration or production. PASA Response: "*The current EIA is aligned with the proposed exploration work programme submitted with the application for an exploration right. If the applicant wanted to pursue any activities beyond the scope of the proposed work programme then environmental authorisation for such activities would have to be obtained. This process provides for further engagement with I&APs and in-depth assessment of the associated issues."*

Issue 3: Why is the current Karoo Strategic Environmental Assessment (SEA) on Shale Gas Development not applicable to this project? PASA Response: *"The scope and terms of reference for the SEA are finalised and the assessment has commenced. Queries on the SEA should be directed to the Department of Environmental Affairs as the driver of that process."*

Issue 4: The time available in the current EIA schedule is insufficient to allow for the required public consultation for such a large application area and contentious project. *"The Agency can consider requests received in writing from the EAP or applicant to extend the timeframe provided that the requests comply with the provisions of the EIA Regulations."*

Issue 5: Why is an EIA being undertaken for exploration rights over areas where further exploration and/or production could not happen due to restrictions imposed by legislation and regulation. PASA Response: "*The EAP has the responsibility to identify environmental attributes; to assess the risks and impacts and provide appropriate mitigation measures. In doing so the EAP has the obligation to consider and apply the provisions of the relevant environmental legislation. PASA, as the regulator, has no authority to direct the EAP or applicant to stop the EIA or to remove incompatible areas. The application will be evaluated in line with the provisions of NEMA and other relevant legislation. The Agency will make recommendations that will be aligned with the relevant provisions to ensure that specified environment receives the necessary protection."*

Section B: Many hundreds of questions and comments on issues related to the proposed early-phase exploration work programme and current EIA process were submitted by numerous I&APs. The main groupings of these, as documented in the Scoping report, are listed below:

- Ecology:
  - Loss and or disturbance to vegetation and faunal habitats;
  - Disturbance to and mortality of fauna;
  - Enabling the establishment of alien and invasive species in disturbed areas;
- Groundwater:
  - Altered hydrogeological regime and groundwater availability;
  - Contamination of groundwater resources;
  - Water consumption;
- Surface water:
  - Altered surface water hydrological regime;
  - Contamination of surface water resources;
  - Water consumption;
- Geology:
  - Damage to and destabilisation of certain geologies;
- Soils:
  - Physical impact on soils (increased erosion / compaction);
  - Contamination of soils;
- Heritage:
  - Loss and or damage to heritage resources;
- Socio-economic:
  - Impact on land tenure and access to private property;
  - Impact on current land use;
  - Structural damage to infrastructure, from vibrations and or site activities;
  - Increased noise levels;
  - Reduced air quality due to dust and or gaseous emissions;
  - Public safety;
  - Landowner security;
  - Veld fires;
  - Contribution to the local economy;
  - Compensation to landowners;
- General:
  - Rehabilitation and liability;
  - Concern with adequacy of the public participation method; and
  - Detailed baseline description;

Section C: These issues and concerns are documented, but will not be responded to as they are made in regard to further exploration work or future production activities which have not been proposed by Rhino Oil and Gas for this application. Rhino Oil and Gas and the authority (PASA) are advised to give due consideration to these concerns as much of the current public opposition to oil and gas development is based on these.

> Assessment of Risk from further exploration and / or future production activities; and
> Objections to this application on the grounds of future risk.

9) Baseline Environment

The status of the baseline environment is described in the Scoping Report. As the application area is vast and specific sites have not yet been identified for field activities, this assessment aimed to identify the general environmental sensitivities across the exploration area. This has involved a desktop study and draws extensively on information contained in studies that have been conducted by various government departments and non-government environmental organisations responsible for the area covered by the exploration right application. More detailed information will be provided in the EIA report once the specialist reports and other research has been concluded. Key aspects to note are:

- The area is extensively farmed by a mixture of commercial enterprises and subsistence entrepreneurs;
- The area includes headwaters, rivers and dams which comprise catchments of key importance for agriculture, industry and human consumption;
- Many agricultural practices (and residents on these farms) rely on groundwater;
- Both surface and groundwater are considered critical resources;
- The region is highly biodiverse with many areas identified, through different mechanisms, as having conservation value.
- Agriculture and eco-tourism are the drivers of the local economy; and
- A number of NGOs and civil society groups work to protect the various environmental resources.

10) Anticipated Issues and Impacts

A scoping-level identification of environmental impacts (physical, biological, social and economic) associated with the proposed early-phase exploration has been undertaken. A number of negative impacts on the bio-physical environment could potentially result from the proposed exploration activities. Impacts that may result and which will be assessed during the EIA phase are summarised below.

10.1) Physical Impacts

Effect on Geology

There is a remote risk that vibrations generated during core hole drilling or seismic survey could destabilise certain geologies and pose risks to faults, underground caverns or mine workings. The

potential impact on the geology and the issue related to faults and seismic sensitivity will be investigated and assessed in the EIA. Complete details of the seismic outputs will be sourced from service providers. The investigation will draw on literature from local and international experience of similar seismic survey methods. If necessary a vibration specialist and or seismologist will be consulted.

Effect on Soil

The physical disturbance of soils may increase the risk of erosion (by wind and water), while vehicles and machinery travelling over such surfaces could compact soils. Seismic vibrations could alter soil structure. These impacts may collectively affect the surface hydrology, damage soil structure, decrease infiltration rates and water retention capacity, and retard the regeneration of vegetation or soil productivity. Leaks and spills of potential pollutants (e.g. fuel and lubricants) may potentially contaminate the soil. The potential impact on soils will be investigated and assessed in the EIA, with input from a specialist (see Section 7.5.4 for the terms of reference). The goal will be to provide an understanding of the regional soil types and their specific properties. The effects of the proposed seismic surveys on soil properties will be researched from local and international literature on seismic surveys. If necessary a vibration specialist and or seismologist will be consulted.

Effect on Water Resources

Altered hydrogeological regime and groundwater availability

Changes to the quality or quantity of groundwater in near surface aquifers as a result of the proposed exploration activities may affect adjacent users who rely on groundwater for domestic and agricultural use. Shot hole preparation and core hole drilling might result in some interaction with groundwater that could impact groundwater availability and quality. The impact on groundwater will be assessed based on the findings of the specialist groundwater assessment (see Section 7.5.27.5.4 for the terms of reference). The aim will be to identify key features of the groundwater resource and to define which regions may be incompatible with the proposed exploration activities related to the groundwater resources.

Altered surface water hydrological regime

The region comprises the headwaters of a number of very important river systems which supply large quantities of water for human consumption, agricultural and industrial use. Potential changes to the hydrological regime could have secondary impacts on water users and the terrestrial and aquatic environment. The impact on surface water will be investigated by SLR and assessed in the EIA. The aim will be to identify surface water features within the application area and to understand the risks posed by the exploration activities. The outcome will be to define which water resources and uses may be incompatible with the proposed exploration. Sites that are incompatible with the proposed exploration activities will be identified.

Contamination of surface and groundwater resources

Contamination of surface or groundwater could occur as a result of the use of drilling fluid use and accidental spillages of pollutants. Any users of the water could be impacted. The impact will be assessed based on the findings of surface water investigations by SLR and the specialist groundwater assessment (see section 7.5.2 for the terms of reference). The aim will be to identify features of the resource that may be sensitive to contamination and which should be avoided. In addition, the outcome will be to define rules and methods that should be applied during physical exploration.

Water consumption

Water would be required for the drilling operations. This could impact water availability to the environment and other user. In some catchments in the region the water resource is fully allocated. The impact relating to the consumption of water will be assessed based on the findings of the surface water investigations and specialist groundwater assessment (see section 7.5.2 for the terms of reference).

Effect on Infrastructure

Vibrations

Air blasts (airborne shock waves), air overpressure and ground vibration generated by during seismic surveys may cause structural damage to infrastructure (buildings, boreholes) or affect the stability thereof. The potential impacts of the energy generated during a seismic survey will be investigated and assessed in the EIA. The risks from vibrations will be researched from local and international literature and considered with input from a specialist (see Section 7.5.5 for the terms of reference). The outcome will be to define the acceptable stand-off/buffer distances.

Physical damage

Exploration activities could result in damage (accidental or deliberate) to infrastructure such as fences, gates, culverts, pipes and roads. This impact will be investigated and assessed in the EIA. The outcome will be to determine rules and methods that should be applied during physical exploration and to detail how compensation would be managed.

10.2) BIOLOGICAL IMPACTS

Effects on Vegetation

Vegetation would be cleared or disturbed as a result of the proposed exploration activities, including creation of tracks and establishment of work platforms. Vegetation disturbance could also promote the establishment of alien invasive plant species. The impact on vegetation will be assessed based on the findings of the specialist biodiversity assessment (see Section 7.5.1 for the terms of reference). The aim will be to identify the different vegetation features, particularly those of high sensitivity. The outcome will be to define which vegetation units may be incompatible with the proposed exploration techniques and to determine exclusion criteria.

Effect on Fauna

Loss of or disturbance to faunal habitats

An indirect impact related to the clearance or disturbance of vegetation (above) is the loss or disturbance of habitats of faunal significance. Some natural habitats within the region hosts a wide variety of faunal species including some of conservation importance. The loss of habitat could affect conservation targets as well as fauna. This impact will be assessed based on the findings of the biodiversity assessment (see Section 7.5.1 for the terms of reference). The aim will be to identify habitats within the application area and to understand the extent and status of these. The outcome will be to define which habitats may be incompatible with the proposed exploration techniques and to determine exclusion criteria.

Disturbance to and mortality of fauna

Animals in the vicinity of the proposed exploration activities may be affected by increased human presence/activity, and noise and vibration generated by vehicles, drill rigs and the use of explosives. In addition to the general disturbance of fauna, those species that cannot effectively vacate the area by themselves may suffer direct mortality due to increased traffic on-site or site clearing. The impact on terrestrial fauna will be assessed based on the findings of the specialist biodiversity assessment (see Section 7.5.1 for the terms of reference). The aim will be to determine which species, particularly those of conservation concern, would be sensitive to the impacts of the exploration activities. The outcome will be to define which species may not tolerate disturbances and to determine the preferred habitats/sites for these species.

10.3) Socio-Economic Impacts

Heritage

The proposed exploration activities could result in the loss of or damage to heritage resources (including archaeological, palaeontology and cultural heritage sites). The impact on heritage resources will be assessed based on the findings of a specialist heritage assessment. The full terms of reference for the heritage assessment are presented in Section 7.5.3.

Effect on existing land uses

Exploration activities would occupy land area, which could have an impact on current land uses by precluding such uses for the duration of each activity. Potential impacts include:

- Prevention or disruption of current land use activities;
- Disturbance to crops, plantations and livestock/game;
- Potential change in land use value and loss of productivity; and
- Related loss of income.

Although the proposed exploration activities, which would be localised and of short duration and they are not expected to have a significant effect on any existing land uses and users. The potential impacts will be investigated and assessed in the next phase of the EIA. The inputs of a specialist on land uses most

at risk will be obtained (see Section 7.5.4for the terms of reference). The outcome will be to identify specific land uses that may not be compatible with exploration. The mechanisms for Access Agreements and management of compensation will be detailed.

Effect on ambient noise levels

Exploration activities could increase noise levels, which may disturb or be a nuisance to landowners or adjacent residents. The region generally has low ambient noise levels and exploration activity could change this, albeit for short durations. This impact will be further investigated and assessed in the EIA. The noise risks to receptors will be considered with input from a specialist (see Section 7.5.5 for the terms of reference).

Effect on air quality

Ambient air quality may be affected by:

- Dust fallout from the movement of vehicles (elevated particulate matter levels);
- Emissions generated by combustion-driven equipment and vehicles; and
- The release of gas from stratigraphic core holes.

This impact will be further investigated and assessed in the next phase of the EIA. The risks to air quality will be considered with input from a specialist (see Section 7.5.6 for the terms of reference). The aim will be to provide an understanding of emissions that could be generated during exploration and to relate these to potential sensitive receptors. This will be undertaken using local and international literature. If the assessment concludes that significant emissions are likely then consideration will be given to investigate air quality related health risks.

Safety, security and fires

Public / landowner safety and security could be compromised or impacted by the following:

- Potentially dangerous activities at exploration sites;
- Increased crime in the vicinity of the proposed exploration activities; and
- Accidental veld fires.

The impacts on safety and security will be further investigated and assessed in the EIA. The aim will be to provide an improved understanding of those activities that could compromise pubic and landowner safety and security, and to determine management criteria that should be applied during the proposed onsite exploration activities to separate receptors from the risk.

Effect on local economy due to job creation and direct revenues

Contribution to the local economy could occur through the creation of direct employment opportunities and generation of indirect revenues as a result of support services and supplies. Alternatively, if exploration detracts from or compromises the main attractions of the region then it could result in a

reduction in external inputs to the local economy. The impact on the local economy will be further investigated and assessed in the EIA. An economic specialist may be consulted for input.

Financial implications to land owners

Exploration activities could impact the use of land or resources and thereby affect farmer's income. Furthermore, they could result in damages that may cause a loss of income or which require rehabilitation in order to prevent long term environmental degradation. The impacts on natural resources (vegetation, groundwater and surface water are discussed in preceding sections). The potential for loss of income by agricultural users will be considered in the EIA. The requirements and methods for compensation for access and loss of income will be further investigated and assessed in the next phase of the EIA. The quantum of the necessary financial provision for rehabilitation, closure and on-going post decommissioning management of negative environmental impacts will be assessed in terms of the Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, (GN R 1147).

10.4) Local Limitations to Exploration

Regulatory restrictions

There are numerous instances where legislation, regulation, guidelines and best practice prohibit (or recommend against) particular activities from taking place. Such constraints could be widely applicable over much of the region and may be specifically applicable to certain exploration and production activities. The EIA will investigate the relevant constraints which would influence the area where the early-phase exploration could take place. These constraints would be documented and a set of criteria produced to delineate all of the areas where the proposed exploration would not be allowed or not be appropriate.

Lack of available water

Some of the catchments for which exploration is being applied are effectively closed with regard the allocation of water to users. There would thus be no water available for exploration activities that require water in terms of such restrictions. Rhino Oil and Gas would need to be aware of such constraints for their planning as the lack of water could influence where exploration activities are undertaken.

Public opposition

As a result of the strong public opposition in KZN to gas exploration, Rhino Oil and Gas appears unlikely to receive a social 'licence to operate'. Rhino Oil and Gas must be aware that the undertaking of activities for the project could well be hampered by public opposition (e.g. including negative publicity, public protests, refusal to provide services, vandalism and damage to property). Many landowners consulted during the EIA process have indicated that they would deny Rhino Oil and Gas access to their properties. Rhino Oil and Gas must be aware that in spite of holding an exploration right (if granted), without access

to the land it may not possible to explore in terms of their right. Significant negotiation and possible legal action in light of the Sections 54 and 55 of the MPRDA may result.

11) Plan of Study for EIA

The EIA process and reporting thereon will comply with Appendices 3 and 4 of the EIA Regulations 2014. A summary of proposed EIA process and public consultation activities that will be undertaken during the EIA is provided below.

Phase	EAP activity	Opportunities for Consultation and Participation		SCHEDULE
		Competent Authorities	I&APs, State Departments and Organs of State	
Scoping	Submit Final Scoping Report to authority by 20 April 2016	Authority to accept scoping report OR Refuse environmental authorisation (43 days of receipt)	I&APs to comment on SR	Nov 2015 to May 2016
Specialist Assessments and Input	EAP to manage specialist activities and receive inputs for EIA.		Ongoing land owner identification. Ongoing consultation, particularly with key stakeholders and Traditional Authorities	April to August 2016
EIA Phase	Assess environmental impacts and identify management measures. Compile draft EIA and EMP report			April to August 2016
	Submit draft EIA report to I&APs authorities.	Review of draft EIA and EMP report (30 days). Comments to EAP	Review of EIA and EMP report (30 days). Comments to EAP	August/ September 2016
	Arrange meetings and consultations	Meetings with authorities during EIA if required.	Public Feedback Meeting. Focused consultation with I&APs or commenting authorities if required.	
	Address public comment and finalise EIA and EMPr reports			September 2016
Authority review and Authorisation Phase	Final EIA report to Authority (106 days from acceptance of scoping report).	Authority Acknowledge Receipt of EIA report (10 days).		September 2016
		Environmental Authorisation Granted / Refused (107 days).	Notifications to I&APs regarding environmental authorisation (granted or refused).	December 2016
Appeal Phase	EAP to provide guidance regarding the appeal process as and when required.	Consultation during processing of appeal if relevant.	Submit appeal in terms of National Appeal Regulations	variable

The project scope to be considered and assessed in the EIA is the 3-year exploration work programme as proposed by the applicant. No further alternatives, other than the no-go, are to be considered.

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the proposed project. The process involves consideration of, *inter alia*: the purpose and need for the project; views and concerns of interested and affected parties; social and political norms, and general public interest. SLR will identify potential impacts against relevant environmental aspects (i.e. land use, biodiversity, etc.) and describe these in terms of the nature of the impact, compliance with legislation and accepted standards, receptor sensitivity and the significance of the predicted environmental change. SLR uses an assessment methodology which considers: the intensity, extent, duration of impacts, the probability of the impact occurring, the reversibility and the degree to which the impacts can be mitigated. The significance of environmental impacts will be rated before and after the implementation of mitigation measures. These measures may be planned or additional measures that may arise from the impact assessment and specialist input.

Consultation in the EIA

The key activities of the stakeholder engagement process in the EIA phase will include the following:

- On-going identification and notification of landowners and stakeholders;
- Registration of parties as I&APs;
- Notification to I&APs of the authority decision on scoping;
- Consultation with I&APs, key stakeholders and authorities;
- Consultation with mineral rights holders and land claimants;
- Collation of issues and concerns for inclusion in the EIA;
- Circulation of the EIA and EMP report for public review, with summaries in local languages.
- Public meeting/s to provide feedback on the findings of the EIA; and
- Notification of I&APs on the PASA decision and appeal process

Specialist Studies

Specialist studies as detailed below are proposed to inform the EIA. Specialist reports will be structured in terms of Appendix 6 of the EIA Regulations 2014. It must be noted that although the work described will be undertaken by specialists, the extent of the study area means that a desktop approach is the only feasible method. Site specific assessments of relevant features will be undertaken when the locality of survey lines and drill sites are being finalised. Exclusion criteria that should be applied when identifying and assessing sites for physical exploration during the detailed site assessment will be presented in the EMPr.

Biodiversity: A desktop analysis of the receiving environment which may be affected by the proposed exploration activities will be undertaken by an ecologist in order to understand the extent, nature and status of biodiversity features. The desktop study will also include the assessment of sensitive habitat types (such as ridges, wetlands and rivers), threatened ecosystems, protected areas and other sensitive biophysical areas. Biodiversity units (vegetation, habitat), areas of conservation importance (protected areas, Ramsar sites, CBAs) and features of high sensitivity to disturbance (species occurrence etc.) will be mapped, at a broad scale, to the greatest degree. The outcome will be to define which biodiversity units and uses may be incompatible with the proposed exploration and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration.

Groundwater: A desktop Groundwater Assessment will be undertaken by a geohydrologist to establish:

- General distribution of groundwater levels in the delineated area,
- Seasonal fluctuation of groundwater levels,
- Classification of groundwater potential for the area, aquifer types and depths,
- Presence of major catchment areas and possible interaction between surface and groundwater
- Current (baseline) regional conditions for groundwater
- Recommendations for later phase groundwater work that should be done if exploration proceeds.

The outcome will be to define the levels of compatibility of the proposed exploration activities with the groundwater resources and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration.

Heritage: A desktop heritage study will be undertaken by a registered archaeologist / heritage consultant. Identified sites will be grouped according to significance. Where exploration activities may affect identified heritage sites of medium and high significance a management plan would be developed. Guidance on how to manage chance finds of heritage resources will also be detailed.

Soils and land cover: A desktop soils and land cover study will be undertaken by a specialist. The aim will be to identify the different land uses and regional soil types within the application area and to understand the extent, nature and status of these. The outcome will be to identify soil types or properties and land uses within the area which may be incompatible with the proposed exploration. Exclusion criteria that should be applied when identifying and assessing sites for physical exploration will be defined.

Noise and Vibration:

A specialist will undertake a literature review of the noise and vibration that could be expected from the proposed exploration activities. The goal will be provide an understanding of the noise and vibration levels that such activities generate in order to enable the interpretation of risk to receptors and infrastructure. A seismologist may also be consulted to provide understanding of the risk of the seismic energy to geological structures. The outcome would be to determine exclusion criteria/buffers that should be applied when identifying and assessing sites for physical exploration during the detailed site assessment.

Air Quality:

A specialist will be appointed to undertake a literature review of the particulate and gaseous emissions that could be expected from the proposed exploration activities. The aim will be to provide an understanding of the volumes and types of emissions that could be generated during exploration and to relate these to potential sensitive receptors. The specialist would also be tasked with identifying receptors that would be sensitive to the gaseous emissions that the proposed exploration activities could generate. The outcome would be to determine practicable mitigation measures to reduce any potential negative impacts.

If the risk requires, the specialist will contribute to determining exclusion criteria/buffers that should be applied when identifying and assessing sites for physical exploration during the detailed site assessment.

Integration of Specialist findings

The specialist findings, recommendations and other relevant information will be integrated into the EIA report by SLR. The full specialist studies will be included as appendices to the EIR. A draft EMPr will be submitted with the EIA Report. The EMPr will be structured in terms of Appendix 5 to the EIA Regulations 2014 and will provide recommendations on how to select, establish, operate, maintain and close the activities and associated infrastructure through all relevant phases of the project life. The aim of the EMPr will be to ensure that the project activities are managed to reduce potential negative environmental impacts and enhance potential positive environmental impacts. The EMPr will detail the impact management objectives, outcomes and actions as required, the responsibility for implementation and the schedule and timeframe. Requirements for monitoring of environmental aspects as well compliance monitoring and reporting will also be proposed. The EMPr will also include the required environmental

awareness plan. Once approved by the relevant authorities, the provisions of the EMPr are legally binding on the project applicant and all its contractors and suppliers.

SCOPING REPORT FOR THE PROPOSED EXPLORATION RIGHT APPLICATION FOR PETROLEUM ON VARIOUS FARMS IN THE MAGISTERIAL DISTRICTS OF MATATIELE AND MT FLETCHER, EASTERN CAPE

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ACRONYMS AND ABBREVIATIONS

Acronyms / Abbreviations	Definition
BID	Background information document
CBM	Coal Bed Methane
DAFF	Department of Agriculture, Forestry and Fisheries
dBA	A-weighted decibel
DMR	Department of Mineral Resources
DW&S	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme report
ER	Exploration Right, as contemplated in Section 79 of the MPRDA
GA	General Authorisation
GN	General Notice
Ha	Hectares
I&AP	Interested and/or affected party
IDP	Integrated Development Plan
IEP	Draft Integrated Energy Plan (2013)
km	Kilometres
m	Meters
mamsl	Metres above mean sea level
mbgl	Metres below ground level
mm	Millimetres
MPRDA	Mineral and Petroleum Resources Development Act, 2002
MSDS	Material Safety Data Sheet
NDP	National Development Plan, 2012
NEMA	National Environmental Management Act, 1998
NEM:AQA	National Environmental Management Air Quality Act, 2004
NEM:PAA	National Environmental Management Protected Areas Act, 2003
NEM:WA	National Environmental Management: Waste Management Act, 2008
NFEPA	National Freshwater Ecosystem Priority Area
NWA	National Water Act, 1998
NGO	Non-governmental organisation
PASA	Petroleum Agency of South Africa
SACNSP	South African Council for Natural Scientific Professionals
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SDF	Spatial Development Framework
SLR	SLR Consulting (South Africa) (Pty) Ltd
SMS	Short Message Service
Tcf	Trillion Cubic Feet
TCP	Technical Co-operation Permit, as contemplated in Section 76 of the MPRDA
WULA	Water Use License Application

SCOPING REPORT FOR THE PROPOSED EXPLORATION RIGHT APPLICATION FOR PETROLEUM ON VARIOUS FARMS IN THE MAGISTERIAL DISTRICTS OF MATATIELE AND MT FLETCHER, EASTERN CAPE

1 INTRODUCTION

1.1 INTRODUCTION TO THE PROPOSED PROJECT

Rhino Oil and Gas Exploration South Africa (Pty) Ltd (hereafter referred to as "Rhino Oil and Gas") lodged an application for an exploration right ("ER') in terms of Section 79 of the Minerals and Petroleum Resources Development Act, 28 of 2002 ("MPRDA"). The application was made to the Petroleum Agency South Africa (hereafter referred to as "PASA"), the designated agency responsible for the administration of petroleum related minerals.

PASA accepted Rhino Oil and Gas' application for the area titled 'Scoping Report For The Proposed Exploration Right For Petroleum On Various Farms In The Magisterial Districts Of Matatiele and Mt Fletcher, Eastern Cape' (12/3/295 ER) in May 2015. The exploration right area is ~120 00 ha in extent and covers 200 farms in the Eastern Cape Province (See (Separate electronic file)
Figure 1-2 for the regional setting of the project). Minerals included in the ER application are oil, gas, condensate, coal bed methane, helium and biogenic gas.

The primary targets of the exploration are various forms of natural gas found in deep underground rock formations or associated with other hydrocarbon reservoirs in coal beds. The natural gas may be trapped in fine fractures within the rock or found in pockets under geological traps. Natural gas generally consists primarily of methane (CH_4), but commonly includes varying amounts of other higher alkanes and sometimes (usually a lesser percentage of) carbon dioxide, nitrogen, and/or hydrogen sulfide. Once extracted, natural gas is a versatile source of energy and one of the cleanest fossil fuels.

Rhino Oil and Gas is proposing to undertake early-phase exploration for oil and gas resources which may be located underground within suitable geological strata. The current ER application only includes exploration work aimed at determining the presence of a petroleum resource. The approval being sought does not include any work to determine the commercial viability of the resource. The initial 3-year exploration work programme is restricted to various non-invasive and remote techniques as well as the drilling of a maximum of 10 core boreholes and up to a maximum of 125 km of seismic survey lines. No permeability testing, pressure testing or hydraulic fracturing (commonly referred to as "fracking") is proposed for this exploration programme. If a resource is identified for more advanced exploration, further authorisation / approvals would be required before these activities could be undertaken.

1.2 APPLICANT BACKGROUND

Rhino Oil and Gas Exploration South Africa (Pty) Ltd is a South African registered subsidiary of Rhino Resources Ltd. Rhino Resources is a technology driven, independent oil and gas exploration and development company focused on Africa. Rhino Resources is building a portfolio of both onshore and offshore oil and gas assets with a primary focus on West Africa, East Africa, and Southern Africa. The company's key strategic areas include the East African Continental Rift System, the Central African Rift System, the coastal margins of East Africa, the South Atlantic margin of West Africa and the eastern Karoo formations of South Africa.

Rhino Resources, Ltd. is currently one of the largest applicants of both onshore and offshore oil and gas rights in South Africa with a number of applications under consideration by PASA. South Africa has the eighth largest shale gas reserves in the world according to a recent US Department of Energy report with estimates ranging from 30 Tcf to 390 Tcf for the Karoo Basin. Rhino Resources' goal is to develop these natural resources with the benefit of enhanced prosperity for African host countries and local communities.

Rhino Oil and Gas had previously held a Technical Co-operation Permit ("TCP") for the Eastern Cape 295 ER application area. The TCP was issued by PASA in terms of Section 77 of the MPRDA. The holder of a TCP has, subject to Section 79 of the MPRDA, the exclusive right to apply for and be granted an exploration right in respect of the area to which the permit relates. Through the current application Rhino Oil and Gas intends to secure an exploration right. Rhino Oil and Gas as the applicant for an Exploration Right will also be the operator for the proposed project.

1.2.1 APPLICANT DETAILS

Address:	Rhino Oil and Gas Exploration South Africa (Pty) Ltd Icon Building, Suite 300 Corner of Long Street & Hans Strijdom Avenue Cape Town 8000
Vice President & COO:	Phillip Steyn
Tel:	+27 21 412 1577
E-mail:	psteyn@rhinoresourcesltd.com
Website:	www.rhinoresourcesltd.com

1.3 OVERVIEW ON THE EXPLORATION PROCESS

The purpose of an exploration study is to identify the existence of any commercially viable reserves of oil and / or gas. The conditions necessary for petroleum reserves to have accumulated are complex and

largely dependent on past geological history and present geological formations and structures. For deposits to occur, particular combinations of potential source and reservoir rocks together with migration pathways and trap structures are required. Discovering such reservoirs and estimating the likelihood of them containing oil and / or gas is a technically complex process consisting of a number of different stages requiring the use of a range of techniques. Such techniques may include, *inter alia*, aero-magnetic/gravity surveys, deep and shallow geophysical (seismic) surveys, shallow drilling and coring, and exploration and appraisal drilling (DTI, 2001). Exploration is an iterative process with data acquired from a prior stage required to improve the knowledge and understanding of the resource, which may then be subject to a later stage of more intensive exploration.

Exploration begins with the identification of target areas. Based on a general geological understanding, often informed by publically available data, broad areas are initially identified as being prospective with the potential to contain reserves of oil and / or gas. These areas are then subjected to early-phase exploration that is focused on large-scale regional analysis. This is done by integrating the regional surface and basin structure data derived from obtainable legacy data. Prospective areas are further defined using a combination of surface/shallow mapping techniques and seismic surveys to aid understanding of deeper, subsurface geology. Aero-magnetic and gravity surveys as well as core drilling are also used to define general structure such as sedimentary basins. The work in this early-phase exploration stage might identify potential areas of interest for follow up study, but do not typically pinpoint areas with oil and gas. At the end of this stage the non-prospective areas would typically be relinquished by the project.

Exploration in prospective areas would then progress to the appraisal stage. Identified areas of potential interest are subjected to further seismic and lithological study, which may involve reinterpreting existing data or conducting new surveys. Such surveys would typically be conducted at higher resolutions or with more accurate techniques to improve the confidence in the information. The purpose of these surveys is to delineate and evaluate the prospects of interest identified in the first phase of exploration. Exploration wells would then be planned to access the target stratigraphy for testing, which may include permeability testing, pressure testing and hydraulic fracturing. It is noted that the only reliable way to determine whether the identified formations contain hydrocarbons is to undertake exploration well drilling (DTI, 2001). This work is aimed at identifying and defining the extent of ‘sweet spots’ with high potential for reserves of oil and / or gas, as well as whether or not the size of the resource warrants further study and drilling.. At the end of this stage the non-prospective areas would typically be relinquished by the project.

In order to fully define the commercial viability of an oil and / or gas resource a further stage of drilling is generally undertaken. Exploration wells (in one or a variety of forms) would be drilled and subject to an array of trials and testing (possibly including permeability testing, pressure testing and hydraulic fracturing). The type of wells and tests would depend entirely on the nature of the resource that has been discovered. The purpose is for the prospect to be identified, evaluated and tested. These wells will

enable the geoscientists to gain the greatest level of understanding of the reservoir and its viability for production. Only once it is determined that a field is commercially viable would an operator consider moving into the production phase. At the end of this stage the non-prospective areas would typically be relinquished by the project.

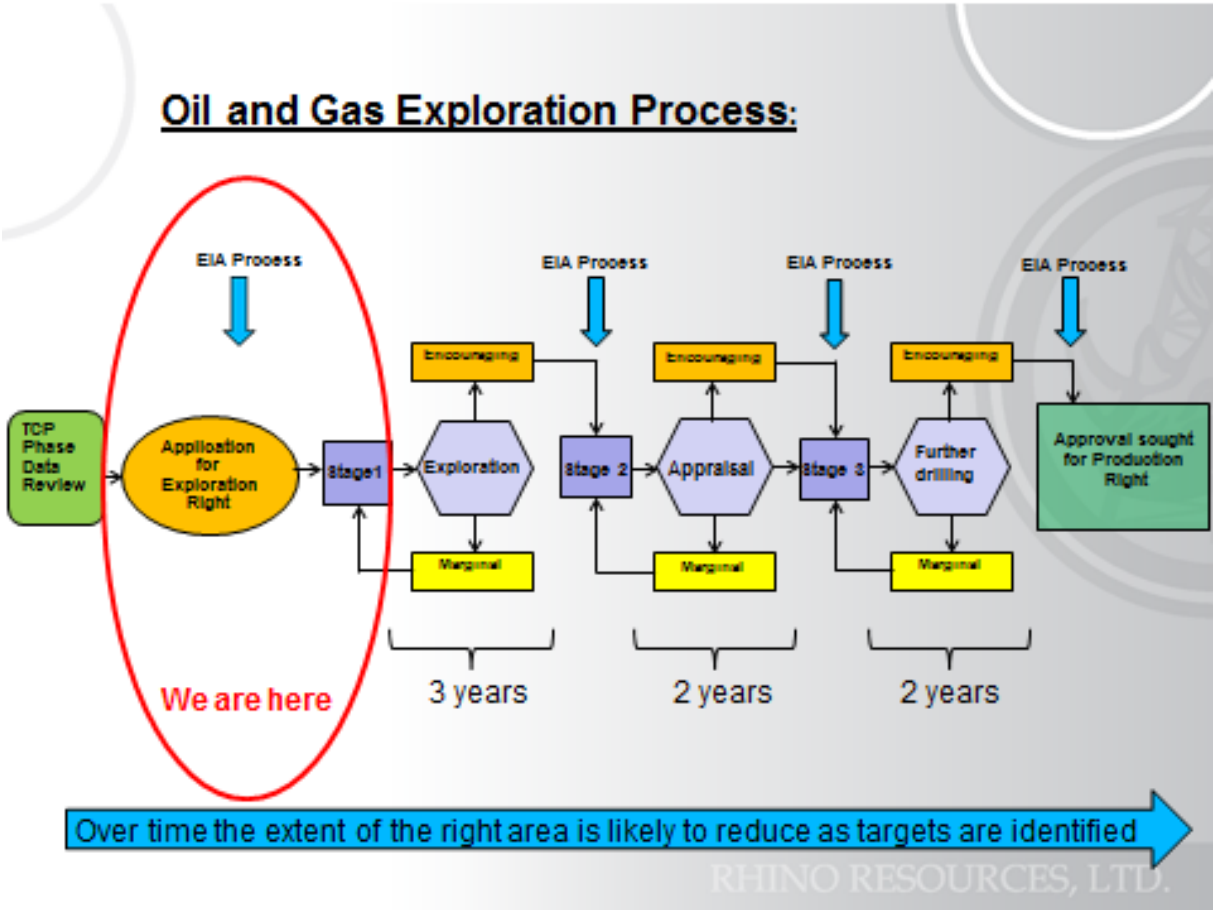


FIGURE 1-1: OVERVIEW OF THE EXPLORATION PROCESS

Rhino Oil and Gas is at the beginning of an oil and gas exploration process and is only seeking authorisation to undertake early-phase exploration activities. The proposed exploration programme is the second step in determining if there is an oil or gas resource in the exploration right area that would warrant further investigation (the first phase having been the Technical study undertaken). The proposed exploration work programme is designed to improve the understanding of the regional geology and inform of the potential for the occurrence of an oil and / or gas resource. It is not known at this stage whether there are any oil and / or gas reserves. It is also not known at this stage what form the oil and / or gas might take. This will only be known after all the data from the initial 3-year exploration work programme has been analysed. At the end of the current exploration work programme it would still not be possible to define the extent of a resource nor to determine if the resource was commercially viable.

1.4 SUMMARY OF AUTHORISATION REQUIREMENTS

The MPRDA, as amended, makes provision, in Section 79, for persons to apply for an exploration right for petroleum products. The application lodged by Rhino Oil and Gas Exploration South Africa (Pty) Ltd for an exploration right over the Eastern Cape project (12/3/295 ER) was accepted by the PASA in May 2015. Acceptance of the application by PASA does not constitute authorisation, but permits the applicant to continue with the necessary process. The acceptance detailed the requirements for the application, which include:

(a) submitting an application for environmental authorisation in terms of Regulation 16 of the 2014 Environmental Impact Assessment ("EIA") Regulations on or before 12 October 2015;

(b) submitting a Scoping Report (this document) as contemplated in Regulation 21(1) of the EIA Regulations 2014 within 44 days from lodgment of the application for Environmental Authorisation; and

(c) consulting with the landowner, lawful occupier and any interested and affected party ("I&APs") and include the results of the consultation in the Scoping and EIA Reports..

These requirements are set out in Section 79(4) of the MPRDA which requires that the applicant submit the relevant environmental reports required in terms of Chapter 5 of the National Environmental Management Act, 107 of 1998 (NEMA) as amended. The Minister may only grant the exploration right if an environmental authorisation has been issued.

Section 24(1) of NEMA sets out that persons wishing to undertake activities (listed or specified in terms of NEMA) must consider, investigate, assess and report on the potential consequences for or impacts on the environment to the competent authority in order to obtain an environmental authorisation. The Minister published the EIA Regulations 2014 (GNR 982, December 2014) which define the requirements for the submission, processing, consideration and decision of applications for environmental authorisation of listed activities. Any activity that is captured in the listing notices (GN R 983 – 985 of December 2014) requires environmental authorisation from the competent authority.

Section 24C(2A) of the NEMA sets out that the Minister responsible for mineral resources must be identified as the competent authority in terms of subsection (1) where the listed or specified activity is directly related to (a) prospecting or exploration of a mineral or petroleum resource. In terms of Section 70 of the MPRDA the Minister responsible for mineral resources has designated the PASA to perform the functions referred to in Chapter 6 of the MPRDA.

In October 2015, Rhino Oil and Gas submitted an application to PASA for environmental authorisation of exploration activities as described in this report for the exploration activity set out in the Listing Notices 2014 (GN R 984) made in terms of Section 24(5) of NEMA. PASA accepted the application and confirmed that a Scoping and EIA process is required.

1.4.1 LEGAL NATURE AND LIMITATIONS ON AN EXPLORATION RIGHT

Any right granted under the MPRDA is a limited real right in respect of the mineral or petroleum and the land to which such right relates. The holder of a right is entitled to the rights referred to in Section 5 of the MPRDA and such other rights as may be granted to, acquired by or conferred upon such holder under the MPRDA or any other law. Mineral rights are also specific and have limitations.

The ER that has been applied for by Rhino Oil and Gas is specific and limited to:

- The minerals being: oil, gas, condensate, coal bed methane, helium and biogenic gas;
- The properties as listed in Appendix 3;
- The work programme as detailed in Section 2, and
- A 3-year time frame from granting.

Any change to the scope of the ER, further exploration or future production activities would need to be subject to additional authorisation in terms of the MPRDA and thus NEMA. Each of these would require a separate EIA (or environmental authorisation amendment) process, which would include a further public participation process and in-depth assessment (potentially including specialist studies) of all project-related activities / issues.

1.5 TERMS OF REFERENCE

Rhino Oil and Gas has appointed SLR Consulting (Pty) Ltd ("SLR") as the independent environmental assessment practitioner (EAP) responsible for undertaking the required environmental assessment and conducting the public participation process. The application will be subject to a scoping and EIA process as stipulated in the EIA Regulations 2014 (GNR 982, December 2014) made under Section 24(5) of the NEMA. SLR has no vested interest in the proposed project and has declared its independence as required by the EIA Regulations 2014 (see Section 8**Error! Reference source not found.**).

The Scoping and EIA process being undertaken by SLR is aligned to the early-phase exploration work programme as proposed (see Section 1.5). The assessment of possible further exploration or future production is outside of the scope of this Scoping and EIA process. If such work were proposed by Rhino Oil and Gas (or another applicant) then they would need to seek further approval from PASA in terms of the MPRDA. Any further approval would be subject to an additional environmental assessment process with further public consultation as is required by NEMA.

1.5.1 DETAILS OF THE EAP

The details of the EAPs that were involved in the preparation of this scoping report are provided in Table 1-1 below.

TABLE 1-1: DETAILS OF THE EAP

DETAILS	REVIEWER	PROJECT MANAGER	Public Participation
Name of the practitioner	Jonathan Crowther	Matthew Hemming	Stella Moeketse
Responsibility on the project	Reviewer	EAP	Public Participation manager
Tel No.:	+27 11 467 0945		
Fax No.:	+27 11 467 0978		
Postal address	PO Box 1596, Cramerview 2060		
E-mail address	jcrowther@slrconsulting.com	mhemming@slrconsulting.com	smoeketse@slrconsulting.com

None of the SLR personnel involved in the environmental assessment process have any interest in the project other than fair payment for consulting services rendered as part of the EIA process.

1.5.1.1 Qualifications and experience of the EAP

Matthew Hemming holds a Masters Degree in Conservation Biology, has over 10 years of relevant experience in the assessment of impacts associated with mining and exploration operations. Jonathan Crowther is a director at SLR, has over 26 years of relevant experience and is registered as an environmental assessment practitioner with the interim certification board and is also registered as an Environmental Scientist with the South African Council for Natural Scientific Professions (SACNASP).

Both Jonathan and Matthew have been involved in multiple impact assessment for large scale mining development in Southern Africa as well as onshore and offshore oil and gas exploration and production projects. Proof of registrations of the practitioners is provided in Appendix 1 and relevant curricula vitae are attached in Appendix 2.

1.6 PURPOSE OF THIS REPORT AND OPPORTUNITY TO COMMENT

Within an EIA process, the purpose of the Scoping Report is to identify the potential environmental issues and impacts associated with the exploration project and to agree on the level of assessment (plan of study) for the EIA.

This draft Scoping Report has been prepared to document the method and findings of the scoping process undertaken to date. The draft Scoping Report is being distributed for a 30-day comment period from 7 March 2016 to 11 April 2016 in order to provide I&APs with the opportunity to comment on any aspect of the proposed project and the findings of the scoping process. Copies of the full Scoping Report have been made available at the following locations:

TABLE 1-2: LOCALITIES WHERE DRAFT SCOPING REPORT WILL BE AVAILABLE

Name and Location	Physical Address
Matatiele Public Library	High Street Matatiele 4730 Tel: +27 39 737 3194
Maluti Magistrates Offices	206 Magistrate Street, Maluti Tel: +27 39 256 0111
Maclear Public Library	Van Riebeeck Street Maclear Tel: +27 45 9321476
Elundini Municipality: Public Library	272 Back Street Mount Fletcher Tel: +27 39 257 0485
A copy of the report was provided to each of the four traditional authority chiefs within the application area	

The Scoping Report is also available to download from the SLR ftp site. To do so, please visit:

ftp.slrconsulting.co.za

Username: 1013151013

Password: vwhuigfpi23r2

Please navigate to the Folder called: Draft Scoping Report

An electronic copy of the Scoping Report can be emailed or provided on CD to those who request it. The executive summary of the report is also available in Xhosa and Sotho.

Any comment on the Scoping Report should be submitted to SLR at the details shown in Table 1-1. These comments will be used to update the Scoping Report which will be submitted to PASA for acceptance. For comments to be included in the updated Scoping Report these must reach SLR by **11 April 2016**. If the Scoping Report is accepted by PASA, the project will proceed onto the EIA phase.

1.7 ASSUMPTIONS AND LIMITATIONS

The assumptions and limitations of this Scoping Report are listed below:

- The assessment assumes that SLR has been provided with all relevant project information and that it was correct and valid at the time it was provided;

- The assessment is based, to a large extent, on a generic description of the proposed exploration activities (specific details cannot be made available at the time of writing this report (e.g. core hole locations, seismic survey routes, etc.).
- There will be no significant changes to the project description or surrounding environment between the completion of the scoping and EIA process and implementation of the proposed project that could substantially influence findings, recommendations with respect to mitigation and management, etc;
- The large size of the application area, information constraints of the project and the time constraints imposed by the EIA process did not allow for detailed baseline assessments of the whole application area. The report is therefore based on a desktop study of available baseline information and the findings of the public consultation process. Requirements for detailed site assessments during finalising of the core hole sites or seismic survey routes will be included in the environmental management programme where necessary;
- As a result of large number of landowners and occupiers in the application area and the limited availability of accurate title deed and landowner contact information, identification of and consultation with every owner of included properties was not achieved. Much effort was made to make potentially affected parties aware through various other means (see Section 5.2); and
- Negotiations with landowners with respect to agreements for access to land to conduct exploration are outside of the scope of this EIA and will be undertaken by the applicant during the proposed exploration programme. The requirements for consultation with each landowner that will be directly affected by the proposed drilling activities or seismic survey will be included in the EIA/Environmental Management Programme (EMPr).

1.8 STRUCTURE OF THE REPORT

This Scoping Report has been compiled to contain all of the information as specified in Appendix 2 to the EIA Regulations, 2014. The report is divided into various Chapters and Appendices for ease of reference which include:

TABLE 1-3: STRUCTURE OF THE SCOPING REPORT

Section	Content
Chapter 1:	**Introduction** This Chapter describes the purpose of this report, provides a brief description of the project and the applicant background, summarises the authorisation requirements, presents the terms of reference of the scoping & EIA, outlines the assumptions and limitations of the study, details the opportunity for comment and describes the structure of the report.
Chapter 2:	**Description of the Project Activities** Provides an overview of the project location, a description of the proposed exploration

	activities and the listed activities that require authorisation.
Chapter 3:	**Policy and Legislative Context** In accordance with the EIA Regulations 2014, all legislation and guidelines that have been considered in the preparation of the Scoping Report are documented in this Chapter.
Chapter 4:	**Needs and Desirability** Describes the need and desirability for the proposed project.
Chapter 5:	**Process followed to reach the Preferred Alternative** This chapter provides details on the process used to compare and evaluate the project alternatives to inform the selection of the preferred alternatives. Described are the various alternatives; the public participation process that has been followed to date; the issues raised by I&APs and the existing biophysical and social environment that could potentially be affected by the project. A comparative assessment of the advantages and disadvantages of the various alternatives is provided.
Chapter 6:	**Anticipated Issues and Impacts** The chapter describes key issues associated with the proposed project. It is these issues that will be subject to the impact assessment.
Chapter 7:	**Plan of Study for EIA** This chapter describes the nature and extent of further investigations to be conducted by SLR and the specialists in the EIA, and sets out the proposed approach to the EIA process.
Chapter 8:	**Undertaking by the EAP** Provides the required undertaking by the EAP.
Chapter 9	**References** Provides a list of the references used in compiling this report.
Appendices	Appendix 1: Proof of EAP Registration Appendix 2: Curriculum Vitae of EAP Appendix 3: Included Properties Appendix 4: Site Plan Appendix 5: Stakeholder Engagement Documents Appendix 6: I&AP submissions

(Separate electronic file)

FIGURE 1-2: REGIONAL SETTING

2 DESCRIPTION OF THE SCOPE OF THE PROPOSED ACTIVITY

2.1 LOCATION OF THE ACTIVITY

The current exploration right application area includes ~ 200 farms over an area of ~ 120 000 ha (see regional setting in Figure 1-2). The corner co-ordinates of the exploration area boundary are provided in Table 2-1. A list of the properties included in the exploration right application area is provided in Appendix 3. Given the large number of properties included, it is not feasible to include a cadastral description of every property in this document.

It should be noted that physical exploration activities would not take place across the entire region. Exploration applications are typically made over large areas as information on the potential locality of a resource is limited at this stage (refer to Section 1.3). It is also necessary to hold an exploration right to gain access to existing data. As early-phase exploration progresses the non-prospective areas will be relinquished (i.e. would be removed from the exploration right area).

TABLE 2-1: DESCRIPTION OF THE PROPERTY

DESCRIPTOR	DETAIL	
Farm Names	See list in Appendix 3	
Application area (Ha)	~ 120 000 ha	
Magisterial Districts	Matatiele and Mount Fletcher	
Distance and direction from nearest towns	~ 12 to 30 km west of Matatiele, ~60 km north of Maclear	
21 digit Surveyor General Code for each farm portion	See list in Appendix 3	
Corner point co-ordinates for exploration area	30° 6' 24.55" S	28° 44' 58.27" E
	30° 15' 0.00" S	28° 45' 0.00" E
	30° 15' 0.00" S	28° 37' 44.13" E
	30° 15' 0.00" S	28° 30' 0.00" E
	30° 30' 0.00" S	28° 30' 0.00" E
	30° 7' 52.42" S	28° 36' 9.72" E
	30° 29' 59.95" S	28° 10' 51.21" E
	30° 28' 11.61" S	28° 9' 18.00" E
	30° 24' 47.06" S	28° 14' 21.30" E
	30° 21' 28.01" S	28° 16' 10.20" E
	30° 19' 57.54" S	28° 21' 56.20" E
	30° 19' 17.58" S	28° 23' 15.00" E
	30° 18' 54.54" S	28° 18' 47.41" E
	30° 17' 1.39" S	28° 23' 8.30" E
	30° 16' 37.06" S	28° 20' 58.88" E

	30° 12' 53.39" S	28° 20' 42.83" E
	30° 8' 37.72" S	28° 24' 3.71" E
	30° 8' 55.64" S	28° 28' 57.11" E
	30° 7' 26.00" S	28° 32' 25.08" E
	30° 8' 21.91" S	28° 40' 6.78" E
	30° 22' 3.29" S	28° 30' 0.00" E
	30° 29' 59.98" S	28° 19' 57.34" E

2.1.1 CURRENT EXCLUSIONS

Section 48 of the MPRDA sets out the specific cases in which properties are excluded from the extent of an exploration right application area. These include:

- as per section 48 of the Protected Areas Act (57 of 2003), special nature reserves, national parks, nature reserves, protected areas or protected environments (including world heritage sites, marine protected areas, specially protected forest areas, forest nature reserves and forest wilderness areas)
- land comprising a residential area;
- any public road, railway or cemetery;
- any land being used for public or government purposes or reserved in terms of any other law; or
- areas identified by the Minister by notice in the Gazette in terms of section 49.

All of the above are excluded from the exploration right application area for this project. Further exclusions may be identified as the exploration process progresses (e.g. railway line servitudes).

Rhino Oil and Gas has indicated that, for the purposes of this ER, it will not be excluding properties or areas where a constraint may restrict exploration activity (current or future), but does not specifically prohibit the granting of an exploration right. Rhino Oil and Gas would, however, ensure that all of their activities are undertaken in a lawful and environmentally responsible manner. It is the role of the environmental process to identify all such constraints and restrict or prohibit exploration activities through documented management commitments. An example of a constraint which prohibits specific exploration activities in certain areas, but does not prohibit the granting of a right are Sections 122 (2) and (3) of the Regulations on Petroleum Exploration and Production (GN R 466, June 2015). These restrictions prohibit “well sites for Hydraulic Fracturing operations” and “wells” within set distances from specific water resources. The term “well” is defined in the Regulations. The restrictions do not apply to stratigraphic core holes (defined separately) or seismic testing as is proposed by Rhino Oil and Gas in this early-phase exploration project.

SLR will identify and document the relevant constraints in the EIA. Measures to restrict exploration activity in line with the constraints will be defined in the EMPr.

2.1.2 REGIONAL SETTING OF EXPLORATION RIGHT AREA

In broad terms the exploration right application area lies in the northern region of the Eastern Cape. It is bound by the Lesotho boundary to the west, from near Qachas Nek to approximately 20 km north of Mt. Fletcher in the south. The area lies to the west of the R56 road between Matatiele and Mt. Fletcher with the Maria-Linden Mission being just inside the boundary. A map showing the locality and setting of the proposed exploration right application area is provided in (Separate electronic file)
Figure 1-2 (also see Appendix 3).

At this early stage of exploration Rhino Oil and Gas is not able to specify where on-the-ground exploration activities would happen within this area, as the data from the initial non-invasive stages in years 1 and 2 would have to be used to refine the exploration area and determine the sites for core hole drilling and the alignment of seismic survey lines.

2.2 LISTED AND SPECIFIED ACTIVITIES

The activities and infrastructure associated with the proposed project are listed in Table 2-2 below. In each case the relevant NEMA listed activities which will be triggered by the proposed project for the various activities and infrastructure has been identified and fully described in Table 2-3. This list comprises the NEMA activities for which an application has been made.

TABLE 2-2: ACTIVITIES OF THE PROPOSED PROJECT

ACTIVITY	EXTENT OF THE ACTIVITY (HA)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE
Exploration for oil, gas, condensate, coal bed methane, helium & biogenic gas			
Evaluation of existing geological data	0	18, Any activity including the operation of that activity which requires an exploration right as contemplated in section 79 of the Mineral and Petroleum Resources Development Act , 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks.	NEMA LISTING NOTICE 2: GNR.984
Mapping of sub-surface structural features and stratigraphy	0		
Acquisition of data on source-rock geochemistry (with some acquisition of rock samples)	0		
Development of geological models	0		
Apatite fission track analysis	0		
Full tensor gradiometry gravity (FTG) surveys by fixed wing aircraft	40000 (but in the air)		
Two-dimensional (2D) seismic surveys	Maximum of 125 linear kilometres		
Core borehole drilling	Maximum of 10 boreholes at sites 0.25 ha each		

TABLE 2-3: LISTED ACTIVITIES APPLIED FOR AS PART OF THE PROPOSED PROJECT

ACTIVITY NUMBER	LISTED ACTIVITY
NEMA LISTING NOTICE 1 GNR.983	
NA	
NEMA LISTING NOTICE 2: GNR.984	
18	Any activity including the operation of that activity which requires an exploration right as contemplated in section 79 of the Mineral and Petroleum Resources Development Act , 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks.
NEMA LISTING NOTICE 3: GNR. 985	
NA	
NEM:WA LISTED ACTIVITIES GNR 921	
NA	

Rhino Oil and Gas has not made application for any other listed activities, nor authorisations under other legislation, as it is unlikely that the proposed exploration activities (see next section) will trigger any of the thresholds in the listing notices. Where necessary, the environmental management programme will detail restrictions required to ensure that no unauthorised activities are undertaken during the proposed exploration.

2.3 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

This Section provides a scoping level description of the activities that have been proposed by Rhino Oil and Gas as part of the early-phase exploration work programme. Further details on the operations and key parameters of exploration methods will be provided in the EIA report.

2.3.1 INTRODUCTION

The hydrocarbon potential of the Karoo Basin has been known since the early 1900s and various exploration programmes were undertaken in the 1940s and the 1960s. This work included seismic surveys and the drilling of several deep wells which targeted oil. Although some resources were discovered the reserves were not considered viable at the time. With the discovery of offshore reserves, exploration for petroleum in the onshore areas was largely abandoned. Recent developments in the technologies available to exploit unconventional gas resources and volatility in supply and prices of hydrocarbons have made prospecting for natural gas (and other petroleum resources) a more attractive financial proposition (less so with the recent decline in oil prices). Several organisations have commenced exploration efforts in the greater Karoo region, targeting, mostly coal bed methane or shale gas (see the PASA map at http://www.petroleumagencysa.com/index.php/maps).

Rhino Oil and Gas proposes to undertake early-phase exploration for oil and gas resources which may be located within suitable subsurface geological strata. The initial, early-phase exploration proposed by Rhino Oil and Gas is only aimed at determining if there is an oil or gas resource in the area that would warrant further exploration. The exploration work would target key geologies of the Karoo Basin.

The primary motivation for the current application is to obtain the data required to clearly define geological structures. The proposed early-phase exploration activities do not, at this stage, extend beyond the acquisition of data. The results of the proposed early-phase exploration programme would serve as a basis for planning for further exploration. It must be noted that the exploration right application area is extensive and it is not considered feasible nor necessary to undertake surveys of every aspect of the area in order to obtain the regional understanding that is required.

The specific 3-year exploration work programme proposed by Rhino Oil and Gas for this exploration right application includes:

YEAR 1:

- **improved mapping of subsurface structure and stratigraphy**
- **detection of structural features and traps**
- **enhance source rock geochemistry database**

YEAR 2:

- **geochemical database compilation**
- **apatite fission track analysis**
- **define the locations (routes) for the site activities**

YEAR 2/3:

- **full tensor gradiometry gravity survey (maximum total survey size of 4000 square kilometers)**
- **drill tests on identified structures (up to a maximum of 10 core holes)**

YEAR 3:

- **purchase existing seismic data**
- **seismic acquisition (2D seismic acquisition of up to 125 line kilometers).**

Through an analysis of existing (historical) seismic and well information data retrieved during the TCP-programme, and from studying published field data in combination with the information derived from Year 1 and 2, Rhino Oil and Gas would identify preliminary locations and/or routes for the field activities. It must be noted that the exploration work is phased with results from the early phases informing the need and planning for the later phases. Each later phase would only be undertaken if the early phase results were positive.

It is not yet possible to specify the location of, or site plans for the proposed activities as these are dependent on the outcome of the prior phases of exploration, which can only be conducted once the ER is approved. For information purposes various diagrams, photos and typical layouts of the type of activities proposed are provided in Appendix 4.

2.3.2 EVALUATION OF GEOLOGICAL DATA

The initial phase of the exploration will be desktop based and aim to identify target sites for exploration surveys and drilling. This work will be undertaken in the initial period, but will continue throughout exploration as new data is acquired or generated:

- Extensive review of available information that exists over the areas of interest will be undertaken. These investigations will include identifying:
    - Sources of published and possibly unpublished data from the Council for Geoscience;

  - Private companies that may have information that could be purchased; and
  - Resources such as information from annual reports of companies close to, or adjoining the properties of interest.
- Creation of geological models based on the database collated from these various sources;
- Detection of structural features and traps
- Apatite fission track analysis
- Remote sensing, including the analysis of existing geophysical data available from the CGS;
- Visualisation of various targets (target generation);
- A “pre-feasibility” analysis of the targets based on all the data gathered and analysed.

2.3.3 Source Rock Geochemistry Database

Rhino Oil and Gas would acquire data on source-rock geochemistry. This may include the acquisition of rock samples from surface outcrops for laboratory analysis. A database on geochemistry of the region would be compiled.

2.3.4 Full Tensor Gradiometry Gravity Survey

Rhino Oil and Gas would purchase full tensor gradiometry gravity (“FTG”) survey data where available and may commission further surveys to image subsurface geology. FTG is used for hydrocarbon and mineral exploration via an airborne platform. The fundamental component of a gravity gradiometer is the gravity gradient instrument (“GGI’), which consists of a slowly rotating disk on which are mounted four very precise accelerometers (termed a ‘complement’). The arrangement of the accelerometers together with their rotation allows a GGI to measure gravity gradients – a very small signal – despite the presence of noise from the movement of the platform and the electronic systems themselves. A GGI produces two data channels representing the differential curvature of the Earth’s gravity field in the frame of reference of the rotor. FTG surveys measure minute variations in the Earth's gravitational field to help image subsurface structures. From these surveys, a detailed interpretation of the subsurface geology can focus future exploration objectives.

Such surveys are flown in fixed wing aircraft fitted with the FTG equipment. The survey involves low-level grid-based flight of a light aircraft at slow speeds. FTG surveys provide a less invasive alternative to acquiring land-based data. This is an advantage when surveying environmentally sensitive areas and when trying to acquire onshore data where extensive permitting is required. Airborne acquisition neutralises any access and terrain issues associated with difficult to access areas.

2.3.5 Core Borehole Drilling

Rhino Oil and Gas has proposed to drill up to a maximum of 10 stratigraphic core holes as part of the early exploration work programme. These core holes, and the equipment used to drill them, are of the same type and scale as the water boreholes present on most farms and prospecting boreholes used for other minerals. Tens of thousands of such core holes have been drilled in the history of mineral prospecting in South Africa. The diameter of the proposed core hole is even too small for the holes to be used for water abstraction.

Drilling requires the use of a truck or trailer mounted, mobile drilling rig at target sites. Drill sites will be accessed using existing roads and farm tracks. The drill rig would be accompanied by supporting equipment such as a water bowser, compressor and vehicles. The drill rig is manned by a staff of approximately five (5) persons. A typical diamond core drill rig and equipment requires an operating area of approximately 1 200 m^2 (ie. 30 m by 40 m). There may be an on-site caravan for the logging of core data.

Drilling would aim to reach the target seams which are generally located at depths of greater than 200 m below the surface. It is possible that drilling may go as deep as 3 000 m in order to define the bottom of the sedimentary layers. Core drilling uses a diamond bit to cut a core (up to 116 mm diameter) out of the rock. As with most drilling methods some water and drilling fluids are added down the hole to lubricate the drill bit, remove drill cuttings and maintain ideal operating conditions. Some of the drilling fluids are recycled in tanks on surface. Full details of the water volumes, types of drilling fluids and the water management will be provided in the EIA report.

The core is removed from the tube and washed, measured, marked and placed into sample trays. Some sections of the may be subject to laboratory analysis for petrologic, structural and mineralogical studies of the rock.

Drilling and sampling at a site is normally completed within a few weeks. Once drilling is completed the rig, all associated equipment and waste products would be removed from site. The borehole would be capped pending further investigation or sealed with cement if not required further. Rehabilitation would be undertaken to re-establish pre-exploration land use. The process of managing the impacts and rehabilitating the exploration sites would be conducted in terms of an EMPr approved by the PASA.

The location of core hole sites is not currently known. Locations would initially be determined from an assessment of geological information derived from the available data and the early phases of exploration. However, the exact location on the ground is flexible and can be adjusted to accommodate local features, landowner' needs and environmental sensitivities. Each proposed borehole site would be assessed against available GIS information to avoid known sensitivities. Access to borehole sites would follow

existing access roads and disturbances with due consideration of environmental constraints. Proposed borehole site locations and access routes would also be subject to landowner agreement. Each proposed borehole site would also be assessed by an independent environmental scientist (or team of) to ensure that the location and the access thereto avoids known sensitivities, results in minimal environmental disturbance and is in compliance with the conditions of the EMPr. Approval of the drilling sites would be sought from PASA prior to establishment.

Some examples of typical core drilling are shown in Figure 2-1. Further detail on the method of core hole drilling will be provided in the EIA report.

FIGURE 2-1: TYPICAL CORE BOREHOLE
(Sources De Beers and Pinnacle Drilling)

2.3.6 Seismic Acquisition and Surveys

Rhino would purchase existing seismic data where available and may commission seismic surveys to image subsurface geology. Seismic data allows for the representation of subsurface geology through the interpretation of seismic waves reflected differently by different geological strata.

Rhino is planning up to 125 km of two-dimensional (2D) survey lines comprising a number of separate lines covering the majority of the proposed exploration area. 2D surveys are typically applied to obtain

regional data from widely spaced survey grids (tens of kilometres). A 2D survey provides a vertical slice through the earth's crust along the survey track-line. The vertical scales on displays of such profiles are generally in two-way sonic time, which can be converted to depth displays by using sound velocity data. If required, infill surveys on closer grids (down to 1 km spacing) are applied to provide more detail over specific areas of interest such as potentially drillable petroleum prospects. Seismic survey methods are not new in South Africa and have been used in many mineral prospecting operations.

The route of survey lines is initially determined from a desktop assessment of geological information. However, the exact route on the ground is flexible and can be adjusted to accommodate local features, landowner' needs and environmental sensitivities. Each survey line would be assessed against available GIS information to avoid known sensitivities. Survey lines would, where possible, follow existing access roads and disturbances with due consideration of environmental constraints. Survey lines would also be subject to landowner agreement. Each survey line would also be assessed by an independent environmental scientist (or team of) to ensure that the location and the access thereto avoids known sensitivities, results in minimal environmental disturbance and is in compliance with the conditions of the EMPr. Approval for each of the survey routes would be sought from PASA in advance of undertaking the activity.

During a survey low frequency, long wavelength acoustic waves are generated through the use of an energy source (Vibroseis truck or explosive shot). The resultant seismic waves, and the reflection of these, are recorded at the surface in geophones laid at set spacing in a linear alignment. Analysis of the return waves provides information about rock types and possible gases or fluids in rock formations.

Survey teams (of between 15 and 25 persons) would require short-term access to farms to survey the route, prepare the line, place generating and receiving equipment, undertake the survey and record the data. Substantial vegetation clearance is generally not required unless the survey were to go through dense bush. In most cases the survey route would follow existing roads, tracks and clear areas. The explosive-shot seismic surveys require the drilling of shallow holes (5 to 30 m in depth) at a regular spacing (20 to 200m intervals) for the placement of the acoustic generating shot. The hole is loaded with an explosive charge designed to propagate into the earth, backfilled and the charge is set off with the recording in progress. If a blast crater is made this is backfilled immediately. The vibratory method uses large Vibroseis trucks with plate that is lowered to the ground at a regular intervals to vibrate the ground. Persons standing near a shot hole or Vibroseis truck (within 20 to 50 m) may be able to detect a slight vibration. The low level of the vibration would be such that it would be very unlikely to have any effect on subsurface animals and would be hardly noticeable to humans and animals. Full details of the seismic method and key parameters including peak particle velocity and noise levels will be provided in the EIA report. Appropriate stand-off distances between the seismic source and receptors would need to be determined.

In two-dimensional (2D) reflection seismic surveying both the sound source and the sound detectors (numbering up to a hundred or more per shot) are moved along a straight line. The resultant product can be thought of as a vertical sonic cross-section of the subsurface beneath the survey line. It is constructed by summing many compressional (pressure) wave reflections from the various sound source and sound detector locations at the halfway sound path points beneath each location (common depth point stacking). Seismic surveys are an important tool for identifying subsurface rocks of different thickness and hardness, as well as places where the geological formations are folded or faulted into possible natural gas traps. Geophysicists can identify the structure, outline, thickness and depth of the formation by interpreting the seismic section.

With cognisance for landowner requirements and the environment, the equipment to be used would be small, portable and unobtrusive. Equipment will entail 4x4 vehicles (bakkies), vehicle-mounted drills (likely small and specifically designed for off-road areas), and small trucks to transport signal source, recording and personnel support equipment. The time taken to complete the surveys varies but under good conditions as much as 10 km can be completed per day. Once surveys are completed all associated equipment would be removed from site. Where surface areas have been disturbed (by shot holes etc) rehabilitation would be undertaken to re-establish pre-exploration land use. The process of managing the impacts and rehabilitating the exploration sites would be conducted in terms of an EMPr approved by the PASA.

A diagrammatic representation of the seismic surveys is shown in Figure 2-2.

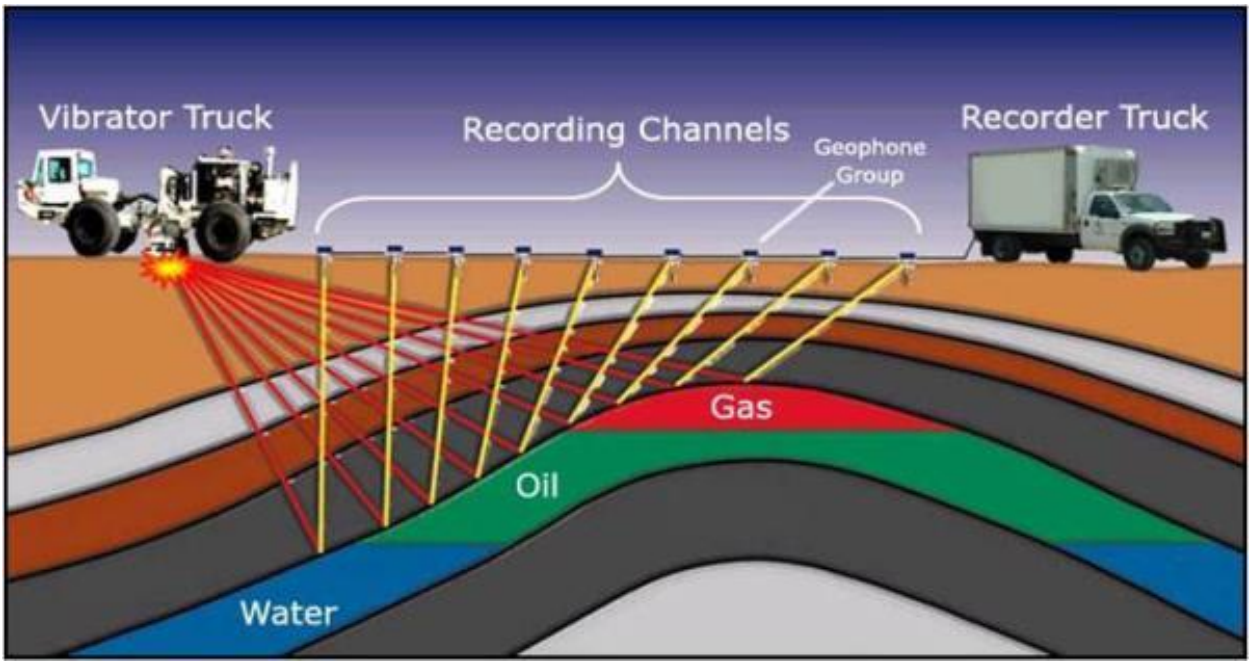


FIGURE 2-2: SCHEMATIC OF TYPICAL SEISMIC SURVEY
(in this case using a Vibrator Truck, source: http://ffden-2.phys.uaf.edu/)

2.3.7 Supporting Infrastructure

None of the proposed exploration activities require the establishment of any permanent infrastructure. Sites would be accessed on existing roads or farm tracks as available. Staff would be accommodated at a location agreed with the landowner or in nearby towns.

2.3.8 Inputs

Equipment for the seismic surveys and drilling would be provided by specialist contractors. The majority of equipment, consumables and even labour for these services is specialised. Contractors and suppliers would be encouraged to source locally as much as is feasible. Electricity, if required, would be provided by on-site generators unless an Eskom supply is available.

Water required for the operation of the drilling rig as well as potable water would be obtained from an available source and in compliance with legislation. The total volume required for drilling depends on the formations encountered, but is estimated to be less than 5 000 L per day of drilling. The total water use per hole is likely to be less than 100 000 L. The water may be bought from a supplier or pumped from a river or stream or sourced from a borehole. The daily water requirements for operations will be restricted to within the water volumes permitted by the General Authorisation (No. 1191 in the Government Gazette No. 26187 published on 26 March 2004) issued by the Department of Water & Sanitation for the taking of water from a resource or a Water Use License will be needed.

2.3.9 Outputs

Chemical toilets will be provided for the personnel. The toilets would be supplied and managed by a specialist contractor and the sewage disposed of at the nearest licenced sewage treatment works, or as required by the local authority.

All general and hazardous waste generated at the drilling site would be separated and stored in containers, before being removed from site and disposed at an appropriate waste disposal facility.

The core recovered from the drilling would most likely be stored in a core 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 (NEMWA) of 2008.

2.3.10 FURTHER EXPLORATION OR FUTURE PRODUCTION

Rhino Oil and Gas have stated that the ultimate goal for the project is to extract hydrocarbons in a commercially viable manner. However, it has indicated that there is currently insufficient information to determine if there is a resource and what techniques might be required for future hydrocarbon extraction. Prior to the early-phase exploration (as proposed) being concluded they are therefore not able to provide any information on what the future may bring with regards the extraction of hydrocarbons. In this regard early-phase exploration is the first stage of the exploration process, and a prerequisite to further exploration or future production. Refer to section 1.3 for details on the process required to develop an oil or gas resource.

What can be stated categorically is that further detailed exploration and future production do not form part of the current exploration right application. No extraction of hydrocarbons or water, no stimulation of wells or hydraulic fracturing (fracking) is proposed in the 3-year exploration work programme for which approval is sought.

If the early-phase exploration were to confirm the presence of a potential resource, then Rhino Oil and Gas would need to seek further approval from PASA for the additional exploration work required to appraise the resource. Any further approval would be subject to an additional environmental assessment process with further public consultation. Approvals are also likely to be required in terms of other legislation.

Similarly if the later exploration led to the discovery of a commercial resource suitable for development then Rhino Oil and Gas would need to secure a production right from PASA. Hydraulic fracturing could be one of the potential techniques for gas production. Any application for a production right has to be subject to an environmental assessment process with further public consultation. Approvals are also likely to be required in terms of other legislation.

All further exploration work or future production operations that may arise, if resources are discovered, is therefore beyond the scope of the current Scoping and EIA process.

3 POLICY AND LEGISLATIVE CONTEXT

In accordance with the EIA Regulations 2014, all legislation and guidelines that have been considered in the preparation of the Scoping Report must be documented. The table below provides a summary of the applicable legislative context and policy.

TABLE 3-1: LEGAL FRAMEWORK

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	RELEVANCE OR REFERENCE
Mineral and Petroleum Resources Development Act (MPRDA) of 2008. Section 79 and associated regulations (GN No. R527)	It is a legal requirement to obtain an exploration right before commencing with any exploration activity. Rhino Oil and Gas has applied to PASA for an exploration right. An exploration right cannot be granted without an environmental authorisation as per Section 79(4) of the MPRDA. This Scoping Report is one of the reports required to inform the application for environmental authorisation made under the NEMA.
Regulations on Petroleum Exploration and Production (GN R 466, July 2015)	The Regulations augment the MPRDA Regulations, so as to prescribe standards and practices to ensure the safe exploration and production of petroleum. Where the context requires, this report has addressed the requirements of the Regulations. It must be noted that the applicant only proposes to drill 'stratigraphic wells' as defined in the Regulations.
National Environmental Management Act (NEMA) of 1998. Section 2 and 24(5)	Section 2 of NEMA sets out a range of environmental principles that are to be applied by all organs of state when taking decisions that significantly affect the environment. Included amongst the key principles is that all development must be socially, economically and environmentally sustainable and that environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably. NEMA also provides for the participation of I&APs and stipulates that decisions must take into account the interests, needs and values of all I&APs. NEMA provides for a schedule of listed activities that may not be undertaken without environmental authorisation from a competent authority.
EIA Regulations 2014 (GN R 982 of December 2014)	The EIA Regulations 2014 define the requirements for the submission, processing, consideration and decision of applications for environmental authorisation of listed activities. This report has been compiled to comply with Section 21 and to meet the requirements of Appendix 2 of the EIA Regulations 2014.

2014 Listing Notices (GN R 983, 984 and 985 of December 2014)	The listing notices set out the activities which require assessment to inform an environmental authorisation decision from the competent authority. Exploration is an activity listed in Listing Notice 2 and therefore requires a Scoping and EIA process to inform the environmental authorisation. No other activities are being posed that trigger the need for an environmental authorisation.
National Environmental Management Waste Act (NEMWA) of 2008.	The NEMWA regulates all waste, including that from exploration. Listed waste management activities above certain thresholds are subject to a process of impact assessment and licensing. No activities are being proposed that trigger the need for a Waste Management Licence. Management of wastes arising from exploration must be undertaken in compliance with the NEMWA and the Regulations Regarding the Planning and Management of Residue Stockpiles And Residue Deposits.
National Environmental Management Air Quality Act (NEMAQA) of 2004.	The NEMAQA regulates all aspects of air quality, including prevention of pollution, providing for national norms and standards and including a requirement for an Atmospheric Emissions Licence for listed activities, which result in atmospheric emissions and have or may have a significant detrimental effect on the environment. In terms of Section 22 no person may conduct a listed activity without an Atmospheric Emission Licence. No activities are being proposed that trigger the need for an Atmospheric Emission Licence.
National Water Act (NWA), 1998 Section 21	The NWA regulates all aspects of the water resource, including prevention of pollution, providing for national norms and standards and the requirement for authorisation of uses listed in Section 21. Uses are either Generally Authorised or a Water Use Licence must be obtained. No activities are being proposed that trigger the need for a Water Use Licence, although certain water uses would need to be assessed once the volumes and localities are known.
Regulations on use of water for mining and related activities aimed at the protection of water resources (GN R 704)	These regulations under the NWA were made in respect of the use of water for mining and related activities and are aimed at the protection of water resources. Where the context requires, this report has addressed the requirements of these regulations.
National Heritage Resources Act, 1999 (NHRA)	The NHRA provides for the protection of all archaeological and paleontological sites and meteorites. Under the general protection provisions, no person may alter, demolish, destroy or remove any of these resources without a permit issued by the relevant provincial resources authority. In addition, any person who in the course of an activity discovers archaeological,

	palaeontological, meteorological material or burial grounds or graves, must immediately cease the activity and notify the responsible heritage resources authority. Section 38 of the Act defines the categories of development for which the responsible heritage resources authority must be notified. Amongst others, under Section 38 (c) 'any development or other activity which will change the character of a site-'(i) exceeding 5000 m^2' the responsible heritage authority must be informed of a development larger than 0.5 ha. No activities are being proposed that trigger the need for a heritage permission.
National Environmental Management: Protected Areas Act (No. 57 OF 2003) (NEMPAA)	The NEMPAA provides for protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. Section 48 of his Act restricts certain activities (incl. exploration) within protected areas.

3.1 GUIDELINES AND POLICIES

3.1.1 NEMA PUBLIC PARTICIPATION GUIDELINE

The Department of Environmental Affairs published a Public Participation in the EIA Process guideline (2010) as part of the Integrated Environmental Management Guideline series. It provides guidance on the procedure and the provisions of the public participation process in terms of NEMA and its EIA Regulations as well as other relevant legislation.

3.1.2 PASA

PASA has Guidelines for Consultation with Interested and Affected Parties (December 2011). PASA developed these guidelines as a tool to assist applicants to undertake a comprehensive consultation process as prescribed by the MPRDA.

3.1.3 MUNICIPAL IDP AND SDF

The Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs) of the district and local municipalities will be reviewed and relevant details presented in the EIA report.

3.1.4 MINING AND BIODIVERSITY GUIDELINES

The South African National Biodiversity Institute (SANBI) and partners have produced a Mining and Biodiversity Guideline (2013) to provide practical guidance to the mining sector on how to address biodiversity issues in the South African context. This guideline provides a tool to facilitate the sustainable

development of South Africa's mineral resources in a way that enables regulators, industry and practitioners to minimise the impact of mining on the country's biodiversity and ecosystem services.

The Guideline distinguishes between four categories of biodiversity priority areas in relation to their importance from a biodiversity and ecosystem service point of view as well as the implications for mining in these areas. These include areas designated as 1) Legally protected, 2) Highest biodiversity Importance, 3) High Biodiversity Importance, 4) Moderate Biodiversity Importance. The 'Highest biodiversity Importance' category is based on the mapped extent of critically endangered and endangered ecosystems, Critical biodiversity areas, river and wetland Freshwater Ecosystem Priority Areas (FEPAs) with a 1 km buffer and Ramsar sites.

The Guidelines indicates that if the presence of biodiversity features, leading to the categorisation as a 'Highest biodiversity Importance' area, are confirmed then this could be a fatal flaw or pose significant limitations for new mining projects. An environmental assessment should inform whether or not mining is acceptable, including potentially limiting specific types of prospecting or mining which may be deemed not acceptable due to the impact on biodiversity and associated ecosystem services found in the priority area. Mining in such areas may be considered out of place and authorisations may well not be granted. If granted, the authorisation may set limits on allowed activities and methods, the extent thereof and impacts.

3.2 DETAILS OF THE SCOPING AND EIA PROCESS

The "One Environmental System" for South Africa commenced on 8 December 2014 removing the environmental regulation of prospecting, mining, exploration and production and related activities from the MPRDA and transferring it to NEMA. Under the "One Environmental System", the Minister of Mineral Resources (or delegated authority) is the competent authority responsible for issuing Environmental Authorisations in terms of NEMA for mining and petroleum related activities. The Minister of Environmental Affairs, however, remains the appeal authority for these authorisations.

The EIA Regulations 2014 (GNR 982, December 2014) define the requirements for the submission, processing, consideration and decision of applications for environmental authorisation of listed activities. The DMR (with PASA as the designated agency) is the competent authority for decisions on applications for environmental authorisation where these relate to exploration as contemplated in Section 79 of the MPRDA.

Any activity that is captured in the listing notices requires environmental authorisation from the competent authority. Three Listing Notices were published (GN R 983, 984 and 985) to define activities that require either a Basic Assessment (BA) or a Scoping and EIA process in order to inform a decision from the

competent authority. Exploration is described in Listing Notice 2 and as such requires a Scoping and EIA process to inform the authorisation decision.

In accordance with Appendix 2 to the EIA Regulations 2014 the objectives of the Scoping process are:

- To identify the relevant policies and legislation relevant to the activity;
- To present the need and desirability of the proposed activity and its preferred location;
- To identify preferred activity, technology and sites related to the project proposal;
- To ensure that all potential key environmental issues and impacts that would result from the proposed project are identified;
- To agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to determine the risks and impacts of the activity; and
- To identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of residual risks that require management and monitoring.

The Scoping and EIA process consists of a series of steps to ensure compliance with these. The process involves an open, participatory approach to ensure to ensure that all impacts are identified and that decision-making takes place in an informed, transparent and accountable manner. A flowchart indicating the Scoping and EIA process is presented in Figure 3-1.

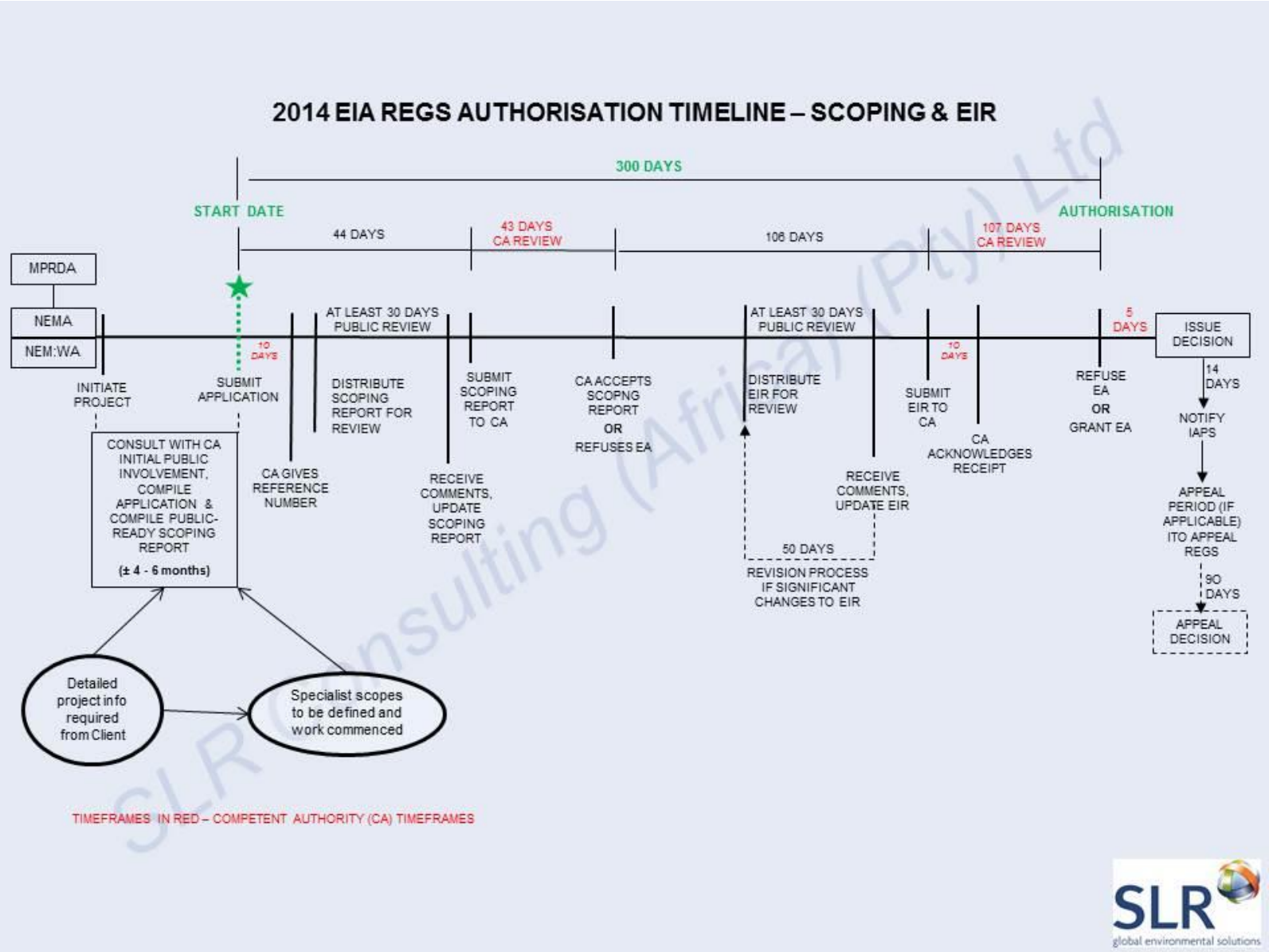


FIGURE 3-1: SCOPING AND EIA PROCESS UNDER THE EIA REGULATIONS, 2014

4 NEED AND DESIRABILITY OF THE PROPOSED PROJECT

Rhino Oil and Gas present the following rationale for the proposed project: Fossil fuels (including gas) play a central role in the socio-economic development of South Africa, while simultaneously providing the necessary infrastructural economic base for the country to become an attractive host for foreign investments in the energy sector (Ministerial foreword of the White Paper on the Energy Policy 1998). The White Paper on the Energy Policy (1998) is the overarching policy document which guides future policy and planning in the energy sector. It states that the government will, *inter alia*, "promote the development of South Africa's oil and gas resources…" and "ensure private sector investment and expertise in the exploitation and development of the country's oil and gas resources". The successful exploitation of these natural resources would contribute to the growth of the economy and relieve pressure on the balance of payments. The Department of Energy states that "The introduction of natural gas into South Africa's mainstream energy supply is an important step in the fulfilment of one of the major objectives of the White Paper on Energy Policy".

The National Development Plan (NDP) (2012) provides the context for all development in South Africa, with the overarching aim of eradicating poverty and inequality between people in South Africa. The NDP identifies the need to diversify the current energy mix and to reduce carbon emissions. There is a clear intention for gas to play a more significant role in the energy mix and the exploration of gas as an alternative to coal for energy production has been recognised as a planning priority.

The position of the NDP is reiterated in the Draft Integrated Energy Plan (IEP) (2013), which seeks to determine how current and future energy needs can be addressed efficiently. Key objectives outlined in the plan include security of supply, increased access to energy, diversity in supply sources and primary sources of energy and minimising emissions. The plan indicates that projected demand for natural gas between 2010 and 2050 would be second only to petroleum products, primarily due to increased growth in the industrial sector. It also identifies significant potential for natural gas in terms of power generation and direct thermal uses.

An increase in domestic natural gas reserves would also contribute to security of supply in the gas-to-liquids industry, which relies on feedstock from coal, oil and gas reserves. The Draft IEP points out the vulnerability of the liquid fuels industry and its economy to fluctuations in the global oil market, given that South Africa is a net importer of oil. Furthermore, existing gas stocks in the domestic offshore are declining, and new sources of feedstock are required to support and increase production in the gas-to-liquids industry (NDP, 2012).

As such, exploration for additional domestic hydrocarbon reserves is considered important and any discoveries would be well received by the local market. The Department of Energy's Integrated Resource Plan (2010-2030) supports this view, stating that regional and domestic gas options should be pursued.

In essence, the government's official position is that exploration and development of oil and gas fields should be encouraged.

The oil and gas industry in the United States provides $300bn in additional revenue per year to US economy and supports around 10 million Hydrocarbon related jobs. Benefits of oil and gas exploration in the US include the following:

- Direct employment leads to a 3-fold increase in indirect employment. Direct job creation in the form of oil industry employees - specialist labour (petroleum engineers, drilling teams) and artisans (welders and fitters).

- Support service jobs are the major benefactors of petroleum production. Indirect job creation as the spin offs to hydrocarbon availability which include; Housing, retail, education, healthcare, food services, manufacturing, transportation and construction.

- Lower cost of energy

The real benefits of an oil and gas industry would come over the long term. South Africa's onshore oil and gas market is still in its infancy and by supporting domestic exploration, South Africa may one day realize the benefits of an oil and gas industry as the United States has.

The identification of potential geological structures or "prospects" within the proposed exploration licence area for future exploration and possible well-drilling provides an opportunity to develop a South African oil and gas industry resulting in long-term benefits consisting of access to new energy sources, improved security of supply, major in-country investments in a development project and reduced dependence on the importation of hydrocarbons. There is also potential in the long-term for local economic stimulation through direct employment, future business opportunities, royalties and tax revenues.

In summary, exploration success would result in long-term benefits for South Africa consisting of access to new energy sources, improved security of supply, major in-country investments in a development project and reduced dependence on the importation of hydrocarbons. Every barrel of oil or cubic foot of gas that is produced domestically instead of being imported will mean more jobs, faster growth and a lower trade deficit.

5 PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED ALTERNATIVE

Early-phase exploration, for which approval is sought in the case of this exploration right application, is undertaken with the purpose of identifying whether a petroleum resource that could be investigated further does exist. In previous decades exploration techniques generally involved drilling at sites where surface geology or 'hunches' lead companies to believe a resource may be present. This resulted in the drilling of many wells, a large number of which were unnecessary. Exploration has advanced to use scientific methods (systematic geological mapping, geochemical analysis and seismic surveys) to identify rock formations likely to contain petroleum resources. This has resulted in a significant increase in the success rate of exploration and much less 'unnecessary' disturbance.

Current early-phase exploration methods allow for the identification of locations of potential petroleum resources with the least risk in regards to cost, safety and potential environmental impact. Rhino Oil and Gas is thus of the opinion that the methods proposed for this early-phase exploration are the preferred alternatives to investigate the presence of any petroleum resources.

5.1 DETAILS OF ALL ALTERNATIVES CONSIDERED

5.1.1 PROPERTY OR LOCALITY

Exploration Right Application Area

The purpose of exploration is to acquire and evaluate relevant data to determine where an oil or gas resource may be located. The process is iterative with data gained in early phases being used to improve the level of knowledge and refine the anticipated (or known) extent of the resource. The exploration process begins with the development of a regional perspective of the geology to determine where conditions may exist that are conducive to hydrocarbon formation. Given the low level of accuracy of the publicly available data, it is necessary to hold a right over a large area such that with ongoing data collation and refinement any identified resource is within the boundaries of application area. The expected dispersed nature of petroleum resources is such that a reasonably large area is required initially in order to secure a resource that may be economically viable. The result is that exploration right application areas are typically made over extensive areas.

It is not possible for more than one exploration right to be held over land for the same mineral and thus an application area must be distinct from other exploration rights (and applications). See the PASA map (http://www.petroleumagencysa.com/index.php/maps) for details of all existing exploration rights and applications. The extent of the Rhino Oil and Gas' exploration right application area is such that it does not overlap with other areas. See the latest version of the PASA Hubmap in Figure 5-1

As mentioned previously, in terms of Section 48 of the MPRDA an exploration right may not be held over land comprising residential areas, any public road, railway or cemetery, any land being used for public or government purposes or reserved in terms of any other law or areas identified in terms of Section 49 of the MPRDA. Section 48 of the NEMPAA further restricts exploration from all protected areas. An exploration right therefore cannot be granted over such properties.

Properties for Exploration Activities

The nature of exploration and the accuracy of the initial data available at the time of application are such that it is not possible at this point in time to define the location for most of the proposed activities. With exploration being very costly and having a low chance of success, Rhino Oil and Gas is motivated to undertake the fewest activities in the most cost effective manner. Thus exploration is undertaken in an iterative manner with the data gained in early phases being used to improve the method and locality of the work planned for the later phases. It is therefore only possible to determine the properties where on-the-ground activities (e.g. core drilling and seismic surveys) may take place once the initial phases have been undertaken. These initial phases can only be undertaken once an exploration right is granted. Private property would only ever be accessed with prior consent of the landowner and then in terms of a written Access Agreement.

Locality of Activities

The specific locality of on-the-ground activities (e.g. core drilling and seismic surveys) can only be identified once the initial exploration phases have been undertaken and the target areas identified. The nature of the proposed exploration activities is such that the target sites are not bound to fixed locations but are somewhat adjustable. This provides Rhino Oil and Gas with flexibility to position the sites for on-the-ground activities that would avoid local sensitivities.

Rhino Oil and Gas is aware that there are many potential restrictions that could prevent them from undertaking certain exploration or production activities at specific sites. These restrictions take many forms and may be legislated, regulated or best practice. It is the role of the environmental process to identify all such constraints and restrict or prohibit exploration activities through documented management commitments. An example of a constraint which prohibits specific exploration activities in certain areas (i.e. no wells within 1 km of a wetland), but does not prohibit the granting of a right is Sections 122 (2) and (3) of the Regulations on Petroleum Exploration and Production (GN R 466, June 2015).

Rhino Oil and Gas will commit to an environmental management programme that specifies the type of sensitivities that must be avoided (e.g. residences, wetlands, watercourses, etc), with necessary buffers where required. Each locality would be subject to an environmental site assessment and approval from PASA to ensure that the activity is not being placed at a sensitive site. Rhino Oil & Gas would ensure that

all of its activities are undertaken in a lawful and environmentally responsible manner and exploration activities would not be undertaken at a site where it is not lawful to do so.

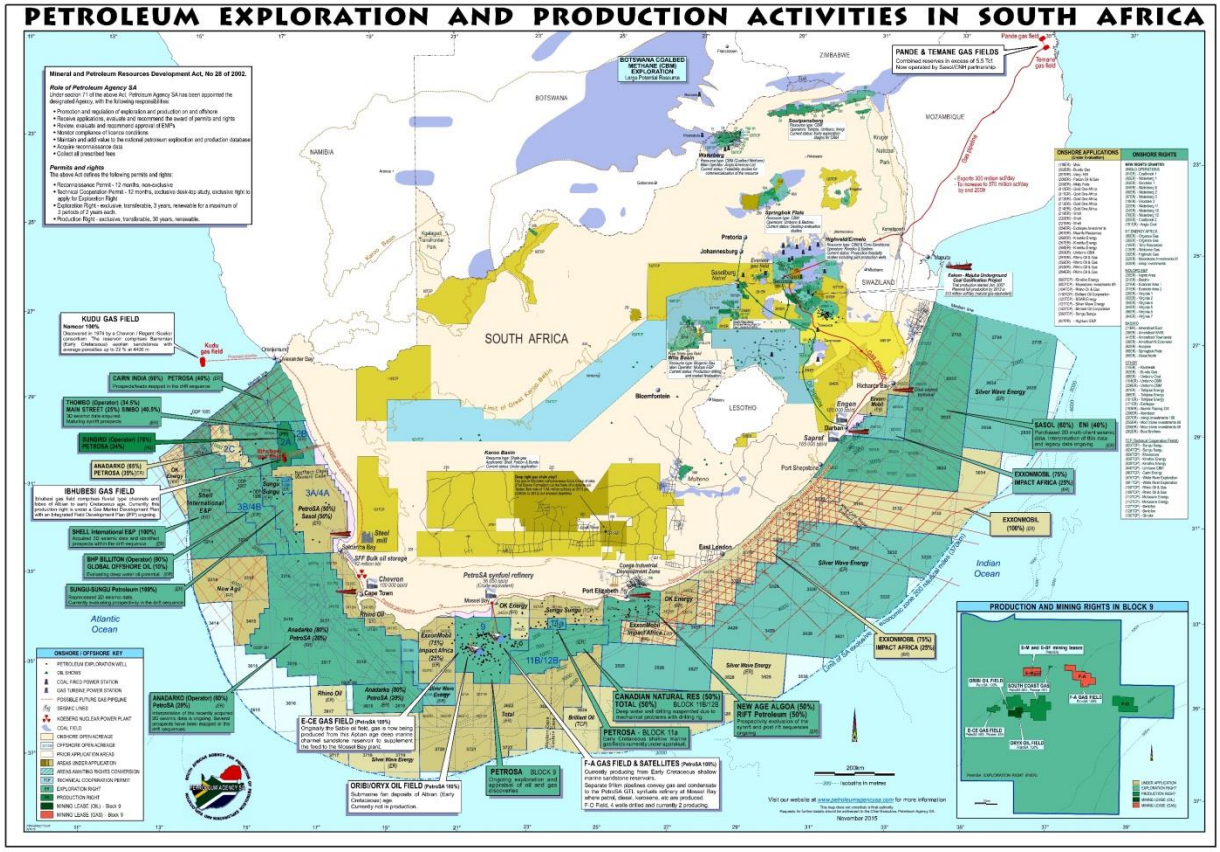


FIGURE 5-1: PASA HUBMAP
(source PASA website)

5.1.2 TYPE OF ACTIVITY

Exploration techniques have improved over the past decades such that many of the activities undertaken are now of low intensity and have relatively low risk to the environment. This is particularly true for early-phase exploration where the exploration is not interrogating a resource, but is solely attempting to identify the most prospective areas for further investigation. Being very costly and having a low chance of success, an exploration company is financially motivated to undertake the fewest activities in the most cost effective manner. Thus exploration companies increasingly use remote sensing techniques for the identification of petroleum resources.

The desktop and data processing activities have no environmental impact and are not considered further in this report. It is relevant to note that Rhino Oil and Gas is intending to gather as much information as is possible from desktop and remote sensing methods as opposed to on-the-ground, field methods. A

limited number of the activities proposed in the exploration work programme would actually require physical, on-the-ground activity.

5.1.3 DESIGN OR LAYOUT

At this stage it is not possible to determine specific details for the various types of exploration activities planned as they can only be established once initial exploration (desktop in this case) is undertaken. This includes:

- The possible grid pattern for the FTG survey (maximum of 4000 km^2). The flight parameters, survey grid and timing can be adapted to some degree depending on land use, weather and other restrictions.
- The possible sites for the 10 (maximum) core holes. The layout of 10 drill sites is very flexible and can be adapted to meet the requirements of the locality. The site layout is typically an area of 30 m by 40 m, with a 10 m by 10 m area forming the working platform and the balance used for equipment storage, staging and parking. In most cases a non-standard layout would not be necessary as drill sites would only be located at sites that are compatible with drilling.
- The possible routing of the 125 km (maximum) of seismic lines. Substantial flexibility is inherent in seismic surveys and the routes would be shifted to avoid areas deemed unsuitable for the seismic activities. Rhino Oil and Gas would plan the layout with cognizance for: logistical constraints associated with land access; incompatible land use or infrastructure (e.g. existing groundwater boreholes); the locations of ecologically sensitive areas and buffer zones.

Any access and use of the land for exploration activities would be through an Access Agreement negotiated between Rhino Oil and Gas and the landowner (or lawful occupier). Thus each landowner would have input in where exploration activity could take place on their land.

5.1.4 TECHNOLOGY

5.1.4.1 Core holes

Rhino Oil and Gas has only proposed the drilling of stratigraphic core holes for this early-phase exploration. The stratigraphic core holes are drilled solely for the purpose of obtaining information on the geological, structural and stratigraphic parameters for the purpose of discovering a petroleum resource. These boreholes, and the equipment used to drill them, are of the same type and scale as the water boreholes present on most farms and prospecting boreholes used for other minerals. In fact the diameter of the core borehole is actually too small for the boreholes to be used for water abstraction.

Rhino Oil and Gas has proposed the use of rotary (diamond) core drilling to implement the stratigraphic core holes. The alternative is to use Percussion / Reverse Circulation (RC) Drilling. The two main limitations of Percussion / Reverse Circulation drilling method for petroleum exploration are the fact that

the depth of drilling is limited by the air pressure, and that the cuttings are delivered to surface as finely crushed material. The rotary core method delivers a cylindrical core of rock for detailed examination. Having an in-tact core sample allows for better interpretation of stratigraphy and in-situ parameters. These factors mean that diamond core drilling is best suited for exploration core drilling.

Rotary (diamond) core drilling can be done using truck mounted drill rigs which are relatively small and efficient. Water and drilling fluids are required to be used to maintain cooling and lubrication of the bit and to return the fine drill cuttings to the surface. To limit risks of pollution the drilling will be done with approved drilling fluids only and return water will be managed in above surface sumps. Details of the drilling fluids and return water management will be provided in the EIA.

An alternative that could have been considered is to drill permeability or pressure-testing wells as part of a more advanced appraisal programme. However, it is premature to consider these more expensive and invasive methods without knowing if and where a resource may exist. Rhino Oil and Gas has not included the drilling of any other wells for the sampling or testing (permeability, pressure testing, stimulation, etc) of petroleum resources in its application. Any such future exploration activities would need to be subject to a separate EIA process (or environmental authorisation amendment) process, which would include a further public participation process and in-depth assessment (including specialist studies) of all project-related activities / issues.

5.1.4.2 Seismic surveys

Where existing data is not available or is required to be improved, Rhino Oil and Gas is proposing to undertake seismic surveys. Seismic surveys generate data which allows for the representation of subsurface geology through the interpretation of seismic waves reflected differently by different geological strata. Modern seismic imaging reduces risk by increasing the likelihood that exploratory wells will successfully tap hydrocarbons and decreasing the number of wells that need to be drilled in a given area. Survey activities are temporary and transitory and are thus one of the least intrusive and most cost-effective means to understanding where recoverable petroleum resources likely exist. Seismic survey methods and techniques have been improved over the past decades to result in safer, more environmentally sound practices.

Rhino Oil and Gas propose to use either the explosive-shot seismic survey method or the vibratory source method. The Vibroseis trucks (used in the vibratory method) are generally much larger/heavier and require that vegetation be cleared along the line for access and to enable the vibrating plate to make good contact with the earth. Explosive-shot surveys require the survey line to be accessed by bakkies or light-trucks to drill the shot holes. The drilling would cause some local surface disturbance and the operation requires management to minimise impacts. Vibroseis trucks could be used in areas of low sensitivity or nearer to urban areas. The two methods also generate slightly different peak particle velocity and noise levels.

5.1.4.3 Further detailed Exploration or Future Production Activities

The current early-phase exploration work programme, for which environmental authorisation is being sought, does not include activities other than those proposed to identify whether a petroleum resource exists that could be investigated further. Rhino Oil and Gas has not proposed to undertake any work beyond the early-phase exploration. Thus no detailed exploration nor permeability testing, pressure testing or hydraulic fracturing is included in this application. The need for such activities, if at all, can only be determined once the early phase exploration has provided the necessary information.

The consideration of alternatives to these further exploration or future production activities would need to be considered in the separate EIA (or environmental authorisation amendment) process, which would be required.

5.1.5 OPERATIONAL ASPECTS

Rhino Oil and Gas has indicated its commitment to undertaking exploration in a manner that provides the optimal results while minimising disturbances to landowners and the environment. It is effectively only the proposed seismic surveys and core borehole drilling that have operations which could cause impact and for which alternatives or adaptions should be considered. At a high-level, both of these activities require access to property; have the potential to disrupt land use and disturb ecology and biodiversity; could result in the pollution of soil and water resources.

The primary mitigation to limit environmental impacts and risks is the undertaking of as least work as possible. Rhino Oil and Gas has proposed a very limited work programme for the early-phase exploration which would provide the required regional information to inform a decision on whether (and where) to proceed to an appraisal stage.

The next level of mitigation would be the appropriate siting of any exploration activity at localities of low sensitivity. This would be achieved through desktop GIS-based screening and then a site assessment to confirm the conditions of the final location. Given that the precise location of exploration sites is reasonably flexible, it should always be possible to locate the activity at a site of low sensitivity, thereby mitigating the majority of impacts. Mitigation to reduce environmental impacts and risks of activities can be applied through operational management and the adoption of best practice. The EMPr that will be developed and approved through this EIA process would define the operational aspects to ensure appropriate management and mitigation of risks.

5.1.6 THE "NO-GO" ALTERNATIVE

Not undertaking the proposed early-phase exploration would prevent the disturbances and potential impacts to the natural environment and agricultural activities as will described in the course of this assessment.

The implications of not undertaking the proposed early-phase exploration is that no information on the potential for an oil and gas resource in the region would be derived. Exploration is necessary to determine if there is or is not an oil or gas resource worthy of further investigation (but will not determine whether the resource could be abstracted in an economically viable manner). In the absence of the exploration a potential petroleum resource cannot be identified, understood or assessed.

Without this knowledge no oil or gas field development would be able to occur. In the absence of oil and gas production there would obviously not be any of the potential risks of that work. Similarly the potential benefits of oil and gas production would not be derived.

5.2 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

This section describes the public participation process ("PPP") that was undertaken prior to the completion of the Scoping report. It provides specific details of the information provided to landowners, community, organs of state and interested and affected parties (I&APs) and all interaction that took place. The primary intent was to inform landowners and other I&APs of the proposed exploration right application, in sufficient detail, in order that they may contribute meaningfully to the identification of impacts and alternatives during the Scoping phase. The PPP included the following:

5.2.1 Competent Authority Consultation

A pre-application meeting was held with PASA in Cape Town on 31 July 2015. The purpose of the meeting was to discuss the legislative requirements and the approach to the EIA process to ensure agreement and compliance. In particular the challenges of carry out landowner notification across a large application area within the timeframes of the EIA Regulation 2014s were highlighted.

SLR subsequently met with PASA in November 2015 to discuss the EIA process and the key issues raised by I&APs at that point in time. SLR submitted in writing to PASA details regarding five key issues that were material to the overall application and the Scoping and EIA process. See Section 5.4 for a summary of those issues and PASA's response. A copy of the SLR letter and PASA's response is provided in Appendix 5.1.

5.2.2 Landowner identification

The applicant identified all properties (including farms and portions) that are included in exploration right application area (see list in Appendix 3). The properties included in the application were searched against the Deeds Office records by a land surveyor to identify the landowner. This resulted in a database of properties and owners (although such information was not available in the Deeds Office for every property).

SLR was provided with this database which included private persons, trusts, companies and various organs of State as landowners. SLR undertook a search to obtain contact information for the landowners. The search for contact details was undertaken using various resources including Deed Search, the internet, telephone books, municipal rate payer databases, farmers' union membership databases, verbal communication with other landowners, and referrals, etc. (such information was not obtained for every landowner).

All landowners for whom contact details were obtained were notified of the application and EIA process by means of a letter and Background Information Document. This was sent via email, post or fax. In

some cases landowners have been notified by referral from a person whom SLR had notified. The list of landowners that have been notified of the project is provided in Appendix 5.2.

To date the minimum percentage of landowners who have been sent a notification is ~97%. The effective percentage may in fact be higher or lower as:

- contact details obtained may not be current with the result that the landowner did not receive notification; and
- many I&APs who have participated are landowners but have not disclosed which properties they own and are thus not reflected as landowners.

It is acknowledged that it has not been possible to source contact information for all landowners and occupiers, and thus certain landowners and occupiers have not been directly notified. The task of notifying landowners and occupiers will be on-going during the course of the EIA process.

5.2.3 I&AP and Stakeholder identification

In addition to landowners, SLR developed an I&AP database comprising of Non-Governmental Organisations ("NGOs"), community-based organisations, commenting authorities and other key stakeholders with a potential interest in the exploration right application. This database included municipal officials, ward councilors, traditional authorities, farmer's unions and State Departments with jurisdiction in the area. The list of I&APs that have been notified of the project is provided in Appendix 5.3.

5.2.4 Site Notices and Advertisements

On the 17th of September 2015, site notices were placed at:

- Matatiele Municipal Office (A2/English and isiXhosa)
- Eastern entrance via R56 into unnamed road (A2/ English and isiXhosa
- Nkau School (A1/ English and isiXhosa)
- Mariazelle Mission School (A3/ English and isiXhosa)
- Southern Boundary (A3/ English and isiXhosa).

Proof of the placement of the site notices is provided in Appendix 5.4.

Press advertisements to notify the public of the project were placed in one local (Pondo on the 18th of September 2015, in isiXhosa) and one regional newspaper (Daily Herald on the 18th of September 2015 in English). The adverts provided notification of the application and details of EAP to be contacted for further information. See Appendix 5.6.

A second round of press advertisements for the project were placed in the East Griqualand Fever in English, Sotho and IsiXhosa on 30 October 2015. The adverts provided notification of the application and details of the public meeting. See Appendix 5.6.

To further assist with the notification process (as set out in Section 47D(c) of NEMA) notices were placed in the Government Gazette (4 March 2016).

The application has also received some press coverage with articles in a number of the local and major newspapers in the Eastern Cape. See Appendix 5.6. The project has also featured widely on social media with numerous posts and the BID and videos from the public meeting being shared on a number of social media platforms. The applications by Rhino Oil and Gas have also been the subject of a number of TV shows including Carteblanche and eNCA. This coverage has added to the notification aspect of the project.

5.2.5 Background Information Document and distribution

A Background Information Document (BID) was developed (in English and Xhosa) to provide introductory information on the project and to encourage persons to register as I&APs. A copy is included in Appendix 5.5. A notification letter and the BID were distributed (by email, fax or post) to all landowners and I&APs for whom SLR had obtained contact details. Recipients were asked to distribute the BID to anyone who may have been interested or affected by the project. At least one BID was given to each organisation at the premises in which the site notices were placed. The BID has been made available at all of the public meetings and continues to be distributed to any new I&AP. It is also available on the ftp site.

The BID was revised in January 2016 following the receipt and consideration of various key issues that were raised during the initial round of public consultation in October/November 2015. A copy is included in Appendix 5.5. The revised BID was distributed at the January meetings and to all new I&APs.

5.2.6 Local Authority meetings

A focused information meeting was held with the leadership of the local community residing in the exploration area. This meeting was held on the 29th of September 2015 at Nokhwezi Community Hall in Matatiele. The attendees consisted of traditional leaders (Matatiele and Elundini Local Municipality) and ward councilors (Matatiele Local Municipality) within the project area. These leaders were invited to the meeting via telephone, notification letters and communication through the Speakers' Offices. At the meeting Rhino and SLR provided a basic overview of the project proposal and EIA process. Attendees were then provided the opportunity to raise any issues or concerns regarding the proposed project. Five copies of the BID were provided to each attendee to distribute to their constituents or other interested

parties. Minutes of the meetings were recorded. Copies of the presentations made at the meetings and the meeting minutes are included in Appendix 5.

A focused information meeting with Elundini Local Municipality ward councilors planned for 30 September 2015 had to be rescheduled at short-notice to later in the EIA process due to prior commitments by the councilors. A meeting was held with the ward councilors of the included areas of the Elundini Local Municipality in January 2016. A meeting was also held with the Matatiele Local Municipality with the project being presented at a council meeting in January 2016.

The project team met with 3 of the 4 local chiefs represented in the area in January 2016. The minutes and attendance registers of these meetings are provided in Appendix 5.6. A meeting with the 4th local chief is planned during the course of the EIA.

5.2.7 Public scoping meeting

At the request of I&APs, a public scoping meeting was held in November 2015. All I&APs and landowners for whom SLR had contacts were invited to the public scoping meeting. The public were notified of the meetings via the advertisements.

At the meeting SLR made a presentation on the Scoping and EIA process that was being undertaken for the Exploration Right application. The presentation included an introduction to the proposed project; an overview of the legal framework regulating exploration right applications and environmental authorisations and an outline of the environmental impact assessment process being undertaken. Rhino Oil and Gas, represented by Mr. P Steyn, provided a presentation on their proposed exploration work programme for the project. The presentation included an overview of Rhino Oil and Gas as a company, the needs and uses of oil and gas and an introduction to the proposed 3-year exploration work programme and related technical information. Copies of the presentations are included in Appendix 5.5. Attendees were provided the opportunity to raise any issues or concerns regarding the proposed project. Questions asked were documented, and where possible were responded to. Being scoping phase meetings, it was not possible to provide answers to many questions and these have been documented and will be answered as the information become available later in the EIA process. Minutes of the meetings were recorded and these are presented in Appendix 5.7 along with the attendance registers.

5.2.8 Registered Interested and Affected Party Database

All landowners for whom we have contact details are considered as registered I&APs. All identified stakeholders as well as those whom attended the public meeting, registered with the project or returned the response sheet are registered as I&APs. All registered I&APs will receive all further information

regarding the project and the EIA process. The database of registered I&APs will continue to be updated during the course of the Scoping and EIA. The database of registered I&APs is in provided in Appendix 5.

In January 2016 SLR issued a project update letter to all I&APs in order to them keep informed of the progress and developments with the EIA process. A copy of this letter is included in Appendix 5.5.

5.2.9 Review of the Scoping Report

The Scoping Report was made available for review to all I&APs for a 30 day period. See Section 1.6 for details on the review period as well as where and how to access the report and submit comments. All registered I&APs were notified by email, fax, SMS, or post of the report's availability.

This scoping report is a revised version as an initial scoping report was made available in October 2015. The current report has been augmented with the additional work and I&AP input that was completed in the extension period. See the following section.

5.2.10 EXTENSION OF SCOPING TIME

During the initial consultation period in the last quarter of 2015, many I&APs had argued that the time available in the EIA schedule was insufficient to allow for the required public consultation, particularly for an application area of such large extent. In order to incorporate further public interaction and investigation to augment the Scoping process, SLR applied to PASA for an extension of time. In December 2015 PASA granted an extension for the scoping process, with the requirement that the final scoping report should be submitted to PASA by the 20th of April 2016. The relevant correspondence with PASA is included in Appendix 5.1

5.3 SUMMARY OF ISSUES RAISED BY I&APS

The issues and concerns raised by I&APs and regulatory authorities during the Scoping phase to date have been compiled into a Comments and Responses table (see Table 5-1). The table provides a summary of the issues and concerns raised by I&APS during the scoping meetings, through completed response forms and direct submission. Also included in the Table are responses to the question or issue. Where necessary the issue or concern will be carried through into the Scoping and EIA reports to be addressed.

Copies of all written comments received from I&APs are also included in Appendix 6. It is noted that comments continue to be received from I&APs and those received after the report was drafted are not included in this report. These will be included in the following report.

TABLE 5-1: SUMMARY OF COMMENTS AND RESPONSES FROM I&APS

(As received up to 26 February 2016)

No.	Comments received		Names, mode of communication and date	Response provided (as adapted for the purpose of the scoping report)
1.	**Categories**	**Procedural Related Issues: Process**		
1.1	**Regulatory Authorities Comments**	The Department of Water And Sanitation (DWS), Eastern Cape would be an interested and affected entity in this case. Would you or your delegated partner send a Background Information Document (BID) to Mrs. Lizna Fourie at DWS, E.Cape (Water Use Authorisation unit). If you have already done so please ignore this correspondence.	Mlondolozi Mbikwana (DWS), Email, 21 September 2015	The DWS is registered on the project database (see Appendix 5.3) and as such was sent a copy of the Background Information Document in Sept 2015.
1.2		Your application for environmental authorisation in terms of regulation 16 of the Environmental Impact Assessment Regulations, 2014 (EIA Regulation) is hereby acknowledged. Please note that you are required to submit co-ordinates of the boundary of the application area.	T Motloung, Petroleum Agency SA, Email, 19 October 2015	The boundary co-ordinates were provided to PASA and are included in Table 2-1 in this report.
1.3		Furthermore, you are required to inform us of the dates and place you intend to hold public consultation meetings with interested and affected parties.		PASA was advised of the dates of all public engagement meetings.
1.4		We received the Review of Draft scoping Report for Environmental Authorisation, thank you.	Phole Mothibe, Matatiele Local Municipality, Email, 21 October 2015	This comment is noted.
1.5.1		**1. Verification of Environmental Attributes:** No site assessments were carried out to corroborate the information derived from the desktop study. Limitations cited under 1.7 of the draft scoping report (Assumptions and Limitations) for the lack of the site assessment such as the size of the application area, information and time constraints are not acceptable. Where desktop study is used during the environmental assessment, it is common cause for it to be authenticated by physical site assessments in order to provide definite characteristics of the application area. In this regards, you are required to undertake physical site assessments of the application area and present the results thereof in the Final Scoping and Environmental Impact Assessments Reports.	PASA comments on DSR. Letter dated 26 November 2015:	Please refer to Sections 2.3.5 and 2.36 which give an indication of the provision for site assessments. Please refer to the plan of study for EIA detailed in Section 7 of the Scoping report.

1.5.2		**2. Consultation with interested and affected parties** 2.1. The large size of the application area, limited timeframe for the compilation of the scoping report and the large number of the landowners and occupiers cannot be used as a justification for the lack of consultation with affected landowners and lawful occupiers of land. The efforts carried out by the applicant in identifying and consulting with affected landowners must be clearly demonstrated and in this regard you need to indicate the percentage of landowners identified, notified and consulted, remaining percentage of those parties that were not notified or consulted and stating specific reasons for not notifying and consulting with the,. Furthermore you need to prove that meaningful consultation with affected parties was carried out.	Please see Section 5.2 of the Scoping Report for information on the public participation process that has been undertaken. Section 5.2.2 gives details on the percentage of landowners identified, notified and consulted. Refer to sections 5.3 and 5.4 for the results of consultation to date. The public consultation process is ongoing and will continue throughout the EIA.
1.5.3		2.2 It is identified that the meeting scheduled with Elundini Ward Counsellors has to be rescheduled; however it is not clear as to when will this meeting be taking place. Please note that consultation with directly affected parties is crucial and therefore it is expected that meaningful engagements with this affected community takes place.	Please see Section 5.2 of the Scoping Report for information on the public participation process that has been undertaken.
1.5.4		**2.3 Conducting a fair public participation process:** During the meeting held in Matatiele on the 29th of September 2015, a communication barrier during the consultation process was observed, and this was mainly caused by the absence of a translator i.e from Xhosa/Sotho to English and vice versa. You are required to conduct consultation meetings in a manner that takes cognisance of the literacy of the affected community, potential language barriers, etc.	Please see Section 5.2 of the Scoping Report for information on the public participation process that has been undertaken. SLR endeavours to cater for all the languages that are anticipated at meetings. At the meeting in question English, Afrikaans and Sotho were provided for. Only isiXhosa was not. At subsequent meetings held with the Traditional leaders/councils/communities all local languages were provided for.
1.5.5		**3. Detailed Description of the Proposed Activities:** Detailed description of the proposed exploration methods with respect to the following must be provided: 3.1 Seismic survey 'shot hole' method is required, particularly information that relates to the type and amount of explosives to be used per hole, rate of vibrations to be expected, handling and management of explosives, rate and level of vibrations etc. and such information must be included in the Final Scoping Report.	Please see Section 2.3 of the scoping report for details on the exploration method. Where required, further details will be provided in the EIA report.
1.5.6		3.2 Drilling methods: provide type of muds to be used and how the drilling muds coming out of the well bore will be handled and managed.	

1.5.7		**4. Impacts and Risks associated with drilling operations:** It is identified that Table 5-5 on page 5-68 only assesses impacts associated with seismic surveys, and does not include potential environmental and social impacts associated with the proposed drilling of stratigraphy boreholes. Preliminary identification and assessment of the potential environmental impacts associated with drilling operations is necessary at this stage in order to determine issues that need further assessment during the Environmental Impact Assessment stage.		As per the EIA Regulations 2014, it is necessary to document how the preferred alternatives were selected. Table 5-5 provides a comparative assessment of the different alternatives that are being considered. The section does therefore not aim to identify and assess all the potential environmental impacts. As there are no feasible alternatives technologies for core hole drilling a comparative assessment was not undertaken. The impacts of the exploration work programme (See Section 2.3 of the report) will be assessed by the methods detailed in the plan of study (see Section 7). The results of the impact assessment will be provided in the EIA.
1.5.8		**5. Consultation with Existing Mineral Holders:** You are required to consult with relevant regional office of the Department of Mineral Resources to establish if there are any mineral rights/permits granted or pending in the area. If there are rights or permits granted over the application area, you wil be required to notify and consult with the affected rights/permit holders in order to prevent any potential conflicts. Furthermore, you will be required to establish potential cumulative impacts that may arise from potentially overlapping activities and determine appropriate mitigation measures.		This will be undertaken prior to the conclusion of the EIA .
1.5.9		**6. Protected Areas:** Section 5.4.6 'Biodiversity' of the draft scoping report identifies the existence of protected area within the application area and further indicates that these areas have been excluded from the extent of the exploration right application area. Please exclude protected areas. The applicant is therefore required to submit a revised Regulation 2 (2) sketch plan for our records.		This will be undertaken prior to the conclusion of the EIA.
1.5.10		**7. Land claims:** We have noted that the Department of the Rural Development and Land Affairs has not been consulted regarding the land claims status of the area in question. You are encouraged to consult and follow up on the matter to ensure that potential claimants are consulted		This will be undertaken prior to the conclusion of the EIA.
1.5.11		**8. Guidelines and policies:** You are required to include Guidelines on Public Participation Process compiled by the Department of Environmental Affairs under item 3.1 of the draft scoping report and reference must be made to the said guideline during the Scoping and EIR process.		Noted
1.5.12		**9. Financial Provision:** We refer to the statement 'Rhino would discuss and conclude the nature and quantum of the financial provision required for the management and remediation of environmental damage with PASA prior to any exploration activities being undertakes under item 7.9.1 'Financial Provision', please note		Noted

		that the final EIA report must contain the quantum and propose the guarantee method to be used.		
1.5.13		1**0. Consultation with various state departments:** At a minimum, the following state organs must be consulted during Scoping and EIA phases: -South African Heritage Resources Agency, -Department of Mineral Resources -Department of Agriculture, Fisheries and Forestry -Affected District Municipalities		Please see Section 5.2 of the Scoping Report for information on the public participation process that has been undertaken. Details of the state organs included as I&APs are listed in Appendix 5.3.
1.6	**From I&APs**	Consultation with communities is important. There are mining companies with local interests whom have not consulted.	Ward Councillor, Scoping Meeting, 29 September 2015	Consultation with the holders of mining rights will be undertaken once the information on overlapping rights is received from the DMR.
1.7		What consultation has been undertaken and will be undertaken?		Please see Section 5.2 of the Scoping Report for information on the public participation process that has been undertaken. Also see Section 7.8 of the report for future opportunities to participate.
1.8		Meetings with the community will be necessary.		Various meeting have been held during the Scoping Phase thus far. See Response 1.7 above.
1.9		Who has been engaged with and was the mayor invited to this meeting?		The mayor of Matatiele was invited to the November and January meetings. See Response 1.7 above.
1.10		When and where will public consultation meetings take place for the Matatiele application	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, Email, 20 and 21 October 2015	Refer to Response 1.7.
1.11		It is indeed an unsatisfactory public participation process, as you say. We are very concerned residents of Matatiele. Our small NGO (ERS) operates as a local social enterprise / NGO, championing the restoration of the uMzimvubu catchment (through the UCP), and moonlighting as EAPs on infrastructural development projects to earn a living and support our NGO work. We are thus familiar with the NEMA prescribed consultation process, and would like to ensure that the affected folks in the target area are properly informed and consulted, and not let down by an improper or biased process.		Many I&APs have argued that the time available in the current EIA schedule was insufficient to allow for adequate public consultation for such a large application area. Requests were made that the public participation period be extended to allow for a more meaningful process. There is also a related argument that the method of consultation has not been adequate given the demographic and cultural diversity of potentially interested and/or affected parties that are resident in the large application areas. There were also requests for additional public meetings. SLR applied to PASA for an extension of time in the scoping process. The further public participation that was undertaken is also detailed in Section 5.2 of the Scoping Report.

1.12		We would strongly request (maybe even demand) an open public meeting during the scoping phase, above and beyond a focus group discussion, as you have suggested. It is noteworthy that your publications have not been placed in publications that are locally read or circulated in the Matatiele/Mt Fletcher area (this is not compliant with s41(2)(c)) of NEMA regs).	
1.13		We are afraid that a one-sided public 'consultation' process which only involves local governance leaders may result in a skewed perception of the options, impacts and alternatives, with an unbalanced view dominated by prospective job creation through mining activities. Your client is bound in terms of s40(2)(d) of the NEMA Regulations to consult with all potential interested and affected parties. Your intentions really do not adequately address proper notice or consultation	
1.14		We are not trying to create obstacles for you: we are simply to try to secure our constitutional rights as citizens to a healthy environment, as well as align with the spirit and intent of our environmental legislation. The obvious shortcomings in your process which will undermine your application, and we suggest you take heed of these in order to facilitate the way to a more honest and transparent process, which draws on all the views and interests of local residents that have a right to be considered.	
1.15		We offer to assist SLR in ensuring that I&APs in the Matatiele area are meaningfully consulted and provided with opportunities to understand the full extent of the proposed activities. None of us deny that we need access to energy, but the consideration of renewable options, along with the trade-offs for long term catchment and human health of fossil fuel extraction, must be part of the assessment agenda.	
1.16		We look forward to the opportunity to meet and discuss these concerns with the full spectrum of I&APs, along with the queries posed in our letter submitted 5 October, attached again.	
1.17		We can also provide access to extensive information on the area, including the District EMF, local groundwater development plans, District climate change response strategy, biodiversity data, etc.	This comment is noted.
1.18		Together with our key local partner, Conservation SA, we have spent the last 4 years mobilising an active civil society alliance in the upper Matatiele watershed area, with a common vision of securing water and livelihoods, and the proposed prospecting goes directly against this vision and the investments in realising it.	The potential impact on water resources has been identified as a key issue that requires further investigation. Refer to Sections 5.4.8 (Groundwater) and 5.4.9 (Surface water) in the Scoping Report for a description of identifies issues and responses thereto. The terms of reference to assess these water related issues are set out in section 7.5.2 of the scoping report.

1.19		I believe that as an environmental consultant you are in this for moral reasons, and not just as a consultant.		SLR has been appointed as the independent EAP responsible for undertaking the required environmental assessment and conducting the public participation process. SLR has no vested interest in the proposed project and has declared its independence as required by the EIA Regulations 2014. None of the SLR personnel involved in the environmental assessment process have any interest in the project other than fair payment for consulting services rendered as part of the EIA process.
1.20		EAPs are expected to be independent so as to may engagement and participation of I&APs easy and without glitches. How do you publish information on these non-significant newspapers and then have meetings with traditional leadership that you know quite well do not understand the PPP as per NEMA and finally FAIL to inform us though we have registered with you as I&AP??? That could tell us one thing about you approach and choice of I&AP. That MAY raise questions about your independence and I do not think is doing the applicant any good.	Sinegugu Zukulu on behalf of the Umzimvubu Catchment Partnership Programme , Email, 21 October 2015	Refer to Responses 1.7 and 1.19.
1.21		We would like this process to be as transparent as legislation expects it to be.		The EIA process is being undertaken in terms so the EIA Regulations 2014. Also refer Response 1.7.
1.22		Please give us an opportunity to participate in the scoping phase. We would really appreciate a meeting public open meeting with you sooner.		Refer to Response 1.7.
1.23		I work for an NGO in the Matatiele area and I'm also from the rural areas by the Drakensburg Mountains that you want to drill. I am of the opinion that rural people are always and forever undermined. The previous apartheid government undermined us and the ANC government is also doing the same thing. SLR and Rhino are also doing exactly the same by not taking the project/ meeting to the rural people.	Mosilo Kwali, Public meeting in Matatiele, 09 November 2015	Refer to Response 1.7.
1.24		We want to be involved and be given the respect we deserve by being included in all the projects in our area.		
1.25		We want the facts about the proposed project to be clearly outlined upfront and this includes activities such as fracking.		A large number of I&APs objected to the exploration right application because the proposed exploration activities may lead to a gas discovery, which may in turn lead to an application for a production right, which may include the possibility of hydraulic fracturing ("fracking") as a production method. In light of this, I&APs have stated that exploration should only be considered for approval if it can be demonstrated that all future activities arising from the exploration would not lead to unacceptable risks. The interest in and concerns around fracking are recognised and acknowledged. However, no fracking is proposed as part of the current work programme and the ER, if granted, would only allow the proposed work programme as described in Section 2.3. The current EIA is aligned to the early-phase exploration work programme. The

			potential impacts of further detailed exploration and future production activities will not be assessed in the EIA process. Please refer to Section 5.4.3 for further discussion in this regard.
1.26	The rural people have history of the area and they can always share the information, granted a chance to do so.		This comment is noted.
1.27	This meeting (venue and time) was not properly communicated with our people. The time of this meeting alone (12h30) doesn't cater for our rural people who need to travel back home. This meeting should be about to end by 12h30 and not only starting.	S L Maqhubu, Public meeting in Matatiele, 09 November 2015	Refer to Response 1.7.
1.28	How come we have never been consulted earlier in the process (by PASA) and other government departments?	Joyce Loza on behalf of Maloti Drakensburg Trans frontier Programme, Public meeting in Matatiele, 09 November 2015	The primary intent of the public participation process is to inform organs of state, landowners, community and other I&APs of the proposed project, in sufficient detail, in order that may contribute meaningfully to the EIA. Thus authorities are afforded an opportunity to participate and comment as part of the EIA process currently being undertaken in terms of the EIA Regulations 2014. SLR is not in a position to comment on how various government departments communicate / interact with each other.
1.29	The proposed project area has approximately 100 000 illiterate people who live in the rural areas. How is SLR going to ensure that that they are included in the public participation process (PPP)?	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, Public meeting in Matatiele, 09 November 2015	Refer to Response 1.7.
1.30	Have the traditional leaders within the proposed project area been invited to this meeting?	S L Maqhubu, Public meeting in Matatiele, 09 November 2015	SLR held a meeting for traditional leaders and Ward Councillors on 29 September 2015. In addition, traditional leaders were also invited to the public meeting held during the Scoping Phase. A further series of consultation meetings with traditional leaders and Ward Councillors were held in January 2016. See Appendix 5.7 for details. Refer to Response 1.7 for further information on the Public Participation Process.
1.31	I am a traditional leader in this area and I was not consulted as per our well-known standard traditional leader's protocol. You were supposed to have met with me to introduce yourselves and the project and my gather my opinion about the project before meeting with my people.	Chief Lebenya, Public meeting in Matatiele, 09 November 2015	

1.32		You disobeyed our protocol so please pack your bags and home. Come back when you are ready to follow our procedures.		Refer to Responses 1.7 and 1.30.
1.33		I'm a financial advisor from Matatiele, who went to King Edward High School in the town. We've advised several mining communities in the Platinum belt and currently in the Sishen area. Our experience has been that if you win over the chiefs, priests and headmasters, you win over the community & in order to win over the community you need voices that they can trust. I have very good relationships in Matatiele with a lot of key stakeholders you'd need to engage, including Mr Harrison (King Edward High School headmaster); Dr Nakin (the municipal manager) and several pastors and chiefs in the area. I'd like to meet with you and explore how we can work together to make your project agree in Matatiele. I believe the project can bring much needed job creation in the area and boost the economy in Matatiele. I'm based in Sandton, please let me know when you'd be available for a meeting.	Teboho Phooko, Email, 13 November 2015	I&APs are afforded an opportunity to participate and comment as part of the EIA process currently being undertaken in terms of the EIA Regulations 2014. Refer to Response 1.7 for further information on the Public Participation Process.
1.34	**Placement of adverts and site notices**	When and where was the application notice advertised (please can you send a copy): we found out via the email grapevine	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, Email, 20 and 21 October 2015	Refer to Response 1.7. The public consultation process is an ongoing one and will continue throughout the EIA.
1.35		We have to insist that your client's intentions to prospect be brought to the attention of all interested parties, by advertising the notice in relevant newspapers, which, for our area include The Daily Dispatch, the EG Fever, and the Natal Witness, and that all potential or registered interested and affected parties, including the competent authority, be notified in writing.		
1.36		We request a copy of the Herald and Pondo News media notices please, as well as a certified copy of the attendance register from your meeting on the 29th September so that we can, as an alliance representing the majority of civil organisations and land users in the area, identify who has been excluded and thereby ensure their participation.		
1.37		We note, furthermore, that many of the rural people in the target area are either semi-illiterate or have no regular access to newspapers of any type. We suggest that you take the provisions of s41(2)(e) to heart, and provide notice physically to remote villages through on-site notices in Xhosa and Sotho, as well as informing local headmen to include this intention in their meetings.		

1.38		Which newspapers did SLR use to advertise this project in our area? The Daily Dispatch? No, it's not a local paper. Our people hardly ever read it.	Charmaine, Public meeting in Matatiele, 09 November 2015	
1.39		Please place your adverts in our local papers and radios stations so that our people can know about your project.	Sissie Matela, Public meeting in Matatiele, 09 November 2015	
1.40		We have local radio stations (many people listen to them) which could have been used.	S L Maqhubu, Public meeting in Matatiele, 09 November 2015	
1.41		You should have brought a team consisting of people who can speak all the languages that are spoken in this area including Isi-Xhosa.	Nolubabalo Kwayimani, Public meeting in Matatiele, 09 November 2015	
1.42		SLR must address the language issue accordingly for all potential future meetings.	Tshepo Lesholu, Public meeting in Matatiele, 09 November 2015	
1.43		Literacy in very low in South Africa, most people don't read including those who are literate. Why was the mode of communication with our people only restricted to placement of adverts in newspapers?	S L Maqhubu, Public meeting in Matatiele, 09 November 2015	
1.44	**Strategic Environmental Assessment**	This process is flawed. This process should be stopped until a strategic environmental assessment (SEA) has been carried out.	Francois du Toit on behalf of African Conservation Trust, Public meeting in Matatiele, 09 November 2015	Many I&APs asked why the current SEA for Shale Gas Development in the Karoo is not applicable to all areas of South Africa where gas might occur, particularly where the resource could be shale gas. I&APs demanded that the Karoo SEA be expanded to include other areas of the country so that there is a consistent framework for oil and gas applications. Moreover, they demanded that all exploration right applications and related EIA processes be stopped until the SEA is complete. While the outcomes of the Karoo SEA may be applicable to all shale gas development in South Africa, the defined scope of the study area is limited. There is strong argument that the study area of the Shale Gas SEA should be aligned with the full geological extent of areas with shale gas potential and not limited to a specific geographical area. The public are advised to motivate to the Department of Environmental Affairs for the study area to be expanded. Please refer to Section 5.4.3 of the Scoping Report for a detailed response in this
1.45		The meeting minutes and reports must indicate that there is a need for an SEA to be carried out.		

				regard.
1.46	**Appointment of consultants**	Why did Rhino use Gauteng environmental consultants instead of our local consultants?	Phillip Rawlins, Public meeting in Matatiele, 09 November 2015	SLR is a professional company that sticks to facts and addresses them objectively. SLR also has experience in oil and gas. (Rhino) In terms of the EIA Regulations 2014, the applicant is required to appoint an EAP to undertaken and manage the EIA process. Thus, as with all EIAs, the EAP managing the process is paid by the applicant. Also refer to Response 1.19.
1.47		Did they give SLR the contract so that they can give them what they want even if it means not undertaking public participation properly?		
1.48		Who pays SLR? Is there any chance of being biased?	Mariette, Public meeting in Matatiele, 09 November 2015	
1.49		It sounds like Rhino has only put focus on underground issues and there's nothing on the above-ground environment. You must also have specialist studies to deal with environmental and socio-economic impacts of your project.	Lumko Mbuyi, Public meeting in Matatiele, 09 November 2015	A number of key issues (above and below ground) have been identified during this Scoping Study to date (refer to Section 5.3). Impacts that will be assessed in detail during the EIA Phase are summarised in Section 6.
1.50		What specialist studies will be carried out as part of this process?		
1.51	**Draft Scoping Report Comments**	1. On page (iv) of the draft Scoping Report (DSR) it is stated that it is important that the Application inform landowner and I&APs in detail to enable them to contribute meaningfully to the process. a. Per schedule 4 of the Draft Scoping Report not one registered owner in the area (which is considerable) has been so advised. This is totally irresponsible as the registered landowners are obviously interested. Their interest and contribution are being totally ignored. b. It is suggested that the Landowners details are not available to the Applicant. This is strange as they are available to everybody else through the offices of the Deeds Registry, which is the custodian of public documents. These are available to everyone in SA. All the exercise would take would be a little time but the exercise would take a conveyancer no more than a week. c. The result of that no owner has been officially notified. d. The Draft Scoping Report says that " Every effort was made potentially affected parties aware" (p1-8). This is clearly an attempt to mislead PASA. The most basic effort has not been taken.	Mark McLeod (legal advisor)on behalf of the Umzimvubu Catchment Partnership programme, Email, 19 November 2015	One of the limitations of the Scoping Study relates to the identification of landowners (see Section 1.7 of the Scoping Report). As a result of large number of landowners and occupiers in the application area and the limited availability of accurate title deed and landowner contact information, identification of and consultation with every affected landowner was not achieved, although much effort was made to make potentially affected parties aware through various other means (see Section 5.2). Also refer to Response 1.7. Requirements for consultation with each landowner that will be directly affected by the proposed drilling activities or seismic survey will be included in EMPr.

1.52		2. Advertisements to inform I&APs: a. The Pondo News and Daily Herald are not circulated locally and certainly are not read by the majority of the rural inhabitants of the area, most of whom speak Sotho or Xhosa; those who speak Xhosa do not regard themselves as Pondos at all. b. There are hundreds of access roads to the area and there are almost a hundred schools within the area. For the applicant to have arbitrarily chosen to place two adverts aside two roads, and to have advertised at two schools is woefully inadequate. c. The adverts were not read to the large percentage of illiterate interested and affected parties who are resident in the affected area. This is contradictory to NEMA's public participation guidelines.		Refer to Response 1.7. The public consultation process is ongoing and will continue throughout the EIA.
1.53		3. No explanation is proffered as to why the record of consultation is not included in the Draft Scoping Report. The written commentary submitted by the Umzimvubu Catchment Partnership Programme (UCPP) is not included in Appendix 4. In fact, the owner's names and details are not even included in appendix 4, just a list of the farm names of these properties.		The revised Draft Scoping Report includes all I&AP correspondence, meeting notes, etc. Refer to Appendix 5.7 and 6.
1.54		4. Availability of DSR for comment: i. The Matatiele Municipality and Library are located at the same place. Although located at the Municipal offices, this site falls outside of the exploration area and is not available to all I&AP's, even if they had known about its presence.b. Maclear is well outside of the area, and so not relevant. Therefore there is just a single site where the Report was made available in English. It was also made electronically via a website: the majority of the affected parties and landowners do not have internet access, and most use English as a second language.d. The applicant could have made the Report available at the following locations amongst others:- Mt Fletcher (Elundini Municipality): A large portion of the area falls within its Municipal boundaries; this is reflected in the list of farms falling into Mt Fletcher. It would have been obvious to make the report available at the Municipal Offices or Magistrates Court in Mount Fletcher. ii. The Maluti Magistrate's Court has jurisdiction over approximately half of the area. It would have been obvious to advertise and make the Report available for inspection at this officeiii. Tribal Courts and Tribal authorities in the area affected areas;iv. Stores, churches and Community halls of which there are dozens, and which are more frequented by I&APsv. Schools as mentioned above there are almost 100 within the target area.e. We suggest that the advertising		Refer to Response 1.7.

		of the report and its availability has been dramatically insufficient, in a calculated effort to slip this application through the approval process without taking the representations of the real interested and affected parties into account. This contravenes the rights of interested and affected parties to know and understand the potential impacts on their land and livelihood base.		
1.55		5. Literacy- how has the DSR been made available to those that are illiterate? In short, it has not, and these people are excluded from the process completely.		Refer to Response 1.7.
1.56		6. No detailed assessment of the area has been undertaken a) Sources of information are: i) This scoping report is just a desktop exercise. If 'Google Earth' and "google search" didn't reflect relevant and material factors the Applicant has simply ignored them. A case in point is the fact that there is a seismic fault running beneath the town of Cedarville in a northerly direction through southern Lesotho, adjacent to the area, which has been totally ignored.		The purpose of scoping is to identify key issues which need to be assessed in the EIA phase. This includes determining what work must be done to complete the description of the baseline environment. The status of the baseline environment is described in Section 5.4 of the Scoping Report. Details of the issues that have been documented and the impacts that will be assessed are set out in Sections 5.4 and 6 of the Scoping report.
1.57		ii) Furthermore the considerable efforts to responsibly steward water and ecological infrastructure in the area through the Presidential Umzimvubu Dam Project (for which the Elundini area forms part of) plus the efforts, investments, data and experience of the Umzimvubu Catchment Partnership Program in the target area have been largely ignored. Disgracefully at the public consultation meeting requested by the Umzimvubu Catchment Partnership, the Applicant and the EAP admitted to not having put a foot on the ground within the area. This is professionally negligent on the part of the EAP, and indicative of the lack of interest in the needs and right of the community by the Applicant.		Refer to Response 1.18.
1.58		b) The public consultation process has been inadequate at best, and the consultant has not physically set foot in the area: therefore the foundations of this report are shaky at best. c) There has been no attempt in the DSR to consult with and obtain information from the existing networks of Local Governance, NGO, and Govt Departments that are managing and developing the catchment areas. This is an obvious omission. It points to a purposeful shortcutting of the process to exclude the voice of these obviously interested parties.		Refer to Response 1.7.

1.59		7. The Consultants concludes (p1-8) that because he hasn't done his job and consulted properly, and hasn't even found out who the landowners are, and hasn't thought to contact the existing networks and partnership NGOs, that there will be "no negative implications in terms of credibility". It is clear that the opposite conclusion should be drawn.		Refer to Responses 1.7 and 1.51.
1.60		8. Nowhere in the Draft Scoping Report has the Applicant dealt with the IPILRA and the rights of informal communities, or protection of their land rights, on tribal land. This is notwithstanding the fact that the stated purpose of the MPRDA 28/2000 is 'to promote local and rural development and the social upliftment of communities affected by mining'.		The issue relating to land tenure and land use are dealt with in Sections 6.1 and 6.2, respectively. In summary, there would not be any change in land tenure, despite the possible issuance of an exploration right. The placement of the target sites/routes would be undertaken in consultation with the landowner/occupier to ensure that conflicting land uses are avoided where possible and disturbance to current land use activities are kept to a minimum. The use of any land for exploration activities would have to be through an Access Agreement negotiated between the exploration right holder and the landowner/occupier.
1.61		9. It would appear that the Applicant has no BEE standing. It is a stated purpose of the MPRDA 28/2002 to 'eradicate all forms of discriminatory practices in the mineral and petroleum industries'. If this is the case, why is this opportunity being given to a wholly white-owned concern, which is a subsidiary of a foreign owned entity, without even offering the opportunity to a local and more representative concern?		Rhino Oil and Gas has identified a BBBEE partner who will participate in the project if a right is awarded. Currently the upstream petroleum industry is exempt from compliance with the BBBEE legislation (GN 1047 of October 2015).
1.62		Due to time pressure, we have been unable to compile detailed comments on the draft scoping report for Rhino's applications. These comments are applicable to all applications by Rhino. While our comments should not be considered exhaustive, we do submit the following general remarks. The current application lodged by Rhino is very open –ended, while many suspect that the application is ultimately aimed at locating coal seams/coal bed methane reserves.	Jeanie le Roux, Email, 20 November 2015	Refer to Responses 1.7 and 1.9.
1.63		Regardless of the wording in the application, the use of well stimulation methods such as hydraulic fracturing becomes a reasonable likeliness, should the project proceed to advanced stages of exploration and/or production. It is therefore not ideal that the current wording is phrased broadly, as if to side step this reality.		Refer to Response 1.25.
1.64		The scoping reports also mention the possibility of using lined sumps – this is not in line with industry best practices and the regulations published in June 2015 for regulating oil and gas exploration and development require closed containers. These		The legal requirements and management of drilling fluids will be investigated in the EIA phase. The EMPr will detail the requirements for this.

		regulations need to be considered as part of the scoping, EMP and EIA phases.		
1.65	**Additional comments**	Please find attached the following documents, as part of our registration as an I&AP for the proposed prospecting application by Rhino Oil & Gas in the Matatiele area: 1. registration response form from BID dated September 2015 2. letter stating concerns and queries 3. Factsheet on the Umzimvubu Catchment Partnership Programme (UCPP) 4. Copy of the MoU for the UCPP Please acknowledge receipt of the attached, and let us know when public consultation sessions will be held as per the NEMA regulations.	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, email, 06 October 2015	The Umzimvubu Catchment Partnership Programme is registered on the I&AP database (see Appendix 5.3).
1.66		Please find herewith two registration forms as interested and affected parties for: a) King Edward High School, Matatiele which I represent as Chairman of the SGB; b) Myself as landowner in the Matatiele Municipal area. Kindly advise of all progress and meetings etc. as required.	Andrew Dummy, Email, 06 October 2015	Mr Dummy is registered on the I&AP database (see Appendix 5.3).and thus will be kept up to date with the developments in the project.
1.67		Thank you for the notification. Please could you forward us the shapefile depicting the project area.	Shane October, ECPTA, Email 22 October 2015	The shapefile of the boundary of the EC 295 ER was provided.
1.68		The presentation was very technical for most of the attendants. As a result, chances are they did not understand the proposed project. Do you think the presentation served its purpose?	Nhlanhla Ntunzwana, Public meeting in Matatiele, 09 November 2015	The intent at the public meetings was to simplify the proposed project such that the wide range of participants could understand as best as possible. The project is, however, of a technical nature and many of the terms cannot be explained without a technical content. Attendees were given an opportunity to ask questions and seek clarification where required. There were also opportunities for people who didn't understand the proposed project to have more focussed discussions after the meetings. Also refer to Response 1.7.
1.69		If the government owns the minerals underneath our land, how do we then say yes or no to the proposed project? How is meeting consultative?	Tshepo Lesholu, Public meeting in Matatiele, 09 November 2015	The decision on whether or not to grant Rhino the exploration right lies with the regulator, Petroleum Agency South Africa (PASA). Neither SLR nor I&APs have the power to grant/deny the right. PASA's decision will be informed by the findings of the EIA process and associated I&AP correspondence. The EIA reports will document the opposition raised by I&APs. A statutory appeal period in terms of the National Appeal Regulations (GN No. R993) will follow the issuing of the decision.

1.70		I find PASA's role to be a bit confusing because they are interested in exploration activities and they also issue rights.	School girl, Public meeting in Matatiele, 09 November 2015	This comment is noted.
1.71		How come PASA and other government departments including us have never been granted a chance to discuss this project? Intergovernmental relations need to be improved.	Joyce Loza on behalf of Maloti Drakensburg Trans frontier Programme, Public meeting in Matatiele, 09 November 2015	Refer to Responses 1.28.
1.72		Why have they granted you authorisation without our knowledge?		PASA has not granted Rhino any form of authorisation relating to the exploration right application. The EIA process is still ongoing.
1.73		How accessible is your scoping report to the local people?	Lumko Mbuyi, Public meeting in Matatiele, 09 November 2015	Refer to Response 1.7.
1.74		I feel that rural people are really being taken for granted. We feel disrespected and undermined by the proponents of this project. Your project will kill us, not now but in the future.	Lebohang Phakisi, Public meeting in Matatiele, 09 November 2015	Refer to Response 1.7.
1.75		There are no tittle deeds within your project area. Most of the land belongs to the government through its municipalities and the Department of Land Affairs. I know for sure that those government officials will only be concerned about job creation and nothing else.	Sakkie Maamis, Public meeting in Matatiele, 09 November 2015	All property in South Africa is under title deed. The title deeds have been accessed in order to identify the landowners. Also Refer to Response 1.51. Job creation is dealt with in Section 5.4.19 of the Scoping Report. In summary, contribution to the local economy could occur through the creation of direct employment opportunities and generation of direct revenues as a result of using local businesses for support services and supplies.
1.76		We do not appreciate the fact that your presentation did not mention or discuss fracking when we all know that fracking is going to be the outcome of your project.	Nolubabalo Kwayimani, Public meeting in Matatiele, 09 November 2015	Refer to Response 1.25.
1.77		We would like the whole team to spend time and go out to the farms- to familiarise themselves with the area and related issues so that they can be more informed about our area and also for you to understand the context in which our comments are based on.	Charmaine, Public meeting in Matatiele, 09 November 2015	Issues relating to both the biophysical and socio-economic environment have been identified for further investigation in the next phase of the EIA. Refer to Sections 5.4 and 6 for a description of these issues and impacts that will be assessed. Also refer Response 1.56.

2.	Categories	Process Related Issues: Objections		
2.1		I am very concerned about this and oppose this full heartedly! There has been enough environmental studies done and past experience to prove that this does not benefit anyone except those who are selling the oil.	Robyn du Preez, Email, 07 October 2015	A large number of I&APs objected to the exploration right application or indicated that they would be lodging an objection, as the proposed exploration activities may lead to a gas discovery, which may in turn lead to an application for a production right, which may include the possibility of fracking. NEMA and the EIA process does not provide for any mechanism to address objections. However, if requires the EAP to consider and address all issues raised by I&APs. NEMA does, however, provide an opportunity for I&APs to appeal the decision in terms of the National Appeal Regulations (GN No. R993). Section 10 of the MPRDA makes provision for the Regional Mining Development and Environmental Committee (REMDEC) to consider and advise the Minister of Mineral Resources on objections received in respect of applications for permits or rights. Thus PASA will send all objections received in respect of the current application to the relevant REMDEC for consideration before a decision to grant or refuse the exploration right is made by the Minister. Also refer to Response 1.25.
2.2		We object the proposed project. Why are you even continuing with the EA process?	Harrison Gordon, Public meeting in Matatiele, 09 November 2015	
2.3		What kind of "No" do you people want? We do not want your project in this area.	Francoise du Toit, Public meeting in Matatiele, 09 November 2015	
2.4		Why are you destroying our country? You are young South African men who should be protecting and correcting our past mistakes as your elders instead, you want to make it worse? You should be ashamed of yourselves. We do not want this project.	I&AP, Public meeting in Matatiele, 09 November 2015	
2.5		We do not want your project in our area. We will not allow you destroy our area. You are not welcome.	Phillip Rawlins, Public meeting in Matatiele, 09 November 2015	
2.6		All the members and I at the Cedarville protected environment object in the strongest terms re-process flaws and outcomes which are in direct conflict with our livelihoods and the environment.	K C Biggs, J J W Biggs, L W Biggs and P G Muir, Hand delivered, 09 November 2015	Refer to Response 2.1. Issues relating to both the biophysical and socio-economic environment have been identified for further investigation in the next phase of the EIA. Refer to Sections 5.4 and 6 for a description of these issues and impacts that will be assessed.
2.7		Further to the poorly organised and chaotically managed public participation process in KZN, in which all sectors of society throughout the province gave a resounding NO to the application by Rhino to explore for oil and gas I would like to reiterate the reasons given for the response.	Judy Bell, Chairperson: Midlands Conservancies Forum's Fracking Committee, Email, 12 November 2015	Refer to Responses 1.7. and 2.1.
2.8		Exploration will lead to mining and fracking to extract any resources found, which will detrimentally affect our lives and livelihoods, impact on our health and that of the environment and in particular,		Refer to Response 1.25.

		lead to pollution of our scarce and precious water resources. The process will lead to the enrichment of a few at the expense of the majority and our life-support systems.		
2.9		We should rather urgently pursue alternatives to the destructive extraction and use of fossil fuels to minimise the impacts of Climate Change, which are now affecting the sustainability of society throughout KZN, South Africa and the rest of the world.		This comment is noted. Refer to the need and desirability of the proposed project in Section 4 of the Scoping Report.
2.10		We write in response to the draft scoping report dated October 2015, as well as the public consultation process, and meeting held in Matatiele on 9th November 2015.11.26 As previously indicated in our submission of the 9th October 2015, and which not appended along with other written submission in the DSR (last appendix, unnumbered), we represent an alliance (the Umzimvubu Catchment Partnership Programme/ UCPP) of over 34 local organisations in the Umzimvubu catchment, all of whom have subscribed to a common vision of restoration in the wider catchment.	Nicky McLeod and Singegugu on behalf of the Umzimvubu Catchment Partnership Programme, email, 19 November 2015	Refer to Response 1.18 The revised Draft Scoping Report includes all I&AP correspondence, meeting notes, etc. Refer to Appendix 5.7 and 6.
2.11		We oppose the validity of the application to explore, on the grounds of both the unsatisfactory scoping process, as well as the risk posed by exploration and mineral development to the area:- i. Complete dissatisfaction with the scoping process: a) highly flawed and exclusionary public consultation process, and disrespect for the Traditional Authorities who are the land rights custodians and key affected parties, Communication regarding the application has been far short of sufficient to notify and allow opportunity for commentary by the estimated 50 000 rural residents of the target area, most of whom speak Sotho or Xhosa and many of whom are illiterate and don't have access to newspapers and the internet. A public meeting was only held at our insistence on behalf of the members we represent, and the resounding response to the application from this meeting was a unanimous NO to the application and to any form of exploration which could threaten our eater resources.		Refer to Response 1.7.
2.12		b. The draft scoping report does not provide spatial indication of buffered no go area such as water supply points or any efforts to delineate such areas which may not be explored and developed for hydraulic fracturing as required by MPRDA R422 S122. It does show that the entire target area in identified in the Provincial Biodiversity Plan as Critical Biodiversity Areas (aquatic and		A number of I&APs raised concern that many sites within the exploration right application area are either protected outright or incompatible with exploration and that legislation prevents such work from taking place in these areas. Refer to Section 2.1.1 of the Scoping Report for a discussion on areas excluded from the application. Also refer to Response 1.56.

		terrestrial) which should ring alarm bells and provide enough reason for a risk averse no go-approach). c. Please refer to the attached summary of the DSR by our legal advisor which provides further detail on the above procedural concerns.	
2.13		ii. Risk posed to groundwater, livelihoods and biodiversity: a. Matatiele is 100% dependent upon groundwater sources for all of its municipal water services and surface freshwater replenishment. There are a multitude of risks posed by both the proposed explorative activities (seismic survey and core drilling) as well as the development activities which could lead to if viable resources are identified underground. The intersection and linking of aquifers and surface water during core drilling and the use of unspecified drilling augmentation fluids is clearly a risk in the exploration yet this has been glossed over.	The potential impact on water resources has been identified as a key issue that requires further investigation. Refer to Sections 6.8 (Groundwater) and 6.7 (Surface water) in the Scoping Report for a description of identifies issues and responses thereto.
2.14		b. The 2013 SANBI Biodiversity Guidelines, as well as NEMPAA and NEMBA, all provide for protection of biodiversity and indicate that mining in such areas may well be incompatible with existing use and authorizations not granted. Exploration activities such as seismic survey and core drilling pose a high risk to disturbance of soil biota, wetlands and riparian zones as well as borehole integrity.	Refer to Response 2.12.
2.15		c. Seismic surveys and core drilling activities, as indicated in your BID, pose risks for inter-alia farm safety, soil and land capability, heritage resources, groundwater and socio-economic factors: the latter is a huge concern, where most rural residents of the target area derive their livelihoods from subsistence and commercial agriculture. The Mehloding hiking trail also runs right through the target area and the presence of trucks and crews creating noise and vibration will have a direct impact on the sense of place and integrity of the landscape.	Issues relating to farm safety (Section 5.4.18), soils (Section 5.4.11), land use (Section 5.4.14), heritage (Section 5.4.12), groundwater (Section 5.4.8) and social (Section 5.4.19) have been identified for further investigation. Impacts to the various environmental aspects will be assessed in the EIA (see Section 6).
2.16		We insist, as key I&APS, that the scoping report reflect the following: 1. The unanimous rejection by over 140 I&APs (mostly local citizens), including the Chief of the Mabenyeng area(western portion of target zone) of the application 29 ER to explore, as demonstrated at the Matatiele public meeting on the 9th November 2015 at Nokwezi hall.	Refer to Response 2.1.
2.17		2. The absence of any consultation process in the Municipal area of Mount Fletcher, which comprises the South Western half of the area;	Refer to Response 1.7.

		3. The absence of any consultation process in the deep rural area abutting the escarpment;		
2.18		4. An appropriate and detailed buffering of all sensitive features (water supply sources (weirs, springs, boreholes, rivers) proposed stewardship sites, wetlands, CBAs, NFEPAs and all riparian zones) be pertinent legislation, to exclude potential impacts of exploration.		Refer to Responses 1.56 and 2.12.
2.19		5. It must be noted that the new 2015 National Water Resources Strategy (NWRS2) provides for water factory identification and protection and that the Matatiele Local Municipality has intention to declare most of its jurisdiction area as a water factory, and to proclaim various levels of biodiversity stewardship protection and protected area status (land above the 1750m contour) for seven proposed parcels of land.		Refer to Response 2.13.
2.20		We believe that should the above points not be taken properly into account, that this application should be refused.		Refer to Response 2.1.
2.21		An extension of the time for the public consultation process to allow for appropriate and complete consultation with all affected parties, effective spatial/ GIS screening of no-go zones as part of screening and scoping to identify whether progressing to EIA stage is in fact warranted.		Refer to Response 1.7.
2.22		However as stated in the BID, current work may have limited impacts, but approval on the basis of explorative findings may have future cumulative and greater impacts and may be difficult to stop if investment has been made, On this basis, we call for a halt to the process and a withdrawal of the application to explore.		Refer to Response 1.25.
2.23		We also call for a moratorium on this and any current and pending applications, and their inclusion in the current CSIR SEA (Strategic Environmental Assessment, a R12 million project) for a South Africa, which currently excludes the Matatiele and adjacent KZN application targets.		Refer to Response 1.44.
2.24		We trust that our collective concerns will be duly considered during the compilation of your scoping report and look forward to your response, and to a copy of the final scoping report when it is submitted to PASA on the 26th November 2016.		Issues have been assimilated and responded to in this comments and responses table. All written correspondence is presented in Appendix 6.
2.25		Position advocated: I would like to object on this application and request that a moratorium is granted for all such gas exploration processes until a Strategic Environmental Assessment (SEA) is put in place.	Joyce Loza on behalf of Maloti Drakensberg Programme, Email,	Refer to Responses 1.44 and 2.1.

2.26		The Maloti Drakensburg Trans Fortier Conservation and Development Programme (MDTP) is a collaborative initiative between South Africa and the Kingdom of Lesotho which was established in 2001 through signing of a memorandum of Understanding (MoU) between the two countries to protect the exceptional biodiversity of the Drakensburg and Maloti mountains through conservation, sustainable resource use, and land-use and development planning. This area encompasses distinct landscapes and biological diversity. It is rich in species and high in endemism. The project takes a regional and ecosystem approach to conservation and development, and serves to promotes biodiversity conservation through linkages with community development based on realization of the region's high potential for nature based tourism. The area transcends three provinces in South Africa namely- Frees State, KwaZulu Natal and the Eastern Cape.	20 November 2015	Issues relating to both the biophysical and socio-economic environment have been identified for further investigation in the next phase of the EIA. Refer to Sections 5.4 and 6 for a description of these issues and impacts that will be assessed.
2.27		MDTP hereby wished to submit its comments in response to the above mentioned application for exploration scoping report. We wish to do this proactively to possible future developments, bearing in mind that the exploration phase, is a phase preceding possible fracking, I would like to draw your attention to a number of concerns regarding the application. Your Scoping report clearly depicts the implications of the exploration process, however does not provide a guarantee on future effects of the application. In my view, this is expected given the absence of proper strategic and environmental studies especially the Strategic Environmental Assessment (SEA). I would therefore like to raise these issues and also recommend that a SEA is conducted to clearly address concerns. In the interest of our mandate which includes managing ecosystems and their services and promoting eco-cultural tourism in this area we are more than happy to provide the applicants with information required for strategic planning processes		Refer to Responses 1.25 and 1.44.
2.28		According to your map of targeted areas, the areas affected include the Maloti Drakensburg Trans frontier Conservation and Development Area (MDTFCA), the buffer of the Ongeluksnek Nature Reserve (ONR) up to the Lesotho boundary to the west, from the near Qachas Nek to approximately 20 Km north of Mt. Fletcher in the south.		Refer to Response 2.12.

2.29		**'Appropriate buffers should be determined around the protected areas and other areas':** This is my concern. The area along the Ongeluksnek Nature Reserve (ONR) border for which the ER has been granted is the buffer area of the ONR which is a protected environmental. The significance of the reserve is:- **Nature and historical heritage values**. These are the regional and national significance, and incorporate the following:-The outstanding natural beauty and aesthetic value of the area-The biological diversity if the species and habitats associated with the vegetation types representing the southern Drakensburg which are not formally protected elsewhere-The Nature Reserve provides protection to a wetland complex which is one of only a few areas in the entre MDTP bioregion where extensive wetlands occur at the altitudes greater than 2400m. The historical significance of the role of Ongeluksnek Pass in Southern African history.**Water Protection**. The correct management of the Nature Reserve as a protected area will ensure the conservation the conservation of a portion of the Mzimvubu River Catchment in order to ensure the sustained production of high quality water. It is the only formally protected part of the Drakensburg catchment in the Eastern Cape Province.**Eco-cultural Tourism**. The natural beauty of the landscape and its historical significance together with other cultural heritage assets in the local area provides the Nature Reserve with a significant potential from an eco-cultural tourism perspective. With the added potential for a Trans frontier conservation area and tourism route linkage to Lesotho, it has the potential to become an important destination for both domestic and international visitors.I want to emphasise on the importance of the buffer area in securing the core area of the reserve, and would require clarity on how the buffer will be protected from the expected operations, Moreover, if you happen to discover the potential for fracking in the areas outside the buffer, what are the chances of not wanting to explore opportunities in the buffer.		SLR is aware of the Ongeluksnek Nature Reserve. Refer to Response 2.12. Issues relating to ecology (Section 5.4.7), water (Section 5.4.8), heritage (Section 5.4.12) and tourism (Section 5.4.19) have been identified for further investigation. Impacts to the various environmental aspects will be assessed in the EIA (see Section 6).

2.30		**Total water consumption for drilling a hole is estimated to be less than 100 000l. This water will be sourced locally is possible and by agreement with the land owner. Contamination of groundwater. This assessment concludes that drilling fluids pose a very low risk as they are largely not hazardous and/or are biodegradable, they are used relatively diluted in the drilling water (<3%) and are used in tiny volumes in comparison with any aquifer volume'.** Many publications have made us aware of the implications of subsequent fracking (we need to keep this in mind because exploration may lead to subsequent fracking once you discover the potential to mine gas). These are: -The processes of fracturing mixes water, sand and chemical compounds of which some are toxic and carcinogenic including benzene, xylene, ethylene glycol, diesel fuel, naohthaline compounds, boric acid, arsenic, formaldehyde, various acids and pesticides, are injected into the borehole to facilitate the fracking process. -Each gas well may is fracked several times to maintain the flow of gas and each gas fields may contain hundreds or thousands of such wells. -We have also been made aware that the abovementioned chemicals are detrimental to human health. For example benzene used in the mixture of fracturing chemicals is linked to leukaemia, other cancers, reproductive and developmental disorder, toluene long tern exposure is associated with birth defects and may affect the nervous system.	Refer to Responses 1.18 and 1.25.

2.31		**Water contamination and use:** The area earmarked is a water strategic area for the Umzimvubu Catchment where the Umzimvubu River System has been prioritized nationally as being one of the few remaining "near-natural rivers" but is classified as vulnerable as a result of rapid rates of degradation in the watershed. The Matatiele area is characterised by some of the priority wetlands that contribute enormously to water security in the area. Water resources in the Matatiele area yield an estimated value of 27 million per year from the Upper Catchment. The risk of water contamination is the inevitable. Groundwater wells can be contaminated with natural gas, radioactive and various carcinogens hydrocarbon compounds associated with natural gas as well as chemicals contained in the fracking solution (Earthlife Africa Cape Town). The hydraulic fracturing process uses extremely large amounts of water (100 000l is a lot for an area with local people that still rely on sips for drinking and washing water). This threatens water resources in the midst of drought which is becoming evident national. Where is Rhino going to get this water? Moreover, local rural communities still drink from sips, what happens when they get contaminated? We have seen mining applications, taking away sources of livelihoods, leaving people sick and poor, and as far as I'm concerned there is no amount of money that will ever compensate for an individual's life. We cannot allow this to happen.	SLR is aware of the value of the Umzimvubu Catchment in terms of water production and this will be given due consideration in respect to exploration during the course of the EIA. Refer to Response 1.18.

2.32		**'Small scale and isolated spillages and hydrocarbons or chemicals may occur but can generally be prevented or treated in situ with a suitable remediate product.'** The use of explosives and Vibroseis trucks to generate vibrations could damage structures. Localised compaction and soil erosion could happen on the access routes and at drill sites.- The Matatiele area is one of the areas that generate revenue from tourism, thereby contributing to the country's tourism economies. The unique tourism experience is accounted to its landscape character-the meandering grasslands, its superlative nature-scenic beauty, solitude, habitats for fauna species such as the critically endangered Bearded Vulture which is restricted to the Maloti Drakensburg Bioregion, wetland habitats for beautiful cranes species providing a tourism experience to bird lovers, flora species, cultural heritage, These are sensitive habitats, even the slightest increase in the number of trucks will have an impact in terms of increased noise, air pollution increased erosion, The increased disturbance due to the presence of trucks is highly expected to have detrimental effects to the tourism experience of the area. They will negatively affect solitude \, increase erosion in an area and impeding accessibility for tourism purposes. Some of the species mentioned above specifically the Bearded Vulture are nearly extinct, any disturbance (destruction of their habitat, noise etc.) may result in them abandoning their distribution range. Therefore we cannot take the risk of ceasing the number of vehicle access to these areas.- Even the slightest vibration form the trucks will destroy the solitude which is one of the wilderness aspects attracting tourists to this area.	Issues relating to ecology (Section 5.4.7), water (Section 5.4.8), noise (Section 5.4.16), vibrations (Section 5.4.15), air pollution (Section 5.4.17) and tourism (Section 5.4.19) have been identified for further investigation. Impacts to the various environmental aspects will be assessed in the EIA (see Section 6).

2.33		**Disturbance to vegetation cover and soil structure will be limited to very small sites which will be rehabilitated.'** I would like to bring to your attention the below, The area of ER concern is not only a key freshwater system area. In addition to that, the adjacent matrix of grassland, forest, thicket, and dune vegetation are some of the most bio-diverse in the world, with four distinct Key Biodiversity Areas (KBAs) falling within the watershed corridor. -The habitats support numerous species of plants and animals and provide a range of ecosystem services that support poverty alleviation in the largely rural and peri-urban settlements with water provision, erosion control, infrastructure protection, fodder for livestock and food security and materials for household and community use. -When intact, they also provide an important carbon sequestration function. Whilst areas may be rehabilitated, we may not recover associated fauna species relying on those habitats as they are sensitive to disturbance. The disturbance will impact negatively Whilst areas may be rehabilitated, we may not recover associated fauna species relying on those habitats as they as they are sensitive to disturbance. The disturbance will impact negatively on the climate change adaption abilities of the ecosystem found here.	Issues relating to ecology (Section 5.4.7) and soil (Section 5.4.11) have been identified for further investigation. Impacts to the various environmental aspects will be assessed in the EIA (see Section 6). Also refer to Response 2.12.
2.34		**Access will largely be through existing gates and new routed or gates only be created in agreement with the land owner.'** Given the language used in the above statement from your scoping report, there is no guarantee that there will be no new routes, this one of the land management activities we avoid in such sensitive landscapes.	Refer to Response 1.60.

2.35		**Drilling requires the use of a truck or trailer mounted, mobile drilling rig at target sites. Drill sites will be accessed using existing roads and farm tracks. The drill rig will be accompanies by supporting equipment such a water bowser, compressor and vehicle. The drill rig is manned by a staff of approximately five (5) persons. A typical diamond core drill rig and equipment required an operating area of approximately 2000m2 (ie. 40m by 50m). There may be an on-site caravan for the logging of core data.** How many of these jobs are for local communities? How many jobs will your create for specifically local communities whose land will be impacted? I am raising this because there seem to be there seems to be misconceptions with regards to the potential for job creation from this initiative. It is therefore critical to address that at length and provide clarity so that local communities are well informed prior to them making decisions.		Refer to Response 1.75.
2.36		It is therefore recommended that: -A moratorium is instituted on this application until a Strategic Environmental Assessment is conducted and we have better clarity on its implications on our already stressed environmental resources. -MDTP will gladly avail any data and technical support it has regarding the SEA process.		Refer to Response 1.44.
2.37		Thank you for providing the Eastern Cape Parks and Tourism Agency (ECPTA) with the opportunity to review and comment on the Draft Scoping Report for Environmental Authorisation: Exploration Right for Petroleum on various farms in the Magisterial Districts of Matatiele and Mount Fletcher, Eastern Cape. Please note that the ECPTA understands the motivation of the project to secure improved supply of energy resources to South Africa as well as the socio-economic possibilities that an entity of this scale may offer, however due to the high level of sensitivity of the proposed development site and its surrounding, ECPTA cannot support this development. This is based on the following:	Bev Geach on behalf of Eastern Cape Parks and Tourism Agency, Email, 20 November 2015	Refer to Response 2.1.

2.38		The project area is directly adjacent to north-eastern and southern-eastern boundaries of Ongeluksnek Nature Reserve (ONR)and falls also within 5km buffer zone of the Reserve. Please note that our comments further below only pertain to possible biodiversity related impacts on ONR and will require further investigation and mitigation measures should be proposed to mitigate the negative impacts on ONR as well as the surrounding 5km buffer zone.		SLR is aware of the Ongeluksnek Nature Reserve. Refer to Response 2.12. Since the exact location of an exploration site is flexible and can be adjusted to accommodate environmental sensitivities, impacts on ecological resources (including vegetation, faunal habitat, etc.) can generally be avoided or reduced with the placement of activities on sites that are not sensitive and do not have sensitive natural vegetation. It may also be appropriate to include a buffer around each protected area within which no exploration activities can take place. This issue will be further investigated in the next phase of the EIA where an appropriate buffer will be determined.
2.39		There are numerous red-flags for this project area as it is a national and international biodiversity priority area. The area forms part of the international biodiversity priority area. The area forms art of the internationally recognised Drakensburg-Alpine centre of endemism, as such, the area is home to some of the rarest endemic animals and plants in the country and it is a global hotspot (Maputaland-Pondoland-Albany biodiversity hotspot). Also, based on the Eastern Cape Biodiversity Conservation Plan (Berliner and Desmet, 2007) almost the entire project area falls within a Critical Biodiversity Area (CBA) 1 and partly within CBA 2 which are critical for conserving biodiversity and maintaining ecosystems functioning.		Refer to Response 2.38.
2.40		The catchments around this area are extremely important from a water provision perspective especially for the eastern part of the province. South Africa being one of the water scarce countries, retaining the remaining water sources areas is essential and a priority. Also, the water sources within the project area is crucial for the maintenance of the highly sensitive biodiversity areas mentioned above.		SLR is aware of the value of the Umzimvubu Catchment in terms of water production. Refer to Response 1.18.
2.41		The area is very susceptible to any form of disturbance with erosion quickly following any disturbance on the landscape, as such this issue will require intensive investigation before any activity starts (i.e. exploration). Due to the soil, terrain and the high rainfall of the area it likely that the heavy machinery will exacerbate the erosion thus resulting in higher situation in rivers of adjacent catchments.		Issues relating to soils and erosion (Section 5.4.11) have been identified for further investigation. Impacts to the various environmental aspects will be assessed in the EIA (see Section 6).
2.42		Due to the sensitivity from a biodiversity, landscape and water-provision perspective as noted above, parts of the project area have been earmarked by the Eastern Cape Protected Area Expansion Strategy (ECPAES) as priority areas for inclusion into the ONR.		Refer to Response 2.38.

2.43		The impacts on biodiversity and ecosystem services are of most concern to ECPTA, whilst we acknowledge the need to contribute to strengthening the security of energy supply as well as the socio-economic benefits of the project. However, as the designated Protected Areas Management Agency for the Eastern Cape, our perspective needs to be wider than these opportunities, as the project will have a significant negative impact on the environment and heritage value where the project is proposed, as noted above. It is recommended that further other energy source alternatives are investigated such as renewable energy. Best practice dictates that all feasible development alternatives should be investigated and the alternative with the lowest environmental impact should be selected. The ECPTA reserves the right to revise initial comments and request further information based on any additional information that may be received. It would be appreciated if ECPTA could be included in all future correspondence relating to this application. Should you wish to discuss the above comments please do not hesitate to contact Ms Shane October.		Issues relating to biodiversity have been identified for further investigation in the next phase of the EIA. Refer to Sections 5.4 and 6 for a description of these issues and impacts that will be assessed.
2.44		It has been brought to our attention through the notice of application that Rhino Oil and Gas Exploration South Africa (Pty) Ltd have lodged an application for an exploration right (ER) in terms of Section 79 of the Minerals and Petroleum Resources Development Act, 2002 (MPRDA) to the Petroleum Agency South Africa (PASA). PASA accepted the application foe the area titled 'Exploration Right for Petroleum on various farms in the Magisterial Districts of Matatiele and Mt Fletcher, Eastern Cape (12/ 3/ 295 ER) in May 2015. The exploration right area is 120 000 ha in extent and overs 200 farms in the Eastern Cape Province (EPC). Minerals included in the ER application are oil, gas, condensate, coal bed methane, helium, biogenic gas.	S La Marque on behalf of Kwanalu, Email, 26 November 2015	This correspondence is noted. Kwanalu is registered as I&AP (See appendix 5.3)
2.45		Kwanalu has a history which back dates to 1860 when it was more commonly known as the NAU: in 1997 a merger between the NAU, South Coast Indian Farmers and the National Farmers Union brought together all farmers under one umbrella group- Kwanalu. Kwanalu celebrated its 10th anniversary in 2007, and in the short span of the merger has serves as the official mouthpiece for inclusive organised agriculture in the province. The organisation focuses on addressing key matters of a general nature, amongst other; agricultural conditions, disaster management, infrastructure, land affairs, development of women and youth, education etc. Kwanalu has proudly taken the lead in KwaZulu-Natal (KZN) and		This correspondence is noted.

		including our associations which straddle the border of KZN and the EC in dealing with numerous issues and proactively participating and engaging in agricultural issues.		
2.46		Kwanalu is fully integrated non-racial, gender sensitive organisation for commercial and small-scale farmers, and remains a key stakeholder and credible organisation in KZN and including our associations which straddle the border of KZN and the EC dealing with relevant issues on behalf of its members. We are unique in South Africa with regard to the level of involvement of particularly women subsistence farmers in our activities and elected leadership. We have a strong commodity and business affiliation which contributes to our institutional success and capacity. This results in Kwanalu being recognised as one of the most integrated and representative farmer organisations with a collective membership in excess of 47 000. Kwanalu is also indirectly serving approximately 300 000 subsistence farmers. The 35-member board, served by important commercial and small holder stakeholders, commodity and agribusiness affiliates, reflects our membership, with a number of women serving on the board. The board is guided by President Andy Buchan who is assisted by two Vice-Presidents, Phenias Gumede and Michael Black. In addition, Honorary Life President Robin Barnsley remains actively involved and plays a specific role with a particular interest in the application for exploration at hand.		This correspondence is noted.
2.47		Kwanalu members (who reside in rural areas) only became aware of the application during the process. The time given during the first phase of direct consultation has been very poorly communicated. The opportunity for interested and affected parties (I&APs) has not been meaningful and in our view prejudicial and not in compliance with the provisions set out in the MPRDA. As such, we place our concern in writing that the rights of our members and those of I&APs have been entirely undermined and call for this to be rectified.		Refer to Response 1.7.
2.48		We further place on record our objection and opposition to the application as referred to above for the granting of the Exploration Right for petroleum on various farms in the magisterial districts of Matatiele and Mt Fletcher, Eastern Cape.		Refer to Response 2.1.

2.49		Whilst we represent the agricultural sector of KZN and including our associations which straddle the border of EC our involvement in this matter does not in any way negate the responsibility of yourselves to engage with each I&AP. We confirm that the rights of Kwanalu and its member's rights remain reserved.		Refer to Response 1.7.
3.	**Categories**	**Technical Related Issues**		
3.1		Where will product be sold?	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, Email, 06 October 2015 and Sissie Matela, Public meeting in Matatiele, 09 November 2015	The current EIA is aligned to the early-phase exploration work programme, which is the first step in determining if there is an oil or gas resource in the exploration right area that would warrant further exploration and does not include any work to determine the commercial viability of the resource. Thus no product would be sold as part of the proposed initial exploration programme. Any change to the scope of the ER, further exploration or future production activities would need to be subject to additional authorisation in terms of the MPRDA and thus the NEMA. Each of these would require a separate EIA (or environmental authorisation amendment) process, which would include a further public participation process and in-depth assessment (potentially including specialist studies) of all project-related activities / issues. Refer to Response 1.24 for a more detail discussion on issues related to possible future exploration and production activities.
3.2		Why exactly did Rhino chose this specific area for oil and gas exploration?	Gerrie Nel, Public meeting in Matatiele, 09 November 2015	Rhino Oil and Gas identified the proposed exploration right area based on information obtained from PASA. Rhino Oil and Gas is at the beginning of oil and gas exploration and is only proposing to undertake early phase exploration activities. The proposed exploration programme is the first step in determining if there is an oil or gas resource in the exploration right area that would warrant further exploration and does not include any work to determine the commercial viability of the resource. The exploration programme is proposed over the majority of the exploration right area in order to get a full understanding of the geology of the area. It is not known at this stage whether there are any viable oil and / or gas reserves. This will only be known after all the data from the initial 3-year exploration work programme has been analysed.
3.3		How deep will the core boreholes be?	Nicky McLeod, Public meeting in Matatiele, 09 November 2015	Drilling would aim to reach the target seams which are generally located at depths of greater than 200 m below the surface. It is possible that drilling may go as deep as 3 000 m.
3.4		What chemicals and fluids will used?		As with most drilling methods some water and drilling fluids would be added down the hole to lubricate the drill bit, remove drill cuttings and maintain ideal operating

				conditions. Some of the drilling fluids are recycled in tanks on surface. Full details of the water volumes, types of drilling fluids and the water management will be provided in the EIA report.
3.5		What happens after they found the oil and gas and they are allowed to operate?	School girl, Public meeting in Matatiele, 09 November 2015	Refer to Response 3.1.
3.6		We are very disappointed to learn that a representative from Rhino does not know basic information about his project (chemicals to be used).	Sissie Matela, Public meeting in Matatiele, 09 November 2015	Refer to Response 3.4 and 1.25.
3.7		Why and how come you don't have real answers when you knew very well that you were going to have a meeting with us? Please prepare properly for public meetings so that you can be able to answer basic questions.		A description of the proposed project is provided in Section 2.3 of the Scoping Report.
3.8		We do not appreciate the fact that Rhino is giving us vague answers to technical questions. It does not look like you have enough relevant information to share with us.	Harrison Gordon, Public meeting in Matatiele, 09 November 2015	A description of the proposed project is provided in Section 2.3 of the Scoping Report. Refer to Response 1.25.
3.9		This area is well known for tremors, in fact, we experienced one yesterday. If this is the case, how will your drilling activities impact us/ cumulatively impacts?	Charmaine, Public meeting in Matatiele, 09 November 2015	Concerns have been raised that air blasts (airborne shock waves), air overpressure and ground vibration, generated by the underground detonation of explosives or Vibroseis used during seismic data acquisition, may cause structural damage to infrastructure, including buildings, groundwater boreholes or affect the stability thereof. This issue will be further investigated in the next phase of the EIA. Please refer to Sections 5.4.15 and 6 for further discussion in this regard.
3.10		How will you provide mitigation measures when you have never been to site?	Simphiwe Dlamini, Public meeting in Matatiele, 09 November 2015	Issues relating to both the biophysical and socio-economic environment have been identified for further investigation in the next phase of the EIA. This will also entail the identification of appropriate mitigation measures (see Section 6). Also refer to Response 1.56.
3.11		Some of the species that have been recorded to be in that area are probably extinct by now, how will you rehabilitate such species?		Since the exact location of an exploration site is flexible and can be adjusted to accommodate environmental sensitivities, impacts on ecological resources (including vegetation, faunal habitat, etc.) can generally be avoided or reduced with the placement of activities on sites that are not sensitive and do not have sensitive natural vegetation. Where surface areas have been disturbed (by vehicle tracks, shot holes, work platform, etc.) rehabilitation would be undertaken to re-establish the pre-exploration land use. The pre-exploration land-use would be determined during the detailed site assessments, which would be undertaken when finalising the location of each seismic line or drill site. Rehabilitation will be detailed in the EMPr.

3.12		We have seen and heard of the results of unmanaged environmental impacts in the old Gauteng mines (Wits area). Have you used their experiences to inform your project and strategy?	Lumko Mbuyi, Public meeting in Matatiele, 09 November 2015	The proposed exploration programme is not the same as the mining referred to and thus would not result in similar impacts. The proposed activities would be managed in terms of a project specific EMPr, which will be prepared during the next phase of the EIA.
3.13		Why don't you invest money in biogas projects, which will also benefit us?	Phillip Rawlins, Public meeting in Matatiele, 09 November 2015	Biogas is not one of Rhino's area of interest or expertise.
4.	**Categories**	**Water and Ecosystem Functions Related Issues**		
4.1		What chemicals are to be used in the process to augment underground fracturing?	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, email, 06 October 2015	Refer to Response 3.4 and 1.25.
4.2		We are deeply concerned about the devastating impact of the proposed operations on our already scare and threatened water sources.	Andrew Dummy, Email, 06 October 2015	Refer to Response 1.18.
4.3		This is water scarce area and our water sources for consumption, livestock and life are threatened.		
4.4		We are a water scarce area. The proposed operation will damage and compromise our water sources. Water is more important than energy. Energy can come from other sources but you can't replace water sources. The wish is too high.		
4.5		What will be the impact on water resources?	Andrew Lucas, DWS, Email, 29 September 2015	Refer to Response 1.18.
4.6		Water: potential contamination of surface and groundwater through aquifers and water leakages. District as WSA is providing groundwater to thousands of people in Matatiele and Maluti areas, mostly dependent upon boreholes for supply.	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, email, 06 October 2015	Refer to Response 1.18.
4.7		Your project will contaminate our water and destroy our livelihood.	Phillip Rawlins, Public meeting in Matatiele, 09 November 2015	Refer to Response 1.18.

4.8		Matatiele is 1000% reliant on groundwater supply. How much research has Rhino undertaken to understand water supply dynamics in the area?	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, Public meeting in Matatiele, 09 November 2015	Refer to Response 1.18.
4.9		It must be noted that some of us are located adjacent to the proposed project area, to the east in the Cedarville flats. We get our groundwater from the Drakensburg mountains like the people in the Matatiele area. In as much as we located outside the proposed project area, our groundwater will be affected like that of the people who are based in the Matatiele area.	Pier Rawlins, Public meeting in Matatiele, 09 November 2015	Refer to Response 1.18.
4.10		We all know that our water is from the Drakensburg Mountains and not from Kokstad. We do not want our water to be contaminated.	Gerrie Nel, Public meeting in Matatiele, 09 November 2015	Refer to Response 1.18.
4.11		Huge water use (over 20 million litres per well, apparently?) in a water-stressed landscape, which is a source of water for drinking, irrigation and recreation for over 1 million downstream users. Mess up the factory, what happens down the line?	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, email, 06 October 2015	Water consumption is addressed in Section 2.3.5 and 2.3.8. The total volume required for core borehole drilling depends on the formations encountered, but is estimated to be less than 5 000 L per day. For an average duration of 20 days to drill a borehole the total water use per hole is likely to be less approximately 100 000 L. Also refer to Response 1.18.
4.12		How much water will be used for prospective core drilling, as well as well development and fracking if prospecting is successful, and where will this water be sourced from?		Refer to Responses 4.11 and 1.25.
4.13		The Matatiele Local Municipality has adopted a draft stewardship plan for the upper catchment, which coincides with the target prospecting area outlined in your BID. Depending on who you met with on the 29th September, you may or may not have been made aware of this Plan. We are in the process of unrolling the Plan with the Chief Whip's office: this includes an intention to declare Matatiele as a 'water factory' in line with the NWRS2 objectives, with support from SANBI for this initiative.	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, email, 21 October 2015	This comment is noted.

4.14		DWS is also in the process of appointing a PSP for undertaking the Resource Classification and Quality Objectives for the entire Umzimvubu catchment, which the sector authority has realised is a strategic water resource area.		This comment is noted.
4.15		We CANNOT afford to foster decisions which primarily benefit a foreign-owned company at the expense of our threatened water resources: Matatiele and surrounds are already facing dire supply shortages.		Refer to Response 1.18.
4.16		Waste water treatment, release and leakages are a huge concern.	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, email, 06 October 2015	Refer to Response 1.1.
4.17		Is there any possibility that energy extracted will be outweighed by the loss of clean water?	Andrew Dummy (King Edward High School, Chairperson), Email, 06 October 2015	Refer to Response 1.18 and 1.25.
5.	**Categories**	**Biodiversity Related Issues**		
5.1		There is work being done to improve the ecology of this region? Although protected areas are excluded, what about future conservation areas.	Ward Councillor, Scoping Meeting, 29 September 2015	Issues relating to ecology (Section 5.4.7) have been identified for further investigation. Impacts to the various environmental aspects will be assessed in the EIA (see Section 6). Refer to Response 2.12 for exclusion areas. With regard to possible future conservation areas, these will need to be considered as and when they are proposed / declared. As indicated in Response 3.11, since the exact location of an exploration site is flexible, sensitive areas (including possible conservation areas) can generally be avoided.
5.2		The Matatiele Local Municipality is working toward expanding protected areas through a biodiversity stewardship programme. This has been aligned with the Provincial Protected Area Expansion Strategy		This comment is noted.
5.3		The project area is located adjacent to Ongeluksnek Nature Reserve, which is managed by the ECPTA.	Shane October, ECPTA, Email, 12	Refer to Response 2.38.

5.4		The project area falls within Critical Biodiversity Areas 1 and 2 as per the Eastern Cape Biodiversity Conservation Plan (Desmet, 2008).	October 2015	Refer to Response 2.12.
5.5		The species Oribi and White tailed rat are expected to occur within the project area.		Issues relating to fauna (Section 5.4.7) have been identified for further investigation. Impacts to the various environmental aspects will be assessed in the EIA (see Section 6).
5.6		Please can all the public participation documents be circulated to ECPTA to us to investigate potential impacts the proposed activity will have on both the CBAs and our reserve?		Refer to Response 1.7.
6.	**Categories**	**Socio-Economic Related Issues: land use, local agricultural productivity and opportunities (farming not fracking will benefit many more people) and livelihoods**		
6.1		Loss of productive land and opportunities: access roads, drilling sites, contamination. Matatiele has a high agricultural quotient	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, email, 06 October 2015	Issues relating to land use (Section 5.4.14), damage to existing infrastructure (Section 5.4.15), Soil contamination (Section 5.4.11) and water contamination (Section 5.4.9) have been identified for further investigation. Impacts to the various environmental aspects will be assessed in the EIA (see Section 6).
6.2		Loss of herd productivity (see health concerns above)		Refer to Response 6.1.
6.3		Restoration of catchment functions to benefit all users and sustain long term, growth of beef industry on meat natural concept to eventually benefit over 8000 rural households.		Refer to Response 6.1.
6.4		How many households will prospecting and fracking support, really, and for how long, in comparison with diverse farming practices off a healthy landscape?		Job creation and the contribution to the economy of the exploration are dealt with in Section 5.4.19 of the Scoping Report and will be further considered in the EIA (see section 6).
6.5		Is Phillip Steyn and Rhino willing to take this risk with the lives of the local people?	Francois du Toit on behalf of African Conservation Trust, Public meeting in Matatiele, 09 November 2015	The risk and impacts associated with the proposed exploration activities will be assessed and evaluated during the next phase of the EIA. PASA's decision of the issuing of the Environmental Authorisation and ER will be informed by the findings of the EIA process and associated I&AP correspondence.
7.	**Categories**	**Socio-Economic Related Issues: Health (human and ecological)**		
7.1		What will be the impacts on both social and the environment?	Andrew Lucas, DWS, Email, 29 September 2015	Issues relating to both the biophysical and socio-economic environment have been identified for further investigation in the next phase of the EIA. Refer to Sections 5.4 and 6 for a description of these issues and impacts that will be assessed.

7.2		Use of volatile organic compounds in diesel (trucks and generators) and unknown chemical cocktails used in fracking fluids, to up efficiency of drilling process, e.g. benzene. These are known carcinogens and endocrine disruptors, exposure to which can lead to reproductive health risks including still births and infertility. Matatiele' s primary economic activity (communal and commercial) is cattle farming for beef and dairy. Can we take this risk?	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, Email, 06 October 2015	Issues relating to air quality (Section 5.4.17) and water contamination (Section 5.4.9) have been identified for further investigation. Impacts to the various environmental aspects will be assessed in the EIA (see Section 6). No permeability testing, pressure testing or hydraulic fracturing is proposed as part of the current exploration work programme. Refer to Response 1.25.
7.3		Social stress and disruption: outsiders working, accommodation price hikes, trucks and earth tremors in local vicinity of wells.		Issues relating to security (Section 5.4.18), vibrations and damage to existing infrastructure (Section 5.4.15) and land use (Section 5.4.14) have been identified for further investigation. Impacts to the various environmental aspects will be assessed in the EIA (see Section 6).
8.	**Categories**	**Socio-Economic Related Issues: employment and training opportunities**		
8.1		Provide community with job opportunities.	Padi C Ntsholo, 22 September 2015	Refer to Response 6.4.
8.2		How many jobs will be created during prospecting and if approved, during drilling and extraction? REALLY? Specialised skill requirements vs local unskilled labour?	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, Email, 06 October 2015 and Sissie Matela, Public meeting in Matatiele, 09 November 2015	Refer to Response 6.4.
8.3		How many jobs will be created for our local people?		Refer to Response 6.4.
8.4		Train some community members once the project gives you positive results in order to acquire required skills.	Padi C Ntsholo, 22 September 2015	Refer to Response 6.4.
9.	**Categories**	**Socio-Economic Related Issues: benefits and compensation**		
9.1		Communities must benefit or they will revolt against the project as has happened in the North West.	Traditional Leader, Scoping Meeting,29 September 2015	Refer to Response 6.4. The MPRDA requires operators to take note of communities and ensure that the

9.2		While the law may be based in Pretoria, the activity will be here, amongst the people. Mining won't happen if the people don't let it.		benefits accrue locally. This is facilitated through a Social and Labour Plan. However, it must be noted that the Social and Labour Plan is only required for the production phase of a project, not during exploration.
9.3		What will be the future of Matatiele and/ or benefits once you are done with your project?	Thabelo Matela, Public meeting in Matatiele, 09 November 2015	Refer to Response 6.4.
9.4		What will be direct benefits to our local people?	Sissie Matela, Public meeting in Matatiele, 09 November 2015	Refer to Response 6.4.
9.5		Will you be able to give the farmers and villagers water and money where required?	School girl, Public meeting in Matatiele, 09 November 2015	Various queries were raised relating to compensation for the minerals derived from the land; access to land; and the use of or impact to land. Refer to Section 5.4. 20 for a response on compensation.
9.6		Who will actually benefit from any product development? South Africa is not geared to operate vehicles on methane in the near future.	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, Email, 06 October 2015 and Sissie Matela, Public meeting in Matatiele, 09 November 2015	Refer to Response 6.4.
10.	**Categories**	**Climate Change Related Issues**		
10.1		Methane leaks: dozens of times more potent as a greenhouse gas than carbon dioxide.	Nicky McLeod on behalf of the Umzimvubu Catchment Partnership Programme, email, 06 October 2015	Core boreholes drilled into the target strata could create the opportunity to enable gas to escape to the surface. The escape or release of gas from exploration core boreholes is of concern as methane (one of the main constituents of natural gas) is a relatively powerful green-house gas with a high global warming potential (23 times that of CO_2). The associated gases could also pose health risks to any persons exposed thereto. Please refer to Section 5.4.17 for further information in this regard.

11.	Categories	Fracking Related Issues		
11.1		We oppose fracking in our area.	Andrew Dummy (King Edward High School, Chairperson), Email, 06 October 2015	Refer to Response 1.25. See also Response 1.18.
11.2		As Nicky has articulated, we have taken time to register as I&AP because we are very much willing and affected by the proposed fracking, so the least we could appreciate is being given an opportunity to participate as per laws of this country.	Sinegugu Zukulu on behalf of the Umzimvubu Catchment Partnership Programme , Email, 21 October 2015	
11.3		Fracking will contaminate the whole area's underground water.	Francois du Toit on behalf of African Conservation Trust, Public meeting in Matatiele, 09 November 2015	
11.4		I am technically informed when it comes to drilling activities. All I can tell you is that given the altitude you will be drilling and also fracking, you will not only contaminate our water but will also be dewatering our aquifer You activities require millions of water that will be sourced from our aquifer.	Rikus Botha, Public meeting in Matatiele, 09 November 2015	
11.5		Given the terrain of the areas you want to drill, how exactly are you planning to get the drilling trucks up those steep slopes? Have you even been near those mountains? Your information gives me an impression that you have no idea of what you are talking about.		
11.6		If fracking has been banned in 180 countries worldwide already due to its impact on water, why do you then want to frack in our area?	Lebohang Phakisi, Public meeting in Matatiele, 09 November 2015	
11.7		Generally, our water boreholes depth varies between 17m and 124m and they are already drying up. We do not want to know what will happen once you start your fracking activities.	Sakkie Maamis, Public meeting in Matatiele, 09 November 2015	

11.8		Fracking is going to affect our catchments and sensitive environments.	Joyce Loza on behalf of Maloti Drakensburg Trans frontier Programme, Public meeting in Matatiele, 09 November 2015	
11.9		There shall be no fracking in our area.	Sakkie Maamis, Public meeting in Matatiele, 09 November 2015	

5.4 DISCUSSION OF KEY ISSUES

A number of key issues were identified during the Scoping Study to date. The key issues described in this section have been identified by the EIA project team with inputs made by I&APs. These are presented below, together with responses by the EIA project team, in three sections, namely:

- Issues material to the overall application and the Scoping and EIA process;
- Issues related to the proposed work programme and current EIA; and
- Issues not related to the proposed work programme and current EIA.

The sequences in which the issues are listed in each section are in no order of priority or importance. The verbatim issues and concerns raised by I&APs during the Scoping Study to date have been compiled into a Comments and Responses Report (see Table 5-1) with the actual submissions included in Appendix 6.

A. ISSUES MATERIAL TO THE EIA PROCESS

A number of key issues material to the application and the Scoping and EIA process arose during the initial consultation conducted in the last quarter of 2015. SLR identified five key issues which were submitted to PASA for consideration and response. Details in this regard are provided below (SLR's letter to PASA and PASA's response thereto are provided in Appendix 5.1):

5.4.1 ISSUE 1:

Most persons participating in the EIA process stated their opposition or lodged an objection. Many of the objections were made with reasons relating to production and fracking. It is clear that the EIA process will not be able to resolve such objections. What mechanisms exist for these objections to be addressed?

PASA Response: "*There is no mechanism under NEMA to address objections, however as part of the EIA process the EAP must consider issues raised and engage with respective parties to resolve or provide clarity on issues raised. Section 10 of the MPRDA provides for the Regional Mining Development and Environmental Committee to consider and advise the Minister on objections received in respect of applications.*"

SLR Response: SLR has, and will continue to, receive and document all opposition to and objections against the application. Through the course of the current EIA process SLR will respond to all submissions which are reasonable and relevant to the early-phase exploration application. Objections that cannot be resolved through the EIA process will have to be handled in terms of the mechanisms provided for in the legislation.

I&APs are advised that where the objections are based on concerns relating to further exploration or future production activities these will be documented but not responded to. The reason for this is that legislation provides that Rhino Oil and Gas would have to make further application for approval/authorisation for any activities beyond the proposed early-phase exploration. The responsibility for assessing impacts and considering objections to future work rests with those future approval processes.

5.4.2 **ISSUE 2:**

Most I&APs have demanded that the current EIA process present details on production and undertakes an assessment of potential production (including fracking) related impacts, even though the current application does not cover further exploration or production. What is PASA's instruction with regards the scope of the current EIA?

PASA Response: "*The current EIA is aligned with the proposed exploration work programme submitted with the application for an exploration right. If the applicant wanted to pursue any activities beyond the scope of the proposed work programme then environmental authorisation for such activities would have to be obtained. This process provides for further engagement with I&APs and in-depth assessment of the associated issues."*

SLR Response: As confirmed by PASA the scope of the EIA is aligned with the early-phase exploration as proposed by Rhino Oil and Gas. SLR will assess the impacts of the proposed early-phase exploration work programme.
It is not possible to provide an informed assessment of potential future impacts where the proponent has no idea of the project plan, the methodology or the locality. The scope of the current EIA is therefore linked and limited to the early-phase exploration work programme.

5.4.3 **ISSUE 3:**

Many I&APs have asked why the current Strategic Environmental Assessment (SEA) for Shale Gas Development in the Karoo is not applicable to all areas of South Africa. Moreover, I&APs have demanded that all exploration right applications and related EIA processes be stopped until the SEA is complete. What is PASA's response in this regard?

PASA Response: *"The scope and terms of reference for the SEA are finalised and the assessment has commenced. Queries on the SEA should be directed to the Department of Environmental Affairs as the driver of that process."*

SLR Response: The following is taken from the official website for the Strategic Environmental Assessment (SEA) for Shale Gas Development in South Africa (http://seasgd.csir.co.za/):

The South African government, through Cabinet and various other decision-making institutions, has made high-level public commitments to shale gas exploration. If the exploration phase occurs and yields successful hydrocarbon deposits and gas-flow regimes, it is a reasonable assumption that Government would consider development of those resources at a significant scale. DEA, along with other relevant authorities, need to be in a position to make decisions relevant to that choice in a timely and responsible fashion.

Although a substantial amount is already known about shale gas development and its consequences based on experience from around the world, very little is known about the industry in the South African context, which makes information very hard for decision-makers and stakeholders to evaluate. In order to make well-informed decisions and have some hope that decisions will be broadly accepted by stakeholders as credible and legitimate, a structured and transparent process of information sharing and scientific assessment needs to take place.

The mission statement of the SEA is "to provide an integrated assessment and decision-making framework to enable South Africa to establish effective policy, legislation and sustainability conditions under which shale gas development could occur."

The Strategic Environmental Assessment (SEA) for Shale Gas Development is being undertaken by a team led by the CSIR. The project has a public participation component and the public are encouraged to participate.

The scope and study area of the Karoo SEA is linked to a specific geographic area which was defined based on the extent of applications for exploration rights made by three applicants [Falcon (x1), Bundu (x1) and Shell (x3)]. It is stated on the website that: *"Considering that PASA's sweet spot reserve estimates are succinctly aligned with the current Exploration Right applications from Falcon, Bundu and Shell, this region represents the obvious area to initiate the first pass SEA process."*The geographical extent of the SEA (copied from the website) is depicted in the image below.

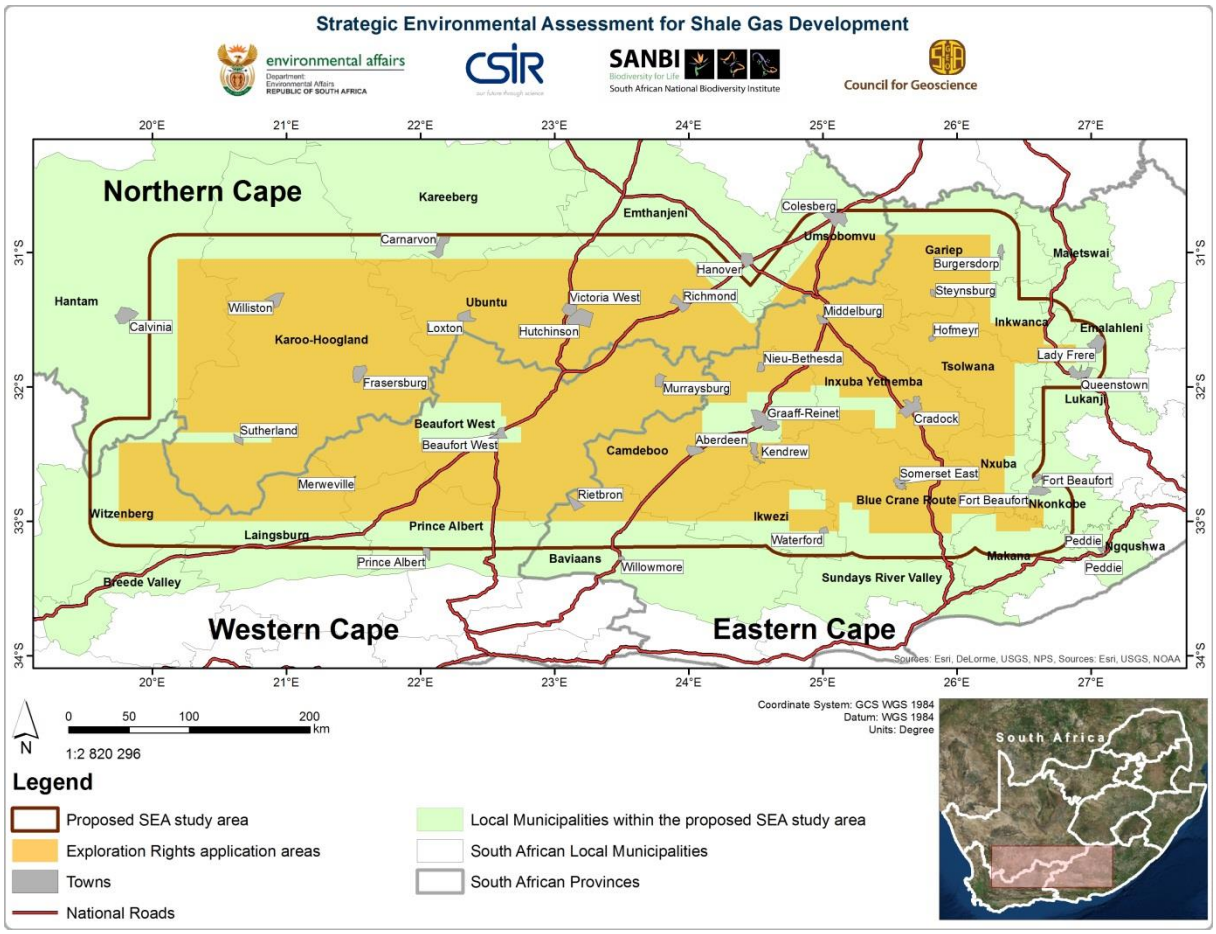


FIGURE 5-2: STUDY AREA OF THE KAROO SEA FOR SHALE GAS DEVELOPMENT
(from SEA webpage)

A second aspect relevant to the Shale Gas SEA study area is government notice 54 of 2011 (in terms of the MPRDA) which places a moratorium on the processing of all new applications for reconnaissance permit, technical co-operation permit, exploration right and production rights in the designated areas depicted in the plan attached as Annexure A to the notice. This area covers much of the Karoo geological basin, but not the full extent of it.

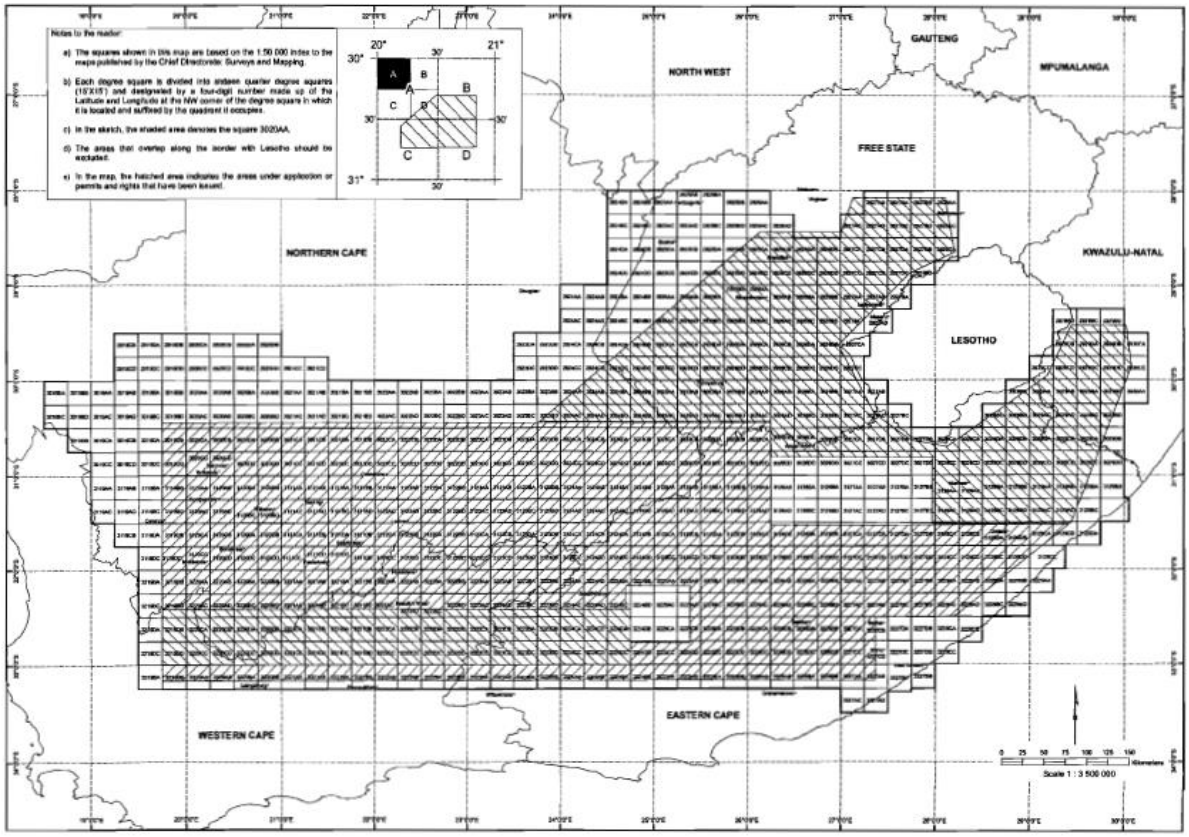


FIGURE 5-3: ANNEXURE A FROM GN 54 OF 2011

The effect of the moratorium is that all applications within the moratorium area are placed on hold (presumably until the SEA is completed). The moratorium remains in place. Conversely, any applications outside of the area defined in the notice are not under moratorium and must be processed as per the legislated requirements and timeframes set out in the MPRDA. The application made by Rhino Oil and Gas is outside of both the SEA study area and the moratorium area.

While the outcomes of the Karoo SEA may be applicable to all shale gas development in South Africa, the defined scope of the study area is limited. There is strong argument that study area of the Shale Gas SEA should be aligned with the full geological extent of areas with shale gas potential and not limited to a geographical area. In this regard the advice of SLR to the responsible authorities is to consider expanding the study area of the Shale Gas SEA. SLR also advises the public to motivate to the Department of Environmental Affairs for the study area of the Shale Gas SEA to be expanded.

5.4.4 **ISSUE 4:**

Most I&APs have argued that the time available in the current EIA schedule is insufficient to allow for the required public consultation for an application area of such large extent. Will PASA grant an extension of time within the EIA process to allow the project to respond to these issues and adjust the public participation process accordingly?

PASA Response: *"The Agency can consider requests received in writing from the EAP or applicant to extend the timeframe provided that the requests comply with the provisions of the EIA Regulations."*

SLR Response: In terms of the EIA Regulations 2014, an applicant must within 44 days of receipt of an application by the competent authority submit the Scoping Report, which has been subject to a public participation process of at least 30 days. This effectively leaves only 14 days to prepare the Scoping Report, consider and respond to all comments received and submit the revised Scoping Report to PASA.

Since the timing stipulated in the EIA Regulations 2014 is considered inadequate for a project of this nature, SLR advised Rhino Oil and Gas in July 2015 to submit a written motivation to PASA requesting a delay in the submission of the application for environmental authorisation, so that a pre-application phase could be undertaken to allow for a more comprehensive public participation process to be included in the Scoping Phase. PASA agreed to the extension and required that the application for environmental authorisation be submitted in November 2015. Unfortunately much of this time was not available to SLR as the applicant was responsible for procuring data (e.g. property data) which was required for the process. This was provided late to SLR, thus reducing the time available. SLR commenced with a pre-application phase in September 2015, which included the distribution of a BID for comment and public meetings (see details in Section 5.2).

The response from I&APs to this initial consultation was a demand that more time be provided in the scoping schedule and for consultation to be augmented to reach the full range of potentially affected parties. In order to incorporate further public interaction and investigation to augment the scoping process, SLR applied to PASA for an extension of time available in the scoping phase. In December 2015 PASA granted a 16-week extension for the scoping process, with the requirement that the final scoping report be submitted to PASA by the 20th April 2016.

5.4.5 **ISSUE 5:**

I&APs raised the concern that many sites within the application areas are either protected outright or incompatible with exploration and/or the production of oil and gas and that legislation prevents such work from taking place in these areas. The question has been asked "why undertake an EIA to obtain exploration rights in areas where any gas, if it were to be found, would not be able to be extracted because of the restrictions imposed by protected area legislation and Regulation 122 of the Petroleum Regulations (GN R 466 of 2015) relating to the location of wells?". The demand is that the application be stopped, all of the future non-compatible/unlawful areas removed and then a new EIA be commenced for the revised area. What is PASA's response in this regard?

PASA Response: "*The EAP has the responsibility to identify environmental attributes; to assess the risks and impacts and provide appropriate mitigation measures. In doing so the EAP has the obligation to consider and apply the provisions of the relevant environmental legislation. PASA, as the regulator, has no authority to direct the EAP or applicant to stop the EIA or to remove incompatible areas. The application will be evaluated in line with the provisions of NEMA and other relevant legislation. The Agency will make recommendations that will be aligned with the relevant provisions to ensure that specified environment receives the necessary protection."*

SLR Response: Rhino Oil & Gas has indicated that they are reviewing the application area (currently under revision by their surveyors) to exclude all properties where the granting of an exploration right is prohibited by Section 48 of the MPRDA including:

- as per section 48 of the Protected Areas Act (57 of 2003), special nature reserves, national parks, nature reserves, protected areas or protected environments (including world heritage sites, marine protected areas, specially protected forest areas, forest nature reserves and forest wilderness areas)
- land comprising a residential area;
- any public road, railway or cemetery;
- any land being used for public or government purposes or reserved in terms of any other law; and
- areas identified by the Minister by notice in the Gazette in terms of section 49.

A revised plan as required by Regulation 2(2) will be prepared by the applicant's surveyors. Overall this will not make a significant difference to the application area as the majority of these were excluded in the original area.

Rhino Oil & Gas further advised SLR that they will not be excluding properties or areas where a constraint may restrict exploration activity (current or future), but does not specifically prohibit the granting of an exploration right. See Section 1.3 for an explanation of the exploration process and the motivation made by Rhino Oil and Gas for retaining these areas in order to develop the regional geological picture required for early-phase exploration.

Rhino Oil & Gas indicated to SLR that it will ensure that all of its activities are undertaken in a lawful and environmentally responsible manner. It is the role of the EIA process to identify all such constraints and restrict or prohibit exploration activities through documented management commitments. An example of a constraint which prohibits specific exploration activities in certain areas, but does not prohibit the granting of a right is Sections 122 (2) and (3) of the Regulations on Petroleum Exploration and Production (GN R 466, June 2015). These restrictions prohibit "well sites for Hydraulic Fracturing operations" and "wells" within set distances from specific water resources. The term "well" is defined in the Regulations. The restrictions do not apply to stratigraphic core holes (defined separately) or seismic testing as is proposed

by Rhino Oil and Gas. SLR will identify and document the relevant constraints in the EIA. Measures to restrict exploration activity in line with the constraints will be defined in the EMPr.

B. KEY ISSUES RELATED TO THE PROPOSED WORK PROGRAMME AND CURRENT EIA

The issues and concerns described below are considered, and responded to, in regard to the early-phase exploration work programme as proposed by Rhino Oil and Gas.

5.4.6 OPPOSITION TO THE PROJECT

The great majority of I&APs that have participated in the EIA process have expressed their opposition to all forms of oil and gas exploration in the Eastern Cape and to this application in particular. This opposition is documented in the minutes of the public meetings and in a large percentage of the correspondence received to date (see Appendix 6). There have been numerous requests and appeals to Rhino Oil and Gas to withdraw their application in the face of this public opinion. It is thus evident that public opinion on whether the project should be approved is a resounding “no”.

The reasons for the public opposition are varied and in many cases are not explicitly stated or articulated in the submissions. SLR does not find it possible to adequately explain the nuances/reasons/motivation for the opposition, as much of this is deeply personal to each I&AP. Provided below is a brief summation of the major themes of the public opposition.

- Concern, even fear, of the future risks that might arise from production should a resource be found. Production, and shale gas fracturing (fracking) in particular, has huge risks to society and the environment and should not be entertained in any form. There is a significant body of evidence from around the world (not least that fracking is banned in a growing number of countries and territories) that fracking results in unacceptable risks to surface and groundwater resources and human health. Such risks are borne by the landowners and local communities who do not participate in the economic benefits that accrue to the right holder and government. While there may be a consumer driven need for hydrocarbons, the risks and costs to society and the environment far outweigh the benefits. There is a lot of evidence of the risks and costs and little evidence that gas production can consistently be undertaken in a safe manner. For this reason I&APs argue that the project should not be approved.

- Concern that given the money involved, if any hydrocarbon resource is found, it will not be possible to stop production regardless of what the future EIA processes may indicate in terms of risk. Thus the only way to avoid such risks is to not open the door to such projects. In addition to the argument presented above there is an opinion that oil and gas industry has a reputation for massive financial contributions, bribery and conspiracy with governments. It is evident that the large amounts of money involved in the industry are such that governments have traditionally and

will continue to favour the needs of the oil and gas industry. The substantial, often short-term, economic benefits that are likely to be derived 'blind' government to sound decision making and it is the landowners and local communities who will bear the risks. The South African government has been associated with a number of financial scandals, providing scant comfort for the integrity of the legislation. In order to prevent any such risks it is best not to begin exploration as once the economic value is known, the greed of the participating parties will make it very difficult to stop production, despite the known risks. For this reason I&APs argue that the project should not be approved.

- Hydrocarbon based energy is a flawed concept and countries are moving away from new hydrocarbons in favour of a renewable energy system. The extraction of hydrocarbons from the earth and their subsequent processing and combustion for human energy needs is the major driver of global warming and climate change. The global community has acknowledged the risk that these place on the planet and humans. Vast amounts of money and effort are being directed to avoid further climate change. The global community has further agreed on the need to move away from hydrocarbon based energy toward more sustainable sources such as renewable energy. Despite gas being cleaner burning than coal and thus considered by some as a transition fuel, the argument is that any continued development of hydrocarbons is counter to the renewable energy path. South Africa has various policies that support the implementation of renewables into the energy pool. For this reason I&APs argue that the project should not be approved.

- A deep mistrust of government institutions and the true motives and people behind such an application. Whilst the exploration right application and EIA processes are set out in legislation, there is a deep mistrust of how these processes are implemented and who the real beneficiaries are. Many people have voiced suspicion that National government has committed to pursue gas extraction and will do so despite public opinion or the findings of an EIA. There is also general suspicion that high ranking political figures and connected families are involved. The South African government and various figures have been associated with a number of financial scandals. There is an expectation that Rhino Oil and Gas (a two person company) are not making the application without some form of support from such parties. Lastly there is a suspicion that Rhino Oil and Gas would ultimately sell the right onto such parties, who would likely ignore the commitments and legislation in the pursuit of profit. For this reason I&APs argue that the project, which has risks and could lead to even greater risk in the future, should not be approved.

- Significant doubt over government's ability to enforce compliance to the legislation. Some participants accept that the EIA process must take place in terms of legislation and expect that the EIA and EMPr will provide for reasonable measures to manage and mitigate risk. Thus in

theory the exploration project could be undertaken without unacceptable risk to health and the environment. The concern however, is that there is little to no enforcement of compliance during operations. The result is that rights holders can and will do what they want with little regard for landowners and local communities who will bear the brunt of negative impacts. For this reason the project, which has risks and could lead to even greater risk in the future, should not be approved.

- South Africa does not understand Shale Gas risks and the necessary legislative framework to protect the environment is not in place. As is acknowledged through the Shale Gas SEA, very little is known about the industry in the South African context. In order to make well-informed decisions and have some hope that decisions will be broadly accepted by stakeholders as credible and legitimate, a structured and transparent process of information sharing and scientific assessment needs to take place. Given this it is nonsensical to allow some exploration applications to proceed in parallel to the SEA and moratorium on other applications. The moratorium should apply to all areas and all forms of onshore exploration. For this reason I&APs argue that the project should not be approved.

- Lack of understanding of how an exploration programme is undertaken and what is actually being authorised. Many people have expressed concern that the current application process, despite only assessing 'early-phase exploration', will provide a blanket authorisation to the full ambit of activities that occur through oil and gas production. They claim that the applicant is intentionally not providing any information on their future plans or the risks that could arise from these. Without detailed information on the future activities and risks thereof it is not possible for I&APs to make informed input into the EIA. I&APS argue that the application and EIA process should therefore not be allowed until such time as all of the future intentions are declared and the information is available for these to be assessed.

Response: Overall the public opposition makes for a very strong argument against the application and the process. Regardless of the reasons and motivation, the fact remains that the majority of I&APs participating in the EIA process are opposed to the project. Although it is noted that that not every I&AP has been opposed to the application, with a small percentage have expressed interest in knowing the outcomes of the exploration or being able to participate in the benefits. If the EIA process were simply a democratic process then the majority vote is clearly "no".

As the EAP, SLR has never before encountered such a united and passionate opposition to a project from such a broad range of I&APs. It is vital that this public opinion is taken into consideration through the EIA process, by the applicant and by the decision makers.

5.4.7 IMPACT ON ECOLOGY

The region is host to a number of sites and habitats of ecological value or which are sensitive as a result of the presence of species of conservation concern. I&APs have questioned whether Rhino Oil and Gas is aware of these areas and why are they not being excluded from the application area. During exploration impacts to the ecology could include:

- Loss of or disturbance to vegetation, including species of conservation concern, from vehicles traversing areas or on-site activities;
- Disturbances to fauna, particularly species of conservation concern, as a result of on-site activities; and
- Enabling the establishment of alien and invasive species in disturbed areas.

The potential impact on water resources is discussed separately below (see Section 5.4.8).

5.4.7.1 Loss of or disturbance to vegetation and faunal habitats

Issue: Vegetation would need to be cleared and/or disturbed as a result of the proposed activities, including the possible creation of new access routes / tracks, establishment of work platforms for drilling, etc. The clearing of vegetation and exploration activities may result in the loss or disturbance to habitats of faunal significance.

Response: The maximum cumulative extent of the total exploration area that would encounter physical on-site activity over the 3 year period would be less than 50 ha (sum of seismic and core hole footprints). Of this only an estimated 6 to 10 ha would be subject to significant disturbance from exploration activities (i.e. less than 0.001 % of the surface of the exploration right area).

Vegetation cover and soil structure would only be disturbed on a small portion of each drill site. A typical diamond core drill rig and equipment requires an operating area of approximately 1 200 m^2 (i.e. 0.12 ha), with approximately 100 m^2 forming the central working platform and the balance used for equipment storage, staging and parking. Similarly for seismic surveys, significant disturbance to vegetation is limited to the actual site of the seismic source (shot hole or vibroseis plate). The disturbance footprint is seldom wider than 3m. Thus the extent of vegetation exposed to these risks is very limited. The balance of the disturbance is transient with vegetation trampling being the most prominent disturbance. Access would, for the most part, take place on existing roads and tracks. If appropriate mitigation measures are not put in place and there is inadequate on-site management such impacts could be residual and long lasting. Such impact would be of concern if drilling or seismic sites were located in areas where sensitive natural vegetation or plant species of conservation importance occur, or if exploration takes place in important faunal habitats.

Since the exact location of an exploration site is flexible and can be adjusted to accommodate environmental sensitivities, impacts on ecological resources (including vegetation, faunal habitat, etc.) can generally be avoided or reduced with the placement of activities on sites that are not sensitive and do not have sensitive natural vegetation. Thus it is recommended that prior to final site selection of the seismic lines or drill sites a detailed site assessment is undertaken by a suitably qualified ecologist / botanist. The final site location should, if necessary, be adjusted to avoid identified sensitive vegetation types or faunal habitats. The final site plan should be submitted to PASA for approval. The specific requirements for such detailed site assessments will be identified in the EIA phase as part of a specialist biodiversity assessment (see Section 7.5.1). These specific requirements will be included in the EMPr.

Additional mitigation measures to minimise the potential impact of loss of and damage to vegetation that will be considered for inclusion in the EMPr include:

- Implementation of buffers (no-go areas) around sensitive areas;
- Minimising the extent of any vegetation clearance by having clearly demarcated work areas;
  - Trees that are larger in diameter than 20 cm should not be felled; and
  - Leave in place smaller vegetation, topsoil, root stock, seeds and endangered or protected species and species used by local communities for commercial or subsistence use (identified in the detailed site assessment);
- Not clearing of vegetation for seismic lines or cutting seismic lines by hand to minimise disturbance;
- Use a seismic method that would be least likely to cause impact to natural vegetation;
- Use existing access routes as far as is possible; and
- Rehabilitation of disturbed areas. Where surface areas have been disturbed (by vehicle tracks, shot holes, work platform, etc.) rehabilitation would be undertaken to re-establish the pre-exploration land use. The pre-exploration land-use would be determined during the detailed site assessments, which would be undertaken when finalising the location of each seismic line or drill site. Rehabilitation will be detailed in the EMPr.

Risks to the natural vegetation and sensitive faunal habitats are further reduced due to the following:

- The exploration right area excludes protected areas (refer to Section 5.4.14 for details); and
- Rhino has not applied for environmental authorisation for those listed activities that apply to the clearance of indigenous vegetation. Thus Rhino would not be permitted to clear more than 1 ha of indigenous vegetation or an area of 300 m^2 or more within, *inter alia*:
  - Community Conservation Areas;
  - Biodiversity Stewardship Programme Biodiversity Agreement areas;
  - Within any Critically Endangered or Endangered ecosystem listed in terms of Section 52 of the NEMBA;

- Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
- On land zoned open space, conservation or had an equivalent zoning;
- A protected area identified in terms of NEMPAA, excluding conservancies;
- World Heritage Sites;
- Areas designated for conservation use in the SDF adopted by the competent authority or zoned for a conservation purpose; and
- Sensitive areas as identified in an Environmental Management Framework as adopted by the competent authority.

5.4.7.2 Disturbance to and mortality of fauna

Issue: In addition to the indirect impact on fauna as a result of loss or damage to natural vegetation (faunal habitat), animals in the vicinity of exploration activities may be affected by increased human presence/activity, and increased noise and vibration generated by vehicles, shot hole drilling and the use of explosives or vibroseis. Some areas are host to species of conservation concern which are often more sensitive to disturbances.

Response: It is acknowledged that some of the natural habitats within the region host a wide variety of faunal species with a number of these species being protected or of conservation importance. Some may not be tolerant of disturbance, particularly during breeding, while others may be range/habitat restricted.

Several studies indicate that noise/vibration has a negative impact on wildlife, mostly observed as behavioural changes including startle and alarm response, with animals moving away from a source of noise and activity (particularly mobile species such birds, large snakes and medium-sized mammals). However, many reptiles and small mammals (rodents and insectivores) may hide underground and may be directly impacted by site clearing. Others may not be able to move out due to a lack of alternate habitat.

Drilling noise and vibration caused by detonation of explosives in shot holes or vibroseis could affect sensitive species, forcing individuals to move away from the source. Some may abandon their shelters. However, most animals would return to the area after the noise or disturbance has ceased, which would be within a day in the case of a seismic survey and within a few weeks for each core hole. Noise and other disturbances as a result of the proposed exploration activities would be unlikely to alter feeding and breeding behaviour or displacement of animals from their preferred habitats, as it would not be of sufficient duration to cause species not to return in the short-term. Provision would need to be made prevent disturbances for specific instances (e.g. breeding cranes).

In addition to disturbance of faunal movement, direct mortality could result from the proposed activities. Those species that cannot effectively vacate the area by themselves may suffer direct mortality due to increase traffic, site clearing or detonation of explosives. Explosives would only be detonated under strictly controlled circumstances (including ensuring through visual checks that the area is clear) and injury or mortality of livestock and game is highly unlikely. However, as seismic surveys involve the generation of subterranean energy waves, burrowing animals may be particularly vulnerable to effects. Mortality of burrowing fauna could result from direct injury due to energy sources or burrow collapse, or from indirect reasons due to physical impairment (e.g. inability to forage, increased predation) or emigration. Monitoring studies have, however, found that although small mammal activity (burrows) may decrease in the seismic corridor just after a seismic survey, there is no long-term impact to the habitat or on small mammal species (Fiehler *et al.* 2014). Other studies (Cypher *et al.* 2012) found there to be no adverse impacts on the animal studied (kangaroo rat) and it was concluded that this, in part, could be as a result of the mitigation measures implemented.

Mitigation would primarily be through a detailed site assessment undertaken by a suitably qualified ecologist prior to final site selection of the drill sites or seismic lines. Other mitigation to minimise the impact on terrestrial fauna that would be considered for inclusion in the EMPr include:

- Restricting vehicle activity (especially vibroseis trucks) to existing roads, as far as possible;
- Implementation of buffers (no-go areas) around sensitive faunal habitats;
- Scheduling operations during least sensitive periods, avoiding migration, nesting and mating seasons;
- Ensuring the charge is small enough and deep enough to avoid sink holes or cratering;
- Ensuring that misfired charges are disabled and removed;
- Avoiding using vehicles and vibration baseplates on soft ground if compaction is a risk; and
- Imposing and enforcing speed limits.

5.4.7.3 Enabling the establishment of alien and invasive species in disturbed areas

Issue: The establishment of alien and invasive plant species may be enabled by disturbances to the natural vegetation. Thus vegetation clearance and soil excavations during exploration could be the catalyst that enables alien and invasive plant species to colonise or proliferate in new areas. The introduction of alien invasive vegetation could occur as a result of vehicular traffic and the import of materials. Many of these activities happen regularly as part of daily activities in the region.

Response: Alien and invasive plant species occur widely in the region and are known to have impacts on natural vegetation, water resources and fauna. As indicated in Section 5.4.1.1, it is estimated that only 6 to 10 ha would be subject to actual disturbance from exploration activities (i.e. less than 0.001 % of the surface of the exploration right area). Thus the extent of disturbed areas vulnerable to colonisation by alien and invasive plants is very limited.

Indirect impacts on natural vegetation from the inadvertent introduction of alien vegetation (through imported material / seeds or vehicles brought in from other areas) can be adequately managed through implementation of an alien eradication / monitoring programme. The specific requirements for an alien eradication / monitoring programme will be identified in the next phase of the EIA as part of a specialist biodiversity assessment (see Section 7.5.1). These specific requirements will be included in the EMPr.

5.4.8 IMPACT TO GROUNDWATER

Most agricultural activities in the region use groundwater and may be partly or wholly dependent of groundwater. Many rural houses obtain potable water from groundwater. Some of the smaller towns operate municipal wellfields as a water source. In some catchments in the region the groundwater is fully allocated and there is no water available for new users, unless such water is reallocated from an existing user. Groundwater can, therefore, be viewed as a critical resource. Any changes to the quality or quantity of water in near surface aquifers may affect local, adjacent and even distant users who rely on groundwater for domestic and agricultural use.

5.4.8.1 Altered hydrogeological regime and groundwater availability

Issue: Activities during exploration, including shot hole preparation and core hole drilling, might involve interaction with groundwater that could impact groundwater availability.

Response: Groundwater levels in the application area are likely to vary significantly, but on average are likely to be approximately 10 m to more than 30 m below ground level. Shot holes would be drilled to a depths of between 5 m and 80 m below ground level. In some places they may therefore reach the water table. If in isolated instances shot holes are drilled in areas where the water table is shallower and intercept groundwater, it may result in a vertical flow of groundwater into the borehole. However, shot holes would immediately be backfilled (before detonation), which would reduce the risk of this occurring. The explosive charges would be small and are not designed to cause damage or break open rock, just to create a sound wave. Any impact and changes in aquifer porosity would be extremely localised (at most only a few square metres around the shot hole) and would not impact on the much larger and extensive surrounding aquifers. The placement of shot holes at suitable buffer distances away from existing boreholes would prevent impacts on those holes.

Core holes would be drilled to depths of up to 3000 m and would intercept groundwater if aquifers are present. The drilling of the core hole creates a direct conduit (of very small diameter) that connects the rock strata from higher up to the bottom of the hole. Groundwater in different stratigraphic aquifers could theoretically flow via this conduit from one aquifer to another, potentially affecting the availability and quality of water in these aquifers. If a core hole is abandoned without proper plugging this flow could continue.

In reality the core holes would be few, of small diameter, widely distributed across large areas and could not easily transfer significant volumes of water. There would also need to be a significant pressure differential between connected aquifers to cause movement, which is unlikely. There would not be any active introduction of materials, no extraction of water, nor any stimulation of the formations via these core holes. During drilling the upper sections of the core holes would be cased and grouted for stability and to close off the near surface aquifer. Core holes would also be backfilled with cement on completion. There is, therefore, very little opportunity for cross connection between aquifers and changes in water availability are not expected.

Since the exact location of a site is flexible and can be adjusted to accommodate environmental sensitivities, impacts on the groundwater can generally be avoided with the placement of activities outside of areas that are not considered suitable on the basis of the specific groundwater resources on site. Thus it is recommended that prior to final site selection of the seismic lines or drill sites a detailed site assessment is undertaken by a suitably qualified geohydrologist. The final site location should, if necessary, be adjusted to avoid identified sensitive groundwater resources. The final site plan should be submitted to PASA for approval. The specific requirements for detailed site assessments will be identified in the next phase of the EIA as part of a specialist groundwater assessment (see Section 7.5.2). These specific requirements will be included in the EMPr.

Other mitigation to minimise the impact on groundwater resources that will be considered for inclusion in the EMPr include:

- Casing of core holes through the aquifer layers;
- Adequate sealing and plugging of core holes after drilling; and
- Monitoring of groundwater (level and quality) in active water boreholes in close proximity to exploration boreholes must be considered.

Also see Section 5.4.9.1 for possible impact on boreholes due to vibrations.

5.4.8.2 Contamination of groundwater resources

Issue: Contamination of groundwater could occur as a result of the use of drilling fluids during core hole drilling, and accidental spillages and leaks.

Response: Very few or no drilling fluids would be used during drilling of the seismic shot holes. Shot hole drilling will be by means of normal rotary air-percussion, i.e. the same method used for most of the water boreholes drilled in the area. Thus there would be no contamination of groundwater from drilling.

Drilling of core holes would, however, require the use of some drilling fluids and lubricants in order to maintain cooling and lubrication of the bit and to return the fine drill cuttings to the surface (these are not fracking fluids). The drilling fluids could mix with groundwater encountered down the hole until such time

as the hole is cased and grouted. The upper aquifers would be exposed to the drilling fluids for the shortest periods as the upper section of the hole is cased and grouted early in the drilling process. Drilling fluids unlikely to have a significant effect on groundwater quality for the following reasons:

- The drilling additives used are largely not hazardous and/or are bio-degradable (these are not fracking fluids);
- Drilling additives are relatively diluted in the drilling water (<3%);
- Fluids are designed to not move far from the drilling hole unless very poor formations or large cracks are encountered;
- A 'mudcake' of drill cuttings seals most of the drilled formations even during drilling;
- Drilling fluids are only used for a short period while the hole is being drilled;
- The total volume of drilling fluids is very small in comparison with any aquifer volume; and
- Return water and drilling fluid would be managed in above surface sumps.

Contaminants could also potentially enter the core hole from accidental situations, and would be introduced directly into the aquifer with limited opportunity for natural filtration by soils or geologic materials. Leaks and spills from vehicles, machinery and handling of potential pollutants (e.g. fuel and lubricants) during activities in the field could potentially contaminate groundwater resources through infiltration. If a contamination incident occurs it could put other boreholes in the same aquifer at risk, particularly those boreholes on the same property or those that are close to the core hole. Although it is not possible to predict the quantities of potential contaminants that may be accidentally released into the environment, periodic leaks and spills, should they occur, are likely to be very small. The placement of core holes at suitable buffer distances away from existing boreholes would prevent impacts on those holes.

Mitigation to minimise the contamination of groundwater resources that will be considered for inclusion in the EMPr include:

- Declare all drilling additives and the quantities to be used prior to use;
- Choose the least hazardous and/or are bio-degradable additives and use the smallest volumes of these;
- Appropriate management and disposal of drilling fluids on surface;
- As a precautionary measure, implement a buffer (no-go area) between shot holes / core holes and active water production boreholes. An appropriate buffer would need to be determined;
- Adequate maintenance of vehicles and machinery;
- Implementation of an adequate waste management plan;
- Good housekeeping practices (including spill prevention and response);
- Appropriate handling and storage of fuels and hazardous materials (e.g. explosives); and
- Monitoring of groundwater in active water boreholes in close proximity to exploration boreholes must be considered.

5.4.8.3 Water consumption

Issue: Water would be required for the operation of the core hole drilling rig. In some catchments in the region the water resource is fully allocated and there is no surface or groundwater available for new users, unless such water is reallocated from an existing user. Exploration will therefore compete with farmers and other users.

Response: The total volume required for core hole drilling depends on the formations encountered, but is estimated to be less than 5 000 L per day. For an average of 20 days of drilling, the total water use per hole is likely to be less than ~100 000 L. The drilling of up to 10 holes would thus consume less than 1 000 000 L from an area of > 1 500 000 ha over a period of many months. At a regional scale this water use is insignificant. However at a local scale, in terms of existing allocations and in times of drought the water use could be significant. The water could lawfully be acquired from a supplier, abstracted from an existing borehole or a local surface water resource (e.g. river or dam). Given the expected water volumes, it is not anticipated that Rhino Oil and Gas would require authorisation in terms of the NWA.

Mitigation to ensure the lawful use of groundwater resources that will be considered for inclusion in the EMPr include:

- Water must be sourced in a lawful manner and without comprising the rights of any existing user.
- Any abstraction from an existing borehole or surface resource must be undertaken with the landowners' consent;
- Water use must be minimised; and
- Water separation / recycling mud systems should be considered for use.

5.4.9 IMPACTS ON SURFACE WATER

Surface water is found in springs, seeps, wetlands, pans, dams and water courses. Surface water in the area is used locally for livestock watering and in ecological services. Baseline water quality in the area is generally good to very good. The region comprises the headwaters of a number of very important river systems (in particular the Umzimvubu) which supply large quantities of water for human consumption, agricultural and industrial use. Surface water can, therefore, be viewed as a critical resource. Any changes to the quality or quantity of water in surface resources may affect adjacent users who rely on water for domestic, agricultural and industrial use.

5.4.9.1 Altered surface water hydrological regime

Issue: Potential changes to the surface water hydrological regime (surface flow, drainage patterns, sediment load and availability) could have secondary impacts on water users and terrestrial and aquatic environment.

Response: The proposed exploration activities are unlikely to have any real effect on the overall hydrological regime as the small footprint of the proposed activities would not alter natural surface drainage patterns. Since project activities would for the most part take place on existing roads and tracks, further surface disturbances that could affect surface drainage patterns (e.g. soil compaction or increased erosion) would be limited.

Although in almost all cases exploration sites/routes would be located where access is available, the seismic survey lines may be required to cross watercourses. Any activity that impedes or diverts the flow of water in, or alters the bed, banks, course or characteristics of a watercourse, requires Water Use Authorisation in terms of the NWA. Since the exact location of a site is flexible, the location of sensitive areas (including wetlands, rivers and streams) would be taken into consideration during the final site selection process. The final site location should be adjusted to avoid identified sensitive surface resources. The specific requirements for detailed site assessments during finalising of the seismic lines or drill sites will be included in the EMPr.

Where surface areas have been disturbed (by vehicle tracks, shot holes, work platform, etc.) rehabilitation would be undertaken to re-establish the pre-exploration land use. The pre-exploration land-use would be determined during the detailed site assessments, which would be undertaken when finalising the location of each seismic line or drill site. The process of managing the impacts and rehabilitating the exploration sites will be detailed in the EMPr.

5.4.9.2 Contamination of surface water resources

Issue: As for groundwater contamination, leaks and spills from vehicles, machinery and handling of potential pollutants (e.g. fuel, and lubricants) during activities in the field could potentially contaminate surface water resources. In addition, inadequate management of surface sumps could result in the contamination of surface water resources. The release of contaminants into water resources could result in a deterioration of water quality, limiting use by water users, as well as damaging aquatic ecosystems.

Response: Exploration requires the use of vehicles and equipment driven by engines using hydrocarbons (diesel). Some of the equipment has hydraulic systems with lubricants. Certain hazardous lubricants and chemicals may also be used and stored on site. Thus leaks and accidental spillages could occur from containers or during refuelling, which could in turn contaminate surface water resources through storm water discharge into wetland, rivers and streams.

The overall volume of the high risk materials on-site during drilling would be relatively small (such materials are generally in 210 L drums or smaller) with no bulk containers on-site. Although it is not possible to predict the quantities of potential contaminants that may be accidentally released into the environment, periodic leaks and spills, should they occur, are likely to be very small. Adequate maintenance of vehicles and machinery, good housekeeping practices (including spill prevention and

response) and the implementation of an adequate waste management plan would minimise any potential impact.

Return drill water would be managed in above surface sumps. Thus these surface sumps would also contain sediments, drilling fluids and possibly hydrocarbons at concentrations not suitable for release to the environment. Inadequate management of surface sumps could result in the contamination of surface water resources.

Since the exact location of a site is flexible, it is recommended that exploration sites be sited away from watercourses/bodies. The specific requirements for detailed site assessments during finalising of the seismic lines or drill sites will be included in the EMPr.

Other mitigation to minimise the contamination of surface water resources that will be considered for inclusion in the EMPr include:

- The location of the surface sumps should also avoid surface water resources and should take the topography, natural drainage and site run-off into account;
- As a precautionary measure, implement a buffer (no-go area) between shot holes, core boreholes and sump ponds and surface water resources. An appropriate buffer will need to be determined;
- Adequate maintenance of vehicles and machinery;
- Good housekeeping practices (including spill prevention and response);
- Appropriate handling and storage of fuels and hazardous materials (e.g. explosives); and
- Implementation of an adequate waste management plan.

5.4.9.3 Water consumption

Refer to Section 5.4.9.3

5.4.10 GEOLOGY

Issue: There is a remote risk that during exploration the drilling or seismic survey could destabilise certain geologies and pose risks to underground caverns or mine workings. The Cedarville fault is likely to increase the susceptibility of the area to seismic events.

Response: The total number of exploration boreholes proposed for drilling (maximum of 10) is considered insignificant across the extent of the exploration area. The drilling would not impact on the geological strata in any significant manner. The sterilisation or damage to coal reserves during this early phase of exploration activities is highly unlikely due to the short duration of the exploration activities. Exploration drilling would not take place in areas where active underground mining is taking place. The drill rig would only be in place for a short period of time and there would be no permanent effects preventing future mining of any reserves. The steel casing and cement plugged holes would not pose a

significant risk to future underground mining. Information on the locations of such boreholes would be on record with regulatory authorities and thus available to any future mining stakeholders. This risk is not different to that from the thousands of water and prospecting boreholes that occur across the exploration right application area.

The energy generated by a seismic source comprises a low frequency, long wavelength and is directed into the earth. The energy dissipates rapidly over a very short horizontal distance. The peak particle vibration (i.e. the measurement of ground vibration) from the seismic surveys is anticipated be less than 0.5 mm/s at a horizontal distance of less than 20 m. A preliminary review of the international literature has shown that such energy is not comparable to a natural seismic event such as an earth quake or tremor and is closer in magnitude to a person jumping or slamming a door (Matheson Mining Consultants, Inc). The surveys are, therefore, unlikely to result in vibrations that could initiate instability in sensitive lithology's and mine operations.

Seismic surveys would only be undertaken in areas where the seismic sensitivity is not a concern. Consideration would also be given during planning to dolomitic areas and those with known underground caverns. This issue related to faults and seismic sensitivity will be further investigated in the next phase of the EIA, where appropriate buffers / no-go areas will be considered.

5.4.11 SOILS

5.4.11.1 Physical impact on soils (increased erosion / compaction)

Issue: The exposure of soils through vegetation clearance and/or physical disturbance of exposed soils may increase the risk of erosion (by wind and water), while the repetitive movement of vehicles and machinery over such surfaces could compact soils. These impacts may collectively affect the surface hydrology, damage soil structure, reduce aeration, soil permeability, infiltration rates and water retention capacity, and retard the regeneration of vegetation. Reduced infiltration could also result in an increase in surface runoff, potentially causing increased sheet, rill, and gully erosion.

Response: Impacts to soils caused by the proposed exploration activities would be limited to the footprint area, which would for the most part be confined largely to existing roads, tracks and other previously disturbed areas (e.g. agricultural lands) already exposed to disturbance, compaction and at increased risk of erosion.

Vegetation cover and soil structure would only be disturbed on a small portion of each drill site. A typical core drill rig and equipment requires an operating area of approximately 1 200 m^2 (i.e. 0.12 ha), with approximately 100 m^2 forming the central working platform and the balance used for equipment storage, staging and parking. Thus the extent of soil exposed to these risks is very limited. In addition, the

majority of exploration activities do not require the clearing of vegetation and thus there would be limited actual disturbance to soils and associated roots/seed.

Since the exact location of a site is flexible, the location of areas would be adjusted to avoid areas that are sensitive to compaction and erosion. Previously disturbed areas would be selected. The specific requirements for detailed site assessments during finalising of the seismic lines or drill sites will be included in the EMPr.

Other mitigation to minimise the impact on soils that will be considered for inclusion in the EMPr include:

- Restricting the movement of vehicles and people to previously disturbed areas (e.g. existing roads) as much as possible,
- Limiting and controlling the movement of people and vehicles over natural areas (i.e. site demarcation and the establishment of no-go areas);
- Minimise the clearing of vegetation cover;
- Ensuring the charge is small enough and deep enough to avoid cratering; and
- Rehabilitation of disturbed areas (including erosion control measures).

5.4.11.2 Contamination of soils

Issue: Leaks and spills from vehicles, machinery and handling of potential pollutants (e.g. fuel and lubricants) during on-site activities may potentially contaminate the soil.

Response: Exploration does require the use of vehicles and equipment that use fuel. Some of the equipment has hydraulic systems with lubricants. Certain hazardous lubricants and chemicals may also be used and stored on site. Thus leaks and accidental spillages could occur from containers or during refuelling, which could in turn contaminate the soil.

The overall volume of the high risk materials on-site during drilling would be relatively small with no bulk containers on-site (such materials are generally in 210 L drums or smaller). Although it is not possible to predict the quantities of potential contaminants that may be accidentally released into the environment, periodic leaks and spills, should they occur, are likely to be very small. Adequate maintenance of vehicles and machinery, good housekeeping practices (including spill prevention and response) and the implementation of an adequate waste management plan would minimise any potential impact.

5.4.12 HERITAGE

Issue: Loss of or damage to heritage resources as a result of exploration activities. Many farms and communities in rural areas have graveyards located near to them. There are also many buildings, infrastructure and sites of cultural or heritage importance across the Eastern Cape.

Response: The heritage resources of the application area include archaeological and palaeontological material and the built environment comprising historic towns and farm buildings. Heritage resources, including archaeological or palaeontological sites over 100 years and buildings, graves and other structures older than 60 years are protected in terms of the NHRA and may not be disturbed without a permit from the relevant heritage resources authority.

The amount of surface and subsurface disturbance is minimal during the exploration phase. Cultural resources buried below the surface are unlikely to be affected, while material present on the surface could be disturbed by vehicular traffic, ground clearing and pedestrian activity.

No exploration drilling or seismic survey would be allowed to take place near to known heritage sites. Site selection would thus take cognisance of all buildings and other known structures, which will include built heritage resources, as well as other known heritage sites.

Since the exact location of a site is flexible and can be adjusted to accommodate environmental sensitivities, impacts on heritage resources can generally be avoided with the placement of activities on sites that do not have any heritage resources. Thus it is recommended that prior to final site selection of the seismic lines or drill sites a detailed site assessment is undertaken by a suitably qualified heritage specialist. The final site location should, if necessary, be adjusted to avoid identified se heritage resources. The final site plan should be submitted to PASA for approval. The specific requirements for detailed site assessments will be identified in the next phase of the EIA as part of a specialist heritage assessment (see Section 7.5.3). These specific requirements will be included in the EMPr.

Additional mitigation measures to minimise the potential impact on heritage resources that will be considered for inclusion in the EMPr include:

- Consultation with the landowner prior to commencement may help to identify heritage site;
- Consultation with leaders and elders of rural communities may help to identify sites of cultural significance; and
- Implementation of buffers (no-go areas) around known heritage sites.

5.4.13 LAND TENURE AND ACCESS TO PRIVATE PROPERTY

Issue: The issuance of an exploration right would result in Rhino Oil and Gas holding a right that necessitates them to access private property in order to conduct exploration. Various queries were raised about how Rhino Oil and Gas would access the minerals on private land. Do land owners have any say with regards to access over their land for exploration? What would Rhino Oil and Gas do if the land owner denied access?

Potential impacts from the proposed exploration activities include:

- Access by exploration personnel onto private property;

- Creation of access routes onto land where none existed; and
- Potential change in land use value.

Response: Despite the issuance of an exploration right, the owner remains in control of the surface rights. A land owner has specific rights over land for which they hold title and is entitled to deny access to their land as this is private property. There would not be any change in land tenure.

Rhino Oil and Gas could not access any property without engaging with the land owner to agree terms and provide adequate notice. A written Access Agreement defining all relevant conditions would be concluded, giving the landowner opportunity to influence the location and terms of use. The MPRDA provides that a mineral right is a limited real right and sets out that the holder may enter the land to which such right relates together with his or her employees, and bring onto that land any plant, machinery or equipment and build, construct or lay down any surface, underground or under sea infrastructure which may be required for the purpose of prospecting, mining, exploration or production, as the case may be. Rhino Oil and Gas's stated approach is to negotiate with willing participants.

Land owners' should be aware that the right to access land is conferred to a mineral right holder in terms of Section 5 of the MPRDA. Rhino Oil and Gas indicated that any enforcement of these rights would only be undertaken if necessary and then in terms of the appropriate legislation (Sections 54 and 55 of the MPRDA).

At this stage the final seismic survey lines and boreholes sites have not been determined and would only be finalised during Year 2/3 of the work programme. The exact location on the ground is flexible and can be adjusted to accommodate local features, landowner' needs and environmental sensitivities. Ultimately, Rhino Oil and Gas want to develop and maintain good working relationship with all landowners and would want to make sure that they understand and are comfortable with the planned activities before any work commences. Any access and use of the land for exploration activities would thus be through an Access Agreement negotiated between the exploration right holder and the landowner (or lawful occupier as the case may be). Thus each landowner will have direct input in where exploration activity could take place on their land.

Access would largely be through existing routes and gates. New routes or gates would only be created in agreement with the landowner. Controlled access points would be locked at all times if that is what the landowner requires.

Activities for the early phase exploration are of short duration, limited extent and localised such that no real change to the land would occur. Unlike with mining there would not be disturbance or sterilisation of large areas of land. As such a change in land value is highly unlikely.

5.4.14 LAND USE

Issue: Exploration activities would occupy land area, which could have an impact on current land uses, e.g. farming, forestry plantation, mining, etc. Exploration activities would preclude other land uses for the duration of the drilling and testing period. Potential impacts include:

- Prevention or disruption of land user' activities;
- Impacts to crops, plantations, veld and livestock/game;
- Related loss of income; and
- Loss of productivity on disturbed land.

Response: The maximum cumulative extent of the exploration area that would encounter on-site activity over the 3 year period would be less than 50 ha. Of this only an estimated 6 to 10 ha would be subject to significant disturbance from exploration activities (i.e. less than 0.001 % of the surface of the exploration right area). At a regional level this is insignificant, although to an individual land owner it may have much greater bearing.

Core hole drill sites would occupy an area of approximately 1 200 m^2 (i.e. 0.12 ha). The drilling and testing period would only preclude other activities for a short period of a few weeks. Seismic surveying can require the use of an area of average of 3 m in width over many kilometres with regularly spaced drill sites. Shot hole or vibration sites are very small (< 50 m^2) and would preclude other activities for a very short duration (hours to a few days). Thus any loss of land for farming activities would be highly localised and temporary.

The placement of the target sites/routes would be undertaken in consultation with the landowner/occupier to ensure that conflicting land uses are avoided where possible and disturbance to current land use activities are kept to a minimum. The primary target for any drilling site would thus be a previously disturbed area that is not currently being used for agricultural production. The use of any land for exploration activities would have to be through an Access Agreement negotiated between the exploration right holder and the landowner/occupier. Measures to ensure that any interference is avoided or minimised would be written into the agreement drawn up with each landowner and included in the final exploration plan. Thus the landowner would have direct say input where the exploration drill site is placed or not placed and the measures required to avoid or minimise interference. Refer to Section 5.4.7 above for further detail on access to land.

All disturbances occurring from exploration would be documented and the affected area returned to an agreed condition by the right holder. In most cases the effects of any disturbance would more than likely not be visible over a period of a few months.

Other mitigation to minimise the impact on landowners and current land uses that would be considered for inclusion in the EMPr include:

- Possible exclusion periods to minimise the impact on current or planned land use activities (e.g. sowing, harvesting, etc.);
- Ensuring livestock is kept away from exploration sites (including temporary fencing and gates, established of buffers zones, etc.);
- Any loss of income would be determined between the landowner and the right holder and compensation agreed where necessary (see Section 5.4.15 for more detail on compensation); and
- Adequate and ongoing consultation with landowners and other mineral right prior to and during on-site exploration activities.

5.4.15 STRUCTURAL DAMAGE TO INFRASTRUCTURE

5.4.15.1 Vibrations

Issue: There are concerns that airblasts (airborne shock waves), air overpressure and ground vibration, generated by the underground detonation of explosives or Vibroseis used during seismic data acquisition, may cause structural damage to infrastructure, including buildings, groundwater boreholes or affect the stability thereof.

Response: The vibration energy of a seismic survey is of a low frequency, long wavelength and is directed into the earth. The energy dissipates rapidly over a very short horizontal distance. The peak particle vibration (i.e. the measurement of ground vibration) from the seismic surveys is anticipated be less than 0.5 mm/s at a horizontal distance of less than 20 m. As a comparison, guidelines for piling using a drop hammer (intermittent) and a vibratory rig (continuous) suggest keeping the peak particle vibration below 15 mm/s and 7.5 mm/s, respectively, in order to prevent damage to buildings (Maslin, 2015). The seismic survey vibrations being much lower then the piling standards are, therefore, unlikely to result in vibrations that could damage structures.

A preliminary review of the international literature has shown that in Australia the guideline limits for airblasts and ground vibration, as a result of a 800 g explosive charge detonated at 5 m depth, are reached at 116 m and 67 m from the shot hole, respectively (Umwelt, 2010). Singh *et al.,* 2007 found that a seismic shot using a large explosive charge (2.5 – 7.5 kg) in deep shot holes (9 – 15 m) had no effect to structures 20 m from the shot hole. The Canadian Oil and Gas Geophysical Operations Regulations (SOR/96-117) provide guideline stand-off distances for the safe operation of seismic surveys from a variety of facilities. These distances vary from as little as 15m to as much as 100m for different seismic sources. Other studies have proposed setbacks ranging from 50 m to 200 m from any buildings. groundwater boreholes, springs, water pipelines, power lines, etc. This issue will be further investigated in the next phase of the EIA and an appropriate buffer will be determined.

5.4.15.2 Degradation or damage due to exploration vehicles and equipment

Issue: Farmers have raised concerns about possible damage to infrastructure such as fences, gates, culverts, pipes and roads due to exploration activities. Accidental damage during exploration could occur as vehicles and equipment move on and between sites. Such damage has direct cost of repair/replacement as well as potential for significant loss of income due to the effects of such damage.

Response: Any use of land or infrastructure for exploration activities would be through an Access Agreement negotiated between the exploration right holder and the landowner/occupier. Thus the landowner would have input into where exploration takes place and which infrastructure is used. Refer to Section 5.4.7 above for further detail on access to land.

Exploration would typically be planned to be located away from infrastructure and appropriate buffers would be applied. Any risks with regard to accidental damage can be minimised by maintaining a suitable buffer between the exploration site and the nearest receptor. Ultimately, if access by exploration personnel and equipment caused any degradation or damage, the right holder would be responsible for effecting satisfactory repairs.

This issue will be further investigated in the next phase of the EIA and an appropriate buffer will be determined.

5.4.16 NOISE

Issue: Primary sources of noise associated with the proposed exploration activities include vehicle traffic, seismic surveys (detonation of explosives) and drill rig operations. Increased noise levels may cause disturbances and nuisance to nearby receptors. The region generally has low ambient noise levels and exploration activities could change this, albeit for short durations.

Response: The noise generated by general operations (presence of vehicles and crew) would be similar in nature to farming operation, and would be transient, with exploration activities not fixed in location. Thus impacts are expected to be of low significance.

Drilling of shot-holes and core holes could introduce and increase noise levels for a slightly extended time period and could impact receptors. The detonation of seismic shots or Vibroseis trucks would also result in noise (a dull thud) which would be new and alter noise levels. Noise is known to attenuate with distance as well as due to other barriers and absorbing factors. Noise levels of shot would decrease rapidly with distance and is of very short duration. Noise impacts would occur where receptors were in close proximity to the source with nuisance levels at distances of up to 250 m.

Any risks with regard to potential noise impacts of drilling and shot blasts can be avoided completely by maintaining a suitable buffer between the exploration site and the nearest receptor. This issue will be further investigated in the next phase of the EIA and an appropriate buffer will be determined.

5.4.17 AIR QUALITY

5.4.17.1 Dust and vehicle emissions

Issue: Dust fallout resulting from the movement of vehicles to and from exploration sites on unsurfaced roads may contribute to elevated particulate matter levels in the air on a local scale. Emissions would also be generated by vehicles and other combustion-driven equipment (e.g. generators) that release nitrogen oxides (NO_X), carbon dioxide (CO_2), carbon monoxide (CO) and volatile organic compounds (VOC).

Response: Dust is relatively inert, but high particulate levels can be damaging to health and vegetation. In terms of dust generation and emissions, the proposed exploration activities would be similar to any comparable operation involving similar vehicles and equipment and emissions would be very limited in both intensity and duration. With regard to seismic surveys it is estimated that approximately 10 km can be completed per day. Thus the potential impact would be temporary in nature.

The impact on air quality as a result of the proposed exploration activities would be managed through good maintenance of vehicles and machinery to minimise emissions. Dust generation can be controlled by imposing and enforcing speed limits on all unsurfaced roads and tracks. Note that spraying affected areas with water to control dust may not be possible or allowed due to water scarcity.

5.4.17.2 Escape or release of gas from exploration boreholes

Issue: Core holes drilled to the target strata could create the opportunity for gas to escape to the surface. The escape or release of gas from exploration core holes is of concern as methane (one of the main constituents of natural gas) is a relatively powerful green-house gas with a high global warming potential (23 times that of CO_2).

Response: If gas is present, the passive flow of gas up the core holes is expected to be unlikely/ limited as the strata remain under pressure and much of the gas is adsorbed to the particle surfaces. However, the leak of gas could pose a safety risk and contribute to green-house gas emissions. Core holes would only be open for a period long enough to complete the drilling and downhole geophysics. If free flowing gas was detected then the holes would need to be plugged as a priority. The core holes are then sealed and plugged across the entire depth, which would ensure that no gas would escape. Thus emissions are not anticipated to have a measurable impact on climate change.

Air quality issues will be further investigated in the next phase of the EIA and an appropriate management will be determined.

5.4.17.3 Health risks from gas released in exploration boreholes

Issue: Core holes drilled to the target strata could create the opportunity for gas to escape to the surface. Gas that is released could be harmful to human health if exposure occurs.

Response: as indicated in the previous section there are not anticipated to be significant releases of gas and thus health impacts are not anticipated.

Air quality issues will be further investigated in the next phase of the EIA and if health risks are identified then these will be considered further.

5.4.18 SAFETY AND SECURITY

5.4.18.1 Public safety

Issue: Public safety with widespread exploration in the region is a concern. Activities at exploration sites are potentially dangerous due to, *inter alia*, increased traffic volumes, heavy machinery, explosives, hazardous materials, release of gas etc. Thus member of the public could be injured if access to exploration sites is not controlled.

Response: Provision would need to be made to ensure public health and safety. Mitigation would largely involve excluding the public from sites where exploration is undertaken.

Any risks relating to drilling and shot blasts can be avoided completely by maintaining an appropriate buffer between the exploration site and the nearest receptor. It is recommended that no core hole drilling site be located within 200 m of a residence or within 500 m of a residential area. This issue will be further investigated in the next phase of the EIA and an appropriate buffer will be confirmed. Explosives would only be detonated under strictly controlled circumstances (including ensuring through visual checks that the area is clear) and injury or mortality of people is highly unlikely.

Other mitigation to minimise the impact on public safety that will be considered for inclusion in the EMPr include:

- Appropriate demarcation of sites (using temporary fencing or danger tape);
- Erecting signage (in appropriate languages); and
- Ensuring excavations are backfilled.

5.4.18.2 Landowner security

Issue: Concerns have been raised relating to safety and security on farms with many farmers having experienced a wide range of crimes against their property, possessions and persons. There is a concern that the increased numbers of people in the area as a result of the proposed exploration activities could exacerbate the situation, either through direct theft by contractors and staff or through undeterred access onto private land through gates that are left open or fences that are removed / damaged.

Response: Concerns regarding site access, trespassing and farm security as a result of exploration teams would be alleviated by developing relationships with individual landowners. All access to land for exploration activities would have to be through an Access Agreement negotiated between the exploration right holder and the landowner/occupier (see Section 5.4.7). Thus any additional landowner requirements with regard to safety and security can be discussed during landowner negotiations prior to the start of exploration and written into the land use agreements with each landowner, as required.

Mitigation to minimise the risks to landowner security that will be considered for inclusion in the EMPr include:

- Avoiding the creation of new access points to farms, as far as possible;
- Ensuring the staff are under constant supervision and do not enter adjacent farms / residential areas under any circumstances except on official business; and
- Ensuring all gates are closed/locked and any fences that are damaged or may need to be removed are repaired / replaced immediately.

5.4.18.3 Fires

Issue: The extensive natural vegetation of the region provides high fuel loads for veld fires. The dry winters combined with high wind speeds provide an environment susceptible to fire. Veld fires can have a devastating effect on landowners with risks to human life and livestock, damages to infrastructure and loss of winter grazing.

Response: During any exploration activities Rhino Oil and Gas and its contractors would be aware of the risk of fire. The contractor would be required to comply with the requirements of the Veld & Forest Fires Act, 1998 (No. 101 of 1998) in terms of establishing contact with the Fire Protection Association and /or surrounding landowners. Environmental awareness training would specifically need to address fire risks. Measures would be put in place to assess the fire risk of all activities and reasonable preventative actions would be implemented where necessary. An emergency procedure for the control of accidental fire would also be put in place. Suitable insurance would be maintained by Rhino Oil and Gas.

5.4.19 CONTRIBUTION TO LOCAL ECONOMY

Issue: Contribution to the local economy could occur through the creation of direct employment opportunities and generation of direct revenues as a result of using local businesses for support services and supplies. On the other hand if the exploration detracts from or compromises the main attractions of the region then it could result in a reduction in external inputs to the local economy.

Response: Since economic growth and employment opportunities are depressed in many of the small towns within the exploration area, any potential stimulation of the local economy would result in a positive impact. However, since exploration is highly technical and requires specialised equipment and crews, job opportunities for local communities would be very limited. The small number people required and very short duration of each of the proposed exploration operations further limits opportunities. A staff of approximately five persons would operate a drill rig, while seismic survey teams would consist on between 15 and 25 persons. These are mostly persons with specific technical skills.

The employment and training of local persons, particularly Historically Disadvantaged Individuals, even for short-term jobs, would be encouraged by Rhino Oil and Gas and all of their sub-contractors. Where ever possible the materials and equipment needed to operate the exploration equipment and sustain the personnel would be acquired locally, thus providing some limited input into the local economy. Training and skills transfer should be ensured whenever possible.

The above potential contribution to the economy would also need to take into consideration any potential negative impacts, e.g. impacts on existing land uses (e.g. agriculture, mining, tourism). Refer to Section 5.6.2 for a more details description of the impacts on existing land use.

5.4.20 COMPENSATION

Issue: Various queries were raised relating to compensation for: the minerals derived from the land; access to land; and the use of or impact to land.

Response: The MPRDA provides that all minerals vest with the State. Thus a landowner has no claim to the minerals that may occur on their land and is not due any compensation for those minerals.

The nature of the proposed exploration programme is not expected to have a significant effect on any landowner or occupier, nor the income derived from such land. This would be ensured by negotiating access with landowners and siting activities at agreed locations that do not conflict with current land use. Where necessary, compensation would be agreed with landowners for access as well as any economic loss, damage to infrastructure, etc. This would form part of the Access Agreement that is negotiated between the exploration right holder and the landowner.

5.4.21 REHABILITATION AND LIABILITY

Issue: Land owners were concerned about who would be responsible for rehabilitation of land and property after any exploration activity. How would the rehabilitation be funded? Was there any enforcement by authorities of rehabilitation and who would foot the bill if Rhino Oil and Gas failed to complete the rehabilitation adequately. Owners were also concerned for the case where exploration was conducted on an adjacent farm, with resulting impacts affecting them.

Response: Rhino Oil and Gas would be responsible for the rehabilitation of all disturbances resulting from their exploration work, as set out in the NEMA. Where areas have been disturbed by exploration, rehabilitation would be undertaken to re-establish the pre-exploration land use. The pre-exploration land-use would be determined during the detailed site assessments, which would be undertaken when finalising the location of each seismic line or drill site. The process of managing the impacts and rehabilitating the exploration sites would be conducted in terms of an EMPr approved by the PASA.The landowner's agreement is required before a drill site is considered rehabilitated.

As part of the EIA process it is necessary to determine the quantum of a financial provision that is required for rehabilitation, closure and on-going post decommissioning management of negative environmental impacts (Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, GN 1147). This quantum must be made available by Rhino Oil and Gas to PASA as security for the completion of rehabilitation should Rhino Oil and Gas fail to do so. PASA in consultation with other relevant authorities would determine the use and allocation of this money for rehabilitation. The financial provision that needs to be made is not limited to the land on which the exploration would be undertaken, but would provide for rehabilitation of damages from exploration.

The quantum of the required financial provision would be determined through the EIA process. The amount and the method of providing the provision would be detailed in the EIA report.

5.4.22 DETAILED BASELINE DESCRIPTION OF THE AFFECTED ENVIRONMENT

Issue: I&APs requested that the EIA report provides a detailed baseline description of the current state of the environment in the area.

Response: The status of the baseline environment is described later in the Scoping Report (see Section 5.4). This description would be added to and augmented in the EIA report. However, as the application area is vast and specific sites for core hole sites and seismic lines have not yet been identified, it is not possible to provide detailed site specific descriptions at this stage or in the EIA.

Only once Rhino Oil and Gas has analysed existing data and undertaken the initial exploration activities (e.g. desktop work and gravity survey) would they be able to identify preliminary locations for the field

activities. These preliminary locations would then be subject to more detailed on-site investigation, which would provide an actual indication of the baseline conditions and environmental sensitivities at each site.

Since the exact location of a site is flexible, the final location can be adjusted to accommodate, *inter alia*, local features and environmental sensitivities identified during the site investigation.

Thus the EIA would aim to identify the general environmental sensitivities and categories across the exploration area, based on a desktop analysis, which must be taken into consideration when selecting a site for a core hole or seismic line. The specific requirements for detailed site assessments during finalising of the core hole sites or seismic lines would be included in the EMPr. The proposed approach would ensure sensitive areas are avoided.

C. KEY ISSUES NOT RELATED TO THE CURRENT EIA PROCESS AND PROPOSED WORK PROGRAMME

The issues and concerns described below are documented, but will not be responded to as they are made in regard to further exploration work or future production activities which have not been proposed by Rhino Oil and Gas for this ER application. Such issues are therefore beyond the scope of this EIA.

However, the applicant (Rhino Oil and Gas) and the authority (PASA) are both advised to give due consideration to these concerns as much of the current public opposition to oil and gas development is based on these.

5.4.23 ASSESSMENT OF RISKS OF POTENTIAL FURTHER EXPLORATION AND FUTURE PRODUCTION

Many of the issues and questions raised by I&APs in this process are in regards to the impacts of further detailed exploration and future production activities. I&APs have identified numerous impacts to various environmental aspects which are expected to occur during further detailed exploration and future production activities. This includes many of the impacts as described in the previous section, but with impacts of much greater significance or even unknown consequences.

I&APs set out that production, and fracking in particular, has huge risks to society and the environment and should not be entertained in any form. They state that there is a significant body of evidence from around the world (not least that fracking is banned in a growing number of countries and territories) that fracking results in unacceptable risks to surface and groundwater resources and human health. Such risks are borne by the landowners and local communities who do not participate in the huge economic benefits that accrue to the right holder and government. While there may be a consumer driven need for hydrocarbons, the risks and costs to society and the environment are considered to far outweigh the benefits. There is substantial evidence of these risks and costs and little evidence that gas production can consistently be undertaken in a safe manner.

Given that Rhino Oil and Gas acknowledge that the end-goal of the exploration process is to extract hydrocarbons, I&APs demand that potential impacts of all future activities should be identified and assessed at this time, before any form of exploration is allowed. I&APs have quoted the precautionary principle as defined in NEMA which "promotes a cautious and risk-averse approach to the use of resources especially where scientific information is insufficient to accurately indicate the possible impacts of such use". In light of this, I&APs have stated that exploration should only be considered for approval if it can be demonstrated that all future activities arising from the exploration would not lead to unacceptable risks.

Response: The interest in and concerns around fracking are recognised and acknowledged. However, no fracking is proposed as part of the current work programme and the ER, if granted, would only allow the proposed work programme as described in this report (see Section 2.3). The current EIA is aligned to the early-phase exploration work programme as proposed by Rhino Oil and Gas. The potential impacts of further detailed exploration and future production activities would not be assessed in the EIA process.

Further to this, Rhino Oil and Gas maintain that due to the current informiaton and the nature of exploration they cannot have details at this stage on what the resource is, where it located geographically or geologically, or how it might be extracted. As the EAP it would simply be speculation to undertake an environmental impact assessment of future activities for which no defined details are known.

I&APs are advised that the responsibility for the assessment of impacts of any future exploration or production activities would fall to the future EIA (or environmental authorisation amendment) process which is required by legislation to inform the environmental authorisation required as part of a mineral right. This would include a further public participation process and in-depth assessment (including specialist studies) of all project-related activities / issues. The assessment would be based on the known details of the work as proposed by the applicant. It is also expected that if/when this phases commences that the Karoo SEA for Shale Gas will be complete and will provide a sound basis on which to undertake an assessment of future exploration work.

5.4.24 OBJECTIONS TO THIS APPLICATION ON THE GROUNDS OF FUTURE RISK

Many of the objections submitted by I&APs in terms of this process are with regards to risks of further detailed exploration and future production activities. These objections are aimed at preventing exploration from ever commencing because the proposed exploration activities may lead to a gas discovery, which may in turn lead to an application for a production right, which may include the possibility of hydraulic fracturing ("fracking") as a production method. Stopping the process now is the surest way to prevent any of the future risks from materialising.

Response: Whilst such risks could arise in relation to the further exploration and future production (i.e. hydraulic fracturing), the objections to the EIA process for the current application should be dealt with as part of a possible future application and not in the consideration of the current early phase exploration application.

5.4.25 CONCERN WITH THE ADEQUACY OF THE PUBLIC PARTICIPATION METHOD

Issue: I&APs have raised various concerns over the intent, method and adequacy of the public participation process. Concerns have been raised in light of both the legislated requirements and expectations on the level of consultation required for a project of such broad extent and long-term consequence. The issues in this regard are varied but include inadequate timeframes for meaningful response; the method and success of notification to both landowners and I&APs; lack of provision for the involvement of persons whose background are rural, non-English and or low education levels; lack of consultation as provided for in the MPRDA and NEMA.

Response: The requirements for public participation and the timeframes for a scoping and EIA process are set out in the EIA Regulations 2014. The timeframes provided in the EIA Regulations require that an applicant must within 44 days of receipt of an application by the competent authority submit the Scoping Report, which has been subject to a public participation process of at least 30 days. This effectively leaves only 14 days to prepare the Scoping Report, consider and respond to all comments received and submit the revised Scoping Report to PASA. In projects such as these where extensive consultation is required, such timeframes are very limiting. The method followed for the public participation to date is described in Section 5.2 of the Scoping report

As described in Section 5.4.4 SLR proposed a pre-application phase to Rhino Oil and Gas to allow for a more comprehensive public participation process to be included in the Scoping Phase. The submission of the application for environmental authorisation was delayed to allow additional time. Unfortunately much of this time was not available to SLR and the pre-application phase was less than 6 weeks. Following the commencement of the public participation in late 2015 it was evident that further time was required. SLR applied to PASA for an extension of time available in the scoping phase and a 16-week time extension was granted. Additional public interaction and investigation to augment the scoping process was undertaken. The further public participation that was undertaken is also detailed in Section 5.2.

The key challenges are the involvement of rural communities who don't have access to mainstream media or whom are not well educated and the identification of contact information for landowners. SLR continues to address these. Notices are being run on community radio stations in local languages and SLR continues to work on consultation with the Traditional Leadership on mechanisms to involve rural communities.

The public consultation process is ongoing and will continue throughout the EIA. Section 7.8 of the scoping report details the future opportunities for I&APs to participate. SLR will continue to augment the public participation process with the aim of involving all potential interested and affected parties; giving I&APS access to information that has the potential to influence the decision with regard the application; and giving I&APS a period of at least 30 days to submit comments on each of the reports produced through this process.

5.5 ATTRIBUTES OF THE AFFECTED ENVIRONMENT

The baseline information presented here is aimed at providing the reader perspective on the existing status of the cultural, socio-economic and biophysical environment in the proposed exploration area. The large extent of the proposed exploration area and the fact that exploration is estimated to physically disturb much less than 0.005% of the surface area meant that it was not feasible, nor necessary, to provide detailed assessments of the environmental aspects. This assessment has thus aimed to identify the environmental sensitivities within the exploration area, at a high-level.

Baseline information for this scoping report was sourced through a desktop study and draws extensively on information contained in studies that have been conducted by various government departments and non-government environmental organisations responsible for the area covered by the exploration right application. Several sources were used for this section, including:

- Eastern Cape Biodiversity Conservation Plan;
- Data held by the South African National Biodiversity Institute (SANBI), World Wildlife Fund (WWF), BirdLife SA, Animal Demography Unit (ADU) etc;
- National Freshwater Priority Areas project;
- The International Union for the Conservation of Nature (IUCN) Red Data List of species;
- Available internet information on environmental issues related to CBM exploration and production;
- Mining and Biodiversity Guideline;
- Available internet information on the baseline environment within the exploration area; and
- Topocadastral and geological maps covering the exploration area at scales ranging from 1:50 000 to 1:250 000.

More detailed information will be provided in the EIA report once the specialist reports and other research has been concluded.

5.5.1 CLIMATE

Introduction

Climate can influence the potential for environmental impacts and related design. Specific issues are listed below:

- Rainfall could influence erosion, evaporation, vegetation growth, rehabilitation planning, dust suppression, and surface water management planning
- Temperature could influence air dispersion through impacts on atmospheric stability and mixing layers, vegetation growth, and evaporation which could influence rehabilitation planning

To understand the basis of these potential impacts, a brief baseline situational analysis is described below. More detailed information will be provided in the EIA report.

Data sources

Information in this section was sourced from the review of available literature (Water Resources of South Africa manual 2005 (WR, 2005)).

Results/Conclusion

Regional Climate

The proposed exploration area is characterised by summer rainfall usually in the form of thunderstorms. Mean annual precipitation varies across the proposed exploration area. In this regard it is expected that the mean annual precipitation for the proposed project area can vary between 700mm to 1000mm (WR, 2005).

Evaporation rates in the southern section of the proposed exploration area are expected to range between 1300mm to 1500mm per annum (WR, 2005).

This is a sub-humid region characterised by summer rainfall, warm temperatures in summer with an average day-time temperature of 17 °C, and colder day-time temperatures in winter with an average of 2 °C which can drop well below zero and is often associated with frost and snow.

5.5.2 GEOLOGY

Introduction

The geology of a particular area will determine the following factors:

- The type of soils present since the soils are largely derived from the parent rock material;
- The presence and quality of groundwater and the movement of the groundwater;
- The presence of paleontological resources in the rock strata;
- The potential for contaminant generation ; and

- The potential for the occurrence of the hydrocarbons of interest.

Groundwater is discussed in section 5.5.7 and paleontological resources in section 5.5.10.

A basic description of the regional geology is provided below. More detailed information will be provided in the EIA report.

Data sources

Information in this section was sourced from the review of available literature. Rhino Oil and Gas have also gathered data from government, industry (where available) and academic sources (theses and dissertations), as well as published papers from the academic literature. Data relevant to the project was synthesised from the review of approximately 150 such reports. These reports were supplemented by over 140 papers from the academic literature as well as dissertations and theses.

Results/Conclusion

The proposed exploration area lies in the north east of the Karoo Basin (see Figure 5-4). The main Karoo Basin in South Africa formed as a result of compression predominantly associated with flexural subsidence, characteristic of foreland basins, during the assembly of the Gondwana super-continent. Consensus on the tectonic setting of the basin, however, remains debated (Tankard et al., 2012; Schreiber-Enslin et al., 2014). The Karoo Basin represents a diverse and complex suite of rock units with an aerial extent of roughly 600,000 square kilometres that attains a maximum sedimentary thickness of 12 kilometres. The north east of the basin is host to several distinct facies of rocks that vary between shoreface, fluvial and lacustrine sediments, deposited between the Permian and Triassic. The deposition of Karoo Supergroup sediments ended in the early Jurassic during the emplacement of the igneous rocks that constitute the Drakensberg Group. The preserved basalts and dolerites attain a maximum thickness of approximately 1,400 m in the Lesotho area. The northern flank of the basin is defined by the erosional limits of the late Carboniferous-Permian Dwyka and Ecca Groups, where they unconformably overlay Archean-Cambrian age, Kaapvaal and Namaqua-Natal basement. The Ecca Supergroup consists mainly of sandstone and shale from the Permian period. The Dwyka Formation within the proposed exploration area consists mainly of tillite from the Carboniferous period.

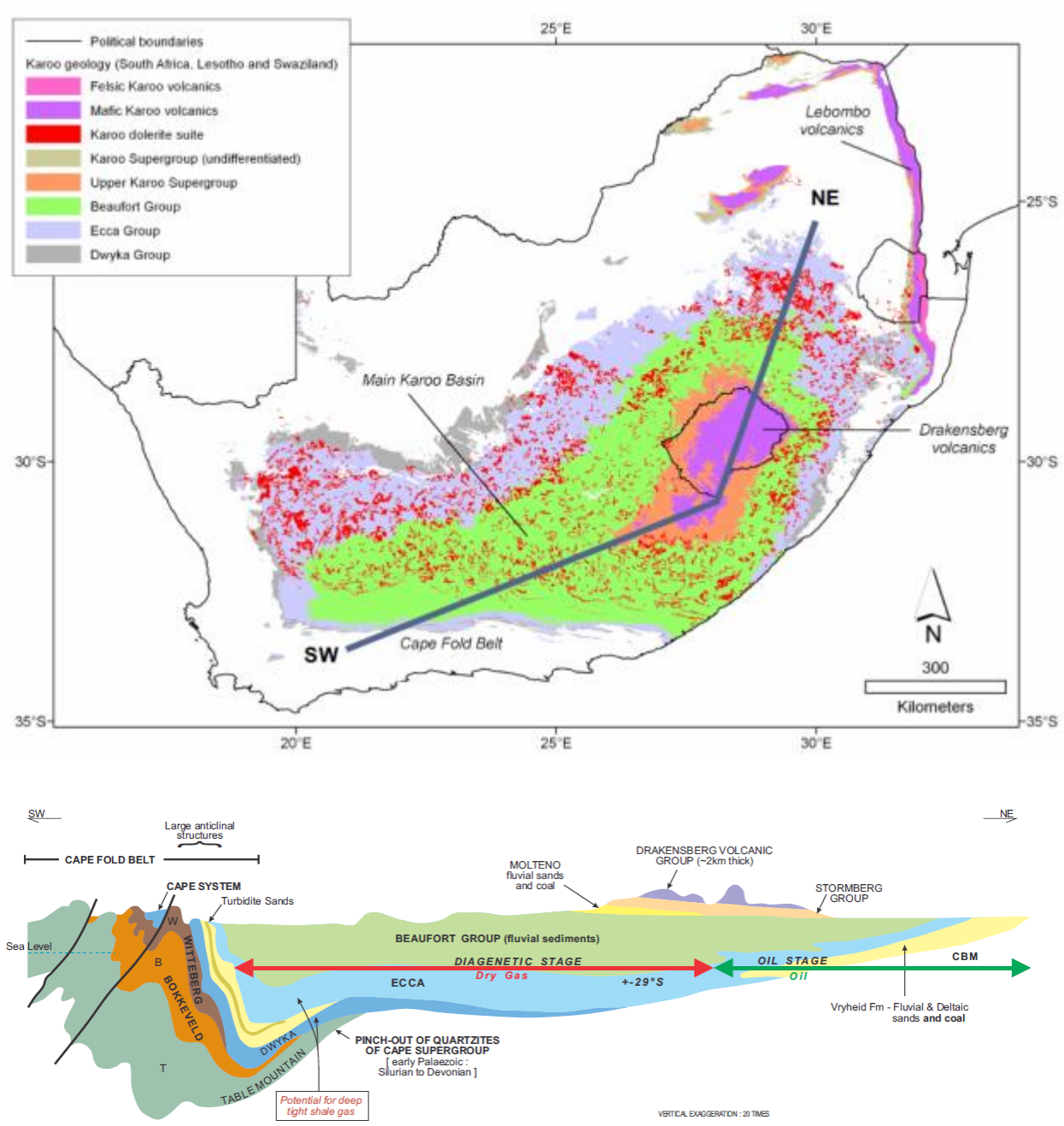


FIGURE 5-4: SIMPLIFIED GEOLOGY OF THE KAROO BASINS
(source PASA brochure)

Resource assessments of the Karoo Basin have historically emphasized the world-class coal reserves that have dominated the energy history of South Africa. Some limited onshore exploration for hydrocarbon occurrences was undertaken in the 1960s but no commercial hydrocarbon occurrences were discovered. However, it is expected that the NE Karoo Basin has potential for a tremendous diversity of hydrocarbon resources including shale oil and shale gas, coalbed methane, helium and biogenic gas.

One of the complications recognized during the initial resource exploration effort undertaken in the 1960s was the widespread occurrence of dolerite dykes, especially in the NE Karoo Basin. The thermal effects of these dykes led some early researchers to state that the dykes were required for distillation of hydrocarbons from adjacent coal and shale beds. The complexity of these dyke intrusions, well documented in the shallow NE Karoo coal fields, makes it difficult to understand the geometry of any possible reservoir horizons in the adjacent sediments. As a result, there is poor understanding of the relationship between the observed non-commercial oil and gas occurrences and any structural control. Further compounding the perception of an absence of commercial hydrocarbons in the Karoo Basin was the documentation of low-permeability conditions in most drill holes. This led many researchers to conclude that the rocks possessed too low a permeability to produce hydrocarbons and porosities too low to trap them.

Shale Gas Potential

The development of shale gas fields, which commenced in the United States in the early 21st Century, has demonstrated the ability to produce voluminous economic quantities of hydrocarbons from extremely low permeability rocks. This was made possible by the use of horizontal drilling and hydraulic fracturing to maximize wellbore connectivity with low-permeability hydrocarbon-bearing strata.

As a result, shale gas in South Africa is being reassessed as a potential hydrocarbon resource. Most exploration focus has emphasized the potential gas resource of the deep Karoo Basin in the southern and western sub-basins where the rocks are most thermally mature. Based on limited preliminary data, Advanced Resources International (ARI, 2011; ARI, 2013), on the behalf of the US Energy Information Administration, assessed the shale gas potential of the Lower Ecca Group shales in the southern Karoo Basin to contain 1,834 TCF of gas-in-place with recoverable shale gas resources of 485 TCF. In 2013, ARI completed a reassessment to show that the lower Permian Ecca Group contains 1,559 TCF of shale-gas-in-place with 370 TCF as the technically recoverable shale gas resource. In this part of the Karoo Basin, the sediments reach nearly 12 kilometers in thickness (Raseroka and McLachlan, 2008). The Petroleum Agency of South Africa estimates recoverable shale gas reserves of about 40 TCF according to a 2014 interview by PASA Resource Development Manager David van der Spuy. (“SA petroleum Agency’s Karoo shale-gas estimate ‘far lower’”, Business day BDlive Paul Vecchiattor 2-12-14, http://www.bdlive.co.za/business/energy/2014/02/21/sa-petroleum-agencys-karoo-shale-gas-estimate-far-lower).

Oil Potential

The oil resource potential of the Karoo Basin has largely been ignored because of the historical absence of commercial oil discoveries, and the restricted occurrence of oil accumulations to the NE Karoo Basin where the rocks are less thermally mature. Further evaluation still needs to be undertaken in the frontier basins.

Coalbed Methane Potential

The NE Karoo Basin also has considerable potential as a Coalbed Methane (CBM) resource play due to well-documented gassy coals at relatively shallow drilling depths. Estimates of the CBM resource in the NE Karoo ranges from 1 TCF for the Waterberg Coalfield (Anglo Thermal Coal for Waterberg Coalfield) to over 196 TCF for the NE Karoo region. (PASA Unconventional Resources Onshore Report).

Helium Potential

In addition to the oil and coalbed methane potential of the NE Karoo Basin, there are also documented reserves of helium in Precambrian-hosted gold mines in some regions. The methane component of these reserves is estimated at over 11.5 BCF (Molopo Energy Company website; PASA Unconventional Resources Onshore Report). Helium is an extremely valuable strategic resource found in limited areas of the world. A rare gas on earth, the bulk of the current helium production (75%) is from the United States. The most important use of helium currently is for cryogenic cooling (32%), although helium has numerous other industrial uses which include welding, controlled atmosphere (medical and other laboratory testing), leak testing, as a purge gas, breathing mixtures for deep sea diving, and also as a lifting gas.

5.5.3 SEISMICITY

The Southern African region is considered to be relatively stable from a seismic perspective. South Africa is located on the African tectonic plate, which includes the African continent and parts of the floor of the Atlantic and Indian Oceans. In general earth tremors and quakes are infrequent and generally of low magnitude. The largest ever recorded earthquake to occur in South Africa was the Ceres-Tulbagh Earthquake, which occurred in September 1969, and had a magnitude of 6.3 on the Richter scale.

There are areas in South Africa with higher peak ground acceleration which indicates a greater likelihood of earth quakes. These are found in the Western Cape region and in parts of the northern and western Free State as well as the Witwatersrand. The Cedarville fault line runs through the region and is an area of known seismic activity.

5.5.4 SOILS

Introduction

The soils of a particular area will influence the vegetation, agricultural potential and ultimately land use.

A basic description of the regional soils is provided below. More detailed information will be provided in the EIA report. A basic description of the regional soils is provided below. More detailed information will be provided in the EIA report.

Data sources

Information in this section was sourced from the review of available literature.

Results/Conclusion

The 73 soil forms can broadly be separated into 14 groups. The soils of the Eastern Cape have a wide range of properties. Variations in texture from light sandy soils to heavy swelling clays; leached soils that are high in organic matter to virtually unweathered soils. The primary diver of this diversity in the province is the variability in the underlying geology, climate and topography.

Soils across the proposed exploration area are extremely diverse with soils ranging in structure and composition. The majority of soils within the study area are considered Lithic and Oxidic and to lesser degree Duplex. Lithic soils are young soils with orthic topsoil but weakly developed subsoil. Oxidic and Duplex soils both have orthic topsoils and are soils with a special subsoil relating to their pedogenic accumulation. Other less common or dominant soils include Humic soils which would be encountered in the margins of the Drakensburg areas and Gleyic soils in lesser concentrations.

5.5.5 CURRENT LAND USES

Introduction

Exploration activities have the potential to affect land uses both within the exploration areas and in the surrounding areas. This can be caused by physical land transformation and through direct or secondary impacts. To understand the basis of the potential land use impacts, a brief baseline situational analysis is described below. More detailed information will be provided in the EIA report.

Data sources

Information in this section was sourced from the review of topographical maps and satellite imagery and through the review of available literature from the Integrated Development Plans for the Matatiele Local Municipality (MLM, 2014/2015), the Elundini Local Municipality (ELM, 2012/2017) and the demarcation board. Google Earth and a Site visit also provided insight into the area.

Results/Conclusion

Agricultural activities

Agricultural activities are limited to the low lying areas where the topography, water and soils are suitable for agriculture. Agricultural activities associated with the exploration area include a combination of commercial and subsistence farming. Commercial farming consists mainly of livestock farming (cattle, sheep and goats), maize and in some areas potatoes. In some areas commercial farming can be associated with irrigation. Subsistence farming is mostly associated with villages which undertake both

hand to mouth and small scale commercial farming. Hand to mouth subsistence farming involves small amounts of cultivation and little profitability which is mostly associated with individual households. Small scale commercial farming takes place where produce is sold within the local villages.

Villages

Numerous villages are located within the exploration area. The table below provided a list of villages that are located within the exploration area. In addition to this, the relevant wards in which these villages are located are also provided in Table 5-2 below. The larger of these villages are visible in Figure 1-2.

TABLE 5-2: WARDS AND ASSOCIATED VILLAGES (DEMARCATION BOARD)

MUNICIPALITY	RELEVANT WARD	RELEVANT VILLAGES
Elundini Local Municipality	Ward Councillor: Ward 12	Mahaneng eMazizini
	Ward Councillor: Ward 13	Mashata Sethathai Mabutyana Mohoabatsana Mutkuk Swquobong Thoteng Koebung Ha-Sefoko Black Fountain New stand
Matatiele Local Municipality	Ward Councillor: Ward 7	Hankonwane Tisita
	Ward Councillor: Ward 8	Nchodo Bellford Mafube Mission Monkhankhaneng Nkosana Pehong Matewu
	Ward Councillor: Ward 11	Felleng Mapfontein Ponstseng Tsikarong Tereseng Tutaneng Pepela Mabua Makomereng Goxe Potlo Kwambobo Sabasaba
	Ward Councillor: Ward 12	KwaNkau Nkaus Sekhutlong Kwasikulumi Moqhobi Machekong

MUNICIPALITY	RELEVANT WARD	RELEVANT VILLAGES
		Phuthing
	Ward Councillor: Ward 13	Ha-Tlakanelo Ha-Mohapi Mpharane Mahareng Likamoreng Kabaka Tsekong Ha-Masupha
	Ward Councillor: Ward 14	Lowell Collingwood Mariazell Mission Mapheelle Ha-Moeketsi Letlapeng Ha-Ramoshanyana Thabachitja Liqalabeng Koaring Mapoleseng Kraal Mafikalisiu Tlokoeng Mafikadisiu Mateleng Mafikallisiu
	Ward Councillor: Ward 15	Likhalong Mosana
	Ward Councillor: Ward 16	Mtshatshaneni Ha-Majono Lekhahla Lihetlane
	Ward Councillor: Ward 25	Matshona

Core Astronomy Areas

To date no Core or Central Astronomy Advantage Areas have been declared within the exploration right application area.

Local road network

No main roads are associated with the exploration area; rather numerous gravel roads linking the various villages are located within the exploration area.

Border posts

Two border posts into Lesotho are located within the exploration area. These include the Qacha's Nek Border post and the Ongeluksnek Border post. The location of these border posts is illustrated in Figure 1-2.

Existing Mineral Rights

Rhino Oil and gas will shortly submit a request to the Regional office of the DMR for information on properties on which there are existing prospecting or mining rights (for non-petroleum minerals), and/or for which applications for prospecting or mining rights have been submitted. Rhino Oil and Gas's proposed exploration does not necessarily affect existing prospecting or mining right holders since the methods and the legislation provide for simultaneous exploitation of resources. This information and the results of consultation with the rights holders will be submitted in the EIA phase.

Land Claims

Rhino Oil and gas will shortly submit a request to the provincial office of the Commission on Restitution of Land Rights for information on properties with the exploration right area on which there are existing Land Claims. This information and the results of consultation with the claimants will be submitted in the EIA phase.

5.5.6 HYDROLOGY

Introduction

Surface water resources include drainage lines and paths of preferential flow of storm water runoff, rivers, wetlands and dams. Project-related activities have the potential to alter the drainage of surface water through the establishment of infrastructure and/or result in the contamination of the surface water resources through seepage and/or spillage of potentially polluting materials and non-mineralised waste (general and hazardous). This section provides a brief description of surface water resources in the exploration area. More detailed information will be provided in the EIA report.

Data sources

Information in this section was sourced through the review of available literature. In this regard, information pertaining to water management areas was sourced from the National Water Resource Strategy (NWRS, September 2003) and catchment information was sourced from the Water Resources of South Africa Manual 2005 (WR, 2005).

Results/Conclusion

Catchments and river systems

The exploration area falls within the Mzimvubu to Keiskamma Water Management Area (WMA) which has a total mean annual run off of 7 241 million cubic meters (mcm). The Mzimvubu to Keiskamma WMA

has the highest mean annual runoff in South Africa, and equates to almost 15% of the total river flow in the country (NWRS, September 2004). The Mzimvubu to Keiskamma WMA consists of numerous quaternary catchments. The characteristics of the quaternary catchments located within the exploration area are included in Table 5-3 below. See Figure 8-2 for the distribution of the quaternary catchments within the exploration area (WR, 20015).

TABLE 5-3: QUATERNARY CATCHMENT CHARACTERISTICS (WR, 2005)

Quaternary catchment	Mean annual Runoff (mcm)	Catchment area (km^2)
T34B	35.90	242
T34C	33.92	282
T33C	51.52	367
T33D	61.01	461
T33B	94.27	602
T33A	97.37	672

The Mosenene River, Seeta River, Mabele River, Lekhetlane River, Marulane River and the Tinana Rivers are located within the exploration area (See Figure 8-2**Error! Reference source not found.**). The source of these rivers including their associated tributaries is located within the exploration area. The Mosenene River, Seeta River, Mabele River, Lekhetlane River and the Marulane River flow in a south easterly direction towards the Kinira River which is located approximately 10km east from the exploration area. The Tinana and Phinari Rivers drain the southern extent of the area into the Thina River. The Kinira and Thina Rivers are the main tributaries of the Mzimvubu River which flows in a south easterly direction to the Indian Ocean at Port St Johns.

Surface water users

Surface water use consists of a combination of domestic, livestock use and irrigation for crop production in the low lying areas. It is estimated that around 1 million people derive water and a livelihood within this catchment (UCPP). The uMzimvubu Catchment Partnership Programme has been established to tackle degradation of the upper uMzimvubu landscape, and the livelihoods dependent upon it.

Wetlands

The upper section of the Umzimvubu catchment in the Matatiele LM hosts as much as 42 765ha of wetland (UCPP). Numerous wetlands are located within the exploration area. For further information regarding the conservational status of these wetlands refer to Section 5.5.8. The location of the wetlands associated with the exploration area is illustrated in Figure 5-5.

Dams

Several small dams are located within the exploration area which are used for livestock and domestic purposes, however no major dams are associated with the exploration area.

5.5.7 GROUNDWATER

Introduction

Groundwater is a valuable resource and is defined as water which is located beneath the surface in rock pore spaces and in the fractures of lithologic formations. Understanding the geology of the area (See Section 5.5.2) provides a basis from which to understand the occurrence of groundwater resources. Exploration related activities have the potential to impact on groundwater resources, both to the environment and third party users through pollution. As a baseline, this section provides a brief description of the existing groundwater conditions. More detailed information will be provided in the EIA report.

Data sources

Information in this section was sourced from the review of available literature.

Results/Conclusion

Aquifer Classification

The exploration area is classified as a minor aquifer region, which implies a moderately yielding aquifer system of variable water quality in terms of the Aquifer Classification Map of South Africa. Although borehole yields in the deeper aquifer are generally, considered low, structural features such as faults and fractures can produce higher yielding boreholes. Majority of the proposed exploration areas is underlain by a fractured and intergranular aquifer with yields in the range of 0.5 to 2 L/s.

Aquifer vulnerability indicates the tendency or likelihood for contamination to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer. In terms of the exploration area, the aquifer vulnerability in accordance to the Aquifer Vulnerability Map of South Africa (Conrad et al. 1999c), varies between 'least' and 'moderate' vulnerability. The areas of 'least' vulnerability are areas that are only vulnerable to conservative pollutants in the long term when continuously discharged or leached. The areas of 'moderate' vulnerability are areas which are vulnerable to some pollutants, but only when continuously discharged or leached.

Aquifer susceptibility indicates the qualitative measure of the relative ease with which a groundwater body can be potentially contaminated by anthropogenic activities and includes both aquifer vulnerability and the relative importance of the aquifer in terms of its classification. In terms of the Aquifer Susceptibility Map of South Africa (Conrad et al, 1999b), the exploration area is associated with a 'low' to 'medium' susceptibility aquifer.

Groundwater Quality

The Groundwater Quality Map of South Africa (Conrad et al, 1999b) indicates that the groundwater quality that can be expected within the exploration area has electrical conductivity concentrations between 0 and 70 mS/m.

Groundwater use

There is significant groundwater use at a local scale with many farmers dependent on the abstraction of groundwater for both potable water as well as for stock watering and in some cases irrigation.

5.5.8 BIODIVERSITY

Introduction

Biodiversity refers to the flora (plants) and fauna (animals). According to the International Union for Conservation of Nature (IUCN) (2011), biodiversity is crucial for the functioning of ecosystems which provide us with products and services which sustain human life. Healthy ecosystems provide us with oxygen, food, fresh water, fertile soil, medicines, shelter, protection from storms and floods, stable climate and recreation.

Exploration related activities have the potential to result in a loss of habitat through the destruction/disturbance of vegetation and/or contamination of soil and/or water resources, thereby reducing the occurrence of fauna and flora on site and in the surrounding areas.

The baseline information on biodiversity in the exploration area will be used to identify sensitive areas, to guide the project planning in order to avoid sensitive areas where possible, to determine how best to conserve the fauna and flora in the area and allow for proper rehabilitation of the site once exploration ceases. A brief description of fauna and flora located within the exploration area is provided below. More detailed information will be provided in the EIA report.

Data sources

Information pertaining to vegetation units provided in this section was sourced from Mucina and Rutherford, 2006. Information regarding conservational importance was sourced from the Eastern Cape Biodiversity Conservation Plan Handbook (ECCPH, August 2007), the Eastern Cape Biodiversity Conservation Plan (ECBCP, August 2007) and from existing databases from the South African National Botanical Institute (SANBI), National Freshwater Ecosystem Priority Areas and IUCN.

Results/Conclusion

Flora

The proposed project area is located within the grassland biome within the Sub-Escarpment Grassland Bioregion and the Drakensberg Grassland Bioregion, which is structurally simple and strongly dominated

by grasses which are comprised of various vegetation units. Vegetation units that are associated with the exploration area include the Drakensberg Foothill Moist Grassland, the East Griqualand Grassland, the Lesotho Highland Basalt Grassland, the Mabela Sandy Grassland and the Southern Drakensberg Highland Grassland (Mucina and Rutherford, 2006). The distribution of these vegetation units within the exploration area are illustrated in (Separate electronic file)
Figure 5-6. Further information pertaining to the various vegetation units is discussed below.

Drakensberg Foothill Moist Grassland

The Drakensberg Foothill Moist Grassland vegetation unit is moderately rolling and mountainous and is incised by river gorges of drier vegetation types. This vegetation unit is dominated by forb-rich grassland with short bunch grasses including *Themeda trianda* (Red Grass) and *Tristachia leucothrix* (Hairy Trident Grass). Almost 20% of this vegetation unit has been transformed for cultivated land and by urban sprawl (Mucina and Rutherford, 2006).

East Griqualand Grassland

The East Griqualand Grassland vegetation unit is characterised by hills with slopes covered by grassland with patches of bush clumps with *Leucosidea sericea* (Oldwood) (only wet areas), or *Dispyros lycioides* (Bluebush), *Acacia Karroo* (Currently known as *Vachellia karroo*) and *Zizuphus mucronata* (Buffalo thorn) in low-lying dry areas. Over one quarter of this vegetation unit has been transformed for cultivation (maize), plantations and urban sprawl (Mucina and Rutherford, 2006).

Lesotho Highland Basalt Grassland

The Lesotho Highland Basalt Grassland vegetation unit consist of plateaus and high ridges of mountains separated by deep valleys. Vegetation consists of short grassland with many areas also with *Passerina montana* (Lithaba) dominated shrub land. Smaller shrubs such as *Chrysocoma cillata* (Beebos) and *Pentzia cooperi* are often very common in disturbed areas. Dominant species located at the lower and middle altitudes include *Themeda trianda* (Red grass) while *Festuca caprina* (Bokbaardgras) is located at lower altitudes. The species *Kniphofia caulescnes* (Caulescent red-hot poker) are predominately evident at higher altitudes. The *Merxmeullera macowanii* (Molalashlolo) grass is located along water courses and drainage lines. Almost 10% of this vegetation unit has been transformed predominantly by cultivation. The vegetation unit is also highly utilised for grazing by sheep, goats, cattle and donkeys. Majority of the disturbances to this vegetation unit take place within the lower altitudes (Mucina and Rutherford, 2006).

Mabela Sandy Grassland

The Mabela Sandy Grassland vegetation unit is characterised by flat valley basins. This vegetation unit is dominated by species-poor, low tussock-dominated, sour grasslands without indigenous trees. *Sporobolus pyramidalis* (Cat's tailgrass) and *Artistida junciformis* (Wire grass) are indicator species. More than 20% of this vegetation unit has been transformed due to cultivation related activities such as maize

and urban sprawl. Threats to the remainder of the vegetation unit include heavy grazing by livestock particularly in communal areas (Mucina and Rutherford, 2006).

Southern Drakensberg Highland Grassland

The Southern Drakensberg Highland Grassland vegetation unit is characterised by steeply sloping mountainous areas which support dense tussock grassland on slopes sometimes with dwarf-shrubby component of dwarf shrubland on exposed rocky areas. Dominant species associated with this vegetation unit include *Themeda triandra* (Red grass), *heteropogon controtus* (Black Speargrass), *Eragrostis racemose* (Narrow heart love grass), *Eragrostis chloromelas* (Boer love grass), *E. curvula* (Curved love grass), *Elionurus muticus* (Wire grass), *Trachypogon spicatus* (Giant spear grass), *Andropogon appendiculatus* (Blougrass), *Harphochloa falx* (Terpillar grass) and *Tristachya leucothrix* (Trident grass). More than 5% of this vegetation unit has been transformed due to cultivation related activities (Mucina and Rutherford, 2006).

Fauna

Numerous faunal species such as birds, amphibians, reptiles, mammals, fish and insects are associated with the various vegetation units located in the exploration area. The lower slopes of the Drakensberg Mountains support a greater variety of faunal species to that of the peaks. According to International Union Conservation of Nature (IUCN), red data faunal species likely to occur within the exploration area are included in Table 5-4 below.

TABLE 5-4: FAUNAL SPECIES OF CONCERN LIKELY TO OCCUR WITHIN THE EXPLORATION AREA

SPECIES	COMMON NAME	CONSERVATIONAL STATUS (IUCN)
Birds		
Bugeranus carunculatus	Wattled Crane	Vulnerable
Balearica regulorum	Grey Crowned Crane	Endangered
Anthropoides paradiseus	Blue Crane	Vulnerable
Sarothrura ayresi	White-winged Flufftail	Critically Endangered
Mammal		
Mystromys albicaudatus	White-tailed Mouse	Endangered
Insects		
Paracilacris lateralis	Drakensberg Grass False Shieldback	Vulnerable
Reptiles		
Bradypodion thamnobates	Dwarf chameleon	Near threatened
Fish		
Oreochromis mossambicus	Mozambique Tilapia	Near threatened
Tomichia cawstoni	-	Critically endangered

Conservational importance

Protected areas

The Malekgalonyane (Ongeluksnek) Nature Reserve is located within the extent of the exploration area. The 13 000 ha reserve was proclaimed in 1976. All areas with protected status under the National

Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003); Biodiversity Act, 2004 (Act 10 of 2004); National Forests Act, 1998 (No. 84 of 1998) and Mountain Catchment Areas Act, 1970 (No. 63 of 1970) (including those under application) have been excluded from the extent of the exploration right application area.

The Maloti Drakensburg Trans frontier Conservation and Development Area (MDTFCA) straddles the 300km border between Lesotho and South Africa incorporating more than 600km of mountain range. Of distinct significance is the exceptional biodiversity of the region which includes over 2500 species of flowering plant, approximately 13% of which are locally endemic. The Malekgalonyane (Ongeluksnek) Nature Reserve forms part of the MDTFCA.

It is also noted that there are various properties in the region that are managed for conservation and ecotourism purposes (game farms, conservancies etc). These areas do not have official protected area status.

Biodiversity hotpsots

The Eastern Cape is known nationally and internationally for its high levels of biodiversity and endemism. The Maputaland-Albany-Pondoland Biodiversity hotspot extends over parts of the region and is a globally recognised biodiversity hotspot. The Drakensberg-Alpine centre of endemism also extends over part of the area.

Protected areas expansion strategy

The aim of the National Protected Area Expansion Strategy (NPAES) is to achieve cost effective protected area expansion for ecological sustainability and adaptation to climate change. The NPAES sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. It deals with land-based and marine protected areas across all of South Africa's territory (SANBI BGIS).

It is understood that much of the proposed project area is located in a NPAES focus area. Focus areas are important for the land-based protected area expansion network as these areas are large, intact and unfragmented areas which are suitable for creation or expansion of large protected areas. It is further understood that the Provincial government (through Eastern Cape Parks and Tourism) and the Matatiele Local Municipality have identified similar areas for protected area expansion. The Matatiele Local Municipality has plans to pursue a stewardship expansion plan (communication with UCPP).

Threatened ecosystems

Section 52 of the National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004) provides for the listing of threatened ecosystems at both national and provincial level. The Mabela Sandy Grassland and the East Griqualand Grassland vegetation units are listed as vulnerable ecosystems

within the exploration area (See Figure 8-3). Vulnerable ecosystems have a high risk of undergoing significant degradation. No critically endangered ecosystems are located within the proposed project area (Mucina and Rutherford, 2006).

Critically endangered and endangered ecosystems are afforded protection through the NEMA whereby environmental authorisation is required from a competent authority prior to the clearance of more than 300 m^2 of vegetation (Activity 12 of Listing Notice 3 GN R 985). The requirement for a Basic Assessment process is only triggered for projects located in the natural habitat within the ecosystem and not in portions of the ecosystem where the natural habitat has been previously lost. Natural habitat is considered as sites where 75% or more of the vegetative cover constitutes indigenous vegetation and where the topsoil has not been lawfully disturbed during the preceding ten years.

Freshwater ecosystems

The Water Research Commission and partners undertook the National Freshwater Ecosystem Priority Areas project (NFEPA). The project produced several outcomes including the Atlas of Freshwater Ecosystem Priority Areas in South Africa, which provides strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. The NFEPA is supported by an implementation manual that provides guidance on the use of FEPA maps when planning and decision-making impacts on freshwater ecosystems. The manual provides ecosystem management guidelines for river FEPAs, wetland FEPAs, sub-quaternary catchments associated with river FEPAs, and Upstream Management Areas. The purpose of freshwater ecosystem management is to conserve biodiversity patterns and ecological processes and to maintain natural variability. Management should aim to prevent the occurrence of large-scale damaging events, as well as the repeated, chronic, persistent, subtle events.

There are numerous NFEPA Rivers and wetlands located within the proposed project area ((Separate electronic file)
Figure 1-2). The present ecological state of the NFEPA Rivers located within the proposed project area is classified as Class C (Moderately modified). The majority of the NFEPA wetlands are floodplain wetlands with the remainder consisting of channelled valley-bottom, flat and seep wetlands (Figure 5-5).

According to the NFEPA implementation manual, mining in any form (including prospecting/exploration) should not be permitted in wetland FEPAs or within 1km of a wetland FEPA buffer, or within 1km of a riverine buffer (including all associated wetland systems and tributaries) within a FEPA catchment. It is noted that there is no legislation regarding buffers around rivers or wetlands in the National Water Act, 1998. The width of a buffer required around a river or wetland depends on many factors such as the risk the proposed development poses to the water resources, the sensitivity of receiving environment and the proposed mitigation measures. The DWS requires application for a water use authorisation if a water use is proposed within 500m of a wetland.

Critical biodiversity areas

The Eastern Cape is globally recognised for its high biodiversity value and scenic beauty. It has the highest biome diversity of any province in South Africa. Recognising these important natural resources and the need to conserve them, the Department of Economic Development and Environment Affairs together with the Department of Water and Sanitation have collaborated to draw up the Eastern Cape Biodiversity Conservation Plan (ECBCP). The ECBCP addresses the urgent need to identify and map critical biodiversity areas and priorities for conservation in the Province. Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning (SANBI). The overall aim is to promote the sustainable utilisation of natural resources by avoiding the loss or degradation of natural habitat in CBAs and promoting sustainable development and natural resource utilisation throughout the landscape, particularly in natural areas. The ECBCP provides an assessment of the value of areas as determined by their necessity in meeting defined conservation targets.

The distribution of terrestrial CBAs located within the exploration area is illustrated in Figure 5-8. Category 1 Terrestrial CBAs are important given that these areas consist of endangered vegetation types and are essential for meeting biodiversity targets for biodiversity features. Category 2 and 3 Terrestrial CBAs are important as these areas consist of endangered and vulnerable vegetation types respectively (ECCPH, August 2007).

The distribution of aquatic CBAs located within the exploration area is illustrated in Figure 5-8. Category 1 Aquatic CBAs are important given that these areas comprise important river sub-catchments and wetlands. Category 2 CBAs are important given that these areas consist of important sub-catchments (ECCPH, August 2007).

Critical biodiversity areas (irreplaceable) and ecological support sites (Highly Significant) are afforded protection through the NEMA whereby environmental authorisation is required from a competent authority prior to the clearance of more than 300 m^2 of indigenous vegetation (Activity 12 of Listing Notice 3 GN R 985). The requirement for a Basic Assessment process is only triggered for sites located in the natural habitat within the region and not in portions of the ecosystem where the natural habitat has been previously lost. Natural habitat is considered as sites where 75% or more of the vegetative cover constitutes indigenous vegetation and where the topsoil has not been lawfully disturbed during the preceding ten years.

5.5.9 AIR QUALITY

Introduction

A change in ambient air quality can result in a range of impacts, which in turn, may cause a disturbance to nearby receptors. As a baseline, this section provides a brief description of pre-mining conditions in the area from which to measure changes as a result of the proposed project. More detailed information will be provided in the EIA report.

Data sources

Information in this section was sourced through the review of available information.

Results/Conclusion

Majority of the proposed exploration area is rural in nature and is comprised mostly of small towns, isolated farmsteads, (Refer to Section 5.5.5), scattered communities and agricultural activities such as livestock grazing and crop cultivation. It follows that the air quality associated with majority of the exploration area is expected to be good. Existing emission sources within the proposed exploration area include fugitive dust from paved and unpaved roads, wind erosion from open areas, household fuel combustion (fuel and coal), vehicle exhaust emissions and smoke from veld fires in winter.

5.5.10 HERITAGE/CULTURAL AND PALEONTOLOGICAL RESOURCES

Introduction

This section describes the existing status of the heritage and cultural environment that may be affected by the proposed project. Heritage (and cultural) resources include all human-made phenomena and intangible products that are the result of the human mind. Natural, technological or industrial features may also be part of heritage resources as places that have made an outstanding contribution to the cultures, traditions and lifestyles of the people or groups of people of South Africa.

Paleontological resources are fossils, the remains or traces of prehistoric life preserved in the geological (rock stratigraphic) record. They range from the well-known and well publicized (such as dinosaur and mammoth bones) to the more obscure but nevertheless scientifically important fossils (such as palaeobotanical remains, trace fossils, and microfossils). Paleontological resources include the casts or impressions of ancient animals and plants, their trace remains (for example, burrows and trackways), microfossils (for example, fossil pollen, ostracodes, and diatoms), and unmineralised remains (for example, bones of Ice Age mammals).

Data sources

Information in this section was sourced through the review of available literature and existing databases (South African Heritage Resource Information System (SAHRIS)).

Results/Conclusion

Heritage/cultural resources

No World Heritage Site or provincial heritage sites as recognised by the South African Heritage Resource Agency are located within the exploration area. Based on heritage studies undertaken within and around the exploration area as documented on SAHRIS, heritage/cultural resources that are likely to be associated with the exploration area include a combination of graves, historic/recent homesteads and stone walled site. Further to this, a section of the MDTFCA is located within the proposed project area. The MDTFCA is known for its rock art painted by the San or Bushmen people who are said to have inhabited the area for more than 400 years.

Paleontological

Fossils are associated with the Clarens Formation, the Elliot Formation and the Molteno Formation. Fossils associated with the Clarens Formation are well-known for the presence of dinosaur trackways and other trace fossils. The Molteno Formation is globally known for the presence of plant fossils belonging to the *Dicroiidium* Assemblage. Very few vertebrate remains have been recorded from the formation, but trace fossils, including well-defined dinosaur trackways have been described from different localities in the Karoo Basin. The Elliot Formation is well-known for the abundance of prehistoric life forms that it contains. This includes reptilian (mainly dinosaur) fossils and fish fossils (SAHRIS).

In addition to the above, according to the SAHRIS database the exploration area is located in an area that is regarded to have a very high to high paleontological sensitivity.

Taking the above into consideration there is a high likelihood of fossil occurrence within the exploration area.

5.5.11 SOCIO-ECONOMIC

Introduction

The proposed project has the potential to contribute both negatively and positively to existing socio-economic conditions. The positive contributions are usually economic in nature with exploration projects contributing directly towards employment, procurement, skills development and taxes on a local, regional and national scale. In addition, the proposed project will indirectly contribute to economic growth in the national, local and regional economies by strengthening the national economy and because the increase in the number of income earning people has a multiplying effect on the trade of other goods and services in other sectors. Negative contributions that can be associated with the proposed project include an influx of people seeking jobs, which can lead to increased pressure on basic infrastructure and services, informal settlement development, increased crime, introduction of diseases and disruption to the existing social structures within established communities. To understand the basis of these potential impacts, a

brief baseline situational analysis is described below. More detailed information will be provided in the EIA report.

Data sources

Information in this section was sourced from the Integrated Development Plans for the Matatiele Local Municipality (MLM, 2014/2015), the Elundini Local Municipality (ELM, 2012/2017) and the Alfred Nzo District Municipality (ANDM, 2014/2015).

Results/Conclusion

The exploration area is located within the Matatielie Local Municipality which falls within the Alfred Nzo District Municipality and the Elundini Local Municipality which falls within the Joe Gqabi District Municipality. Further detail regarding the demographics of the Matatielie Local Municipality and the Elundini Local Municipality is provided below.

Population

The Alfred Nzo District Municipality has a total population of 804 500 people. The Alfred Nzo District Municipality population is predominantly female. Females constitute approximately 54% of the population while males constitute 45% (ANDM, 2014/2015).

The Matatiele Local Municipality consists of a population of approximately 203 843 people. Matatiele Local Municipality has a slight imbalance between females and the males. The females outnumber the males such that they constitute 54% of the population while the males amount to 46% of the population (MLM, 2014/2015).

The Elundini Local Municipality has an estimated population of 123 600 people. The male and female ratio constitutes 46.6% and 53.4% respectively of the overall population (ELM, 2012/2017).

Employment

The average unemployment rate for the Alfred Nzo District Municipality is currently estimated to be 43.5% (ANDM, 2014/2015). The unemployment rate is currently estimated at 38.2 % for the Matatielie Local Municipality (MLM, 2014/2015). The average unemployment rate of Elundini Local Municipal is 23.11% (ELM, 2012/2017).

Households

The majority of residents within the Alfred Nzo District Municipality reside in traditional dwellings that are made of traditional materials (70%). 29% have formal dwellings such as a house, flat in block town house cluster (ANDM, 2014/2015). Approximately 49.7% of the Matatiele Local Municipality population and 33% of the Elundini Local Municipality population live in formal houses/buildings. The remainder of the population reside in huts, shacks and caravans (MLM, 2014/2015 and (ELM, 2012/2017).

Basic services

In the Alfred Nzo District Municipality approximately 47% of households do not have access to drinking water. Waterborne sanitation is only provided in urban areas which constitutes approximately 79% of households. Toilets in rural areas comprise pit toilets. The bucket system has been totally eradicated. Approximately 6% of the population have access to electricity while the remainder of the population sources energy from alternatives means such as wood, gas and paraffin.

In the Matatiele Local Municipality approximately 49% of all households have access to clean drinking water through local water supply schemes. The remainder of the households rely on water from rivers, springs and dams. Waterborne sanitation is only provided in urban areas within the local municipality. Toilets in rural areas comprise pit toilets while the bucket system has been totally eradicated. Approximately 45% of households use electricity for lighting, leaving 65% of household's using alternative means of energy for lighting (MLM, 2014/2015).

Approximately 54 750 residents within the Elundini Local Municipally obtain their drinking water from springs and rivers. Water borne sanitation is found in most urban area. The rural areas make use of pit toilets while the buck system has been eradicated. Approximately 43.6% of households use electricity for lighting within the Elundini Local Municipality (ELM, 2012/2017).

Education

The Alfred Nzo District Municipality has low education and literacy levels. 8 % of the population has no education while 53% have only some form of primary school education. Only 14.2% of the population have completed grade 12. Only 4% of the population has attained any higher qualification (ANDM, 2014/2015).

The percentage of non-scholars in the Matatiele Local Municipality was 9.4% in 2011. The percentage of Children between the ages 6-13 that enrolled in school was 94.4% in 2011. Approximately 12.7% of the population have obtained a matric and the percentage of people that obtained a higher education is 3.1% (MLM, 2014/2015).

In the Elundini Local Municipality approximately 15.90% of the population consists of non-scholars. Approximately 11.80% of the population have obtained a matric while only 5.20% of the population have obtained a higher education (ELM, 2012/2017).

5.6 ENVIRONMENTAL AND CURRENT LAND USE MAPS

This section includes a series of maps that show the spatial locality and aerial extent of all environmental, and land use features associated with the exploration area.

(Separate electronic file)

FIGURE 5-5: SURFACE WATER RESOURCES

(Separate electronic file)

FIGURE 5-6: VEGETATION TYPES

(Separate electronic file)

FIGURE 5-7: PROTECTED AND STEWARDSHIP AREAS

(Separate electronic file)

FIGURE 5-8: ASSESSMENT OF BIODIVERSITY STATUS

(Separate electronic file)

FIGURE 5-9: : WETLANDS AND NFEPA RIVERS

(Separate electronic file)

FIGURE 5-10: LAND USE AND DEMARCATION

5.7 METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

The SLR method for the assessment of environmental impacts is set out in Table 7-2. This methodology was loosely applied for the purpose of comparing alternatives and in light of the level of information available at this point in the assessment.

5.8 IMPACTS IDENTIFIED FOR EACH ALTERNATIVE

The aim of this Section is solely to compare the environmental impacts and risks of the potential alternatives of the project for the purpose of selecting the preferred alternative(s). Only those impacts which differentiate between the alternatives are documented. The reader is advised that this Section does not aim to identify all environmental impacts of the project nor does it provide a conclusive assessment of the impacts. The environmental impact assessment of the project will be presented in detail in the EIA report.

Table 5-5 identifies the potential impacts of the project alternatives, in relation to the local environment. The preliminary assessment ratings provided in this table are for the unmitigated scenario only which assumes that limited consideration is given to the prevention or reduction of environmental and social impacts. In most cases the alternative would be the mitigation. Furthermore, a conservative approach has been applied to these ratings in the absence of site specific studies. A discussion of each of the impacts and the advantages and disadvantages identified is provided in Section 5.9. Once all the investigations and studies have been completed the assessment and related ratings may change. Moreover, once the mitigation/management measures have been incorporated into the assessment as part of the EIA a determination of residual impact will be provided. The final ratings will be included in the EIA report.

TABLE 5-5: POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS IDENTIFIED FOR THE PROPOSED ALTERNATIVES

ALTERNATIVE	IMPACT	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT:		
		INTENSITY	EXTENT	DURATION			Can be reversed	Causes irreplaceable loss	Can be avoided/ managed/ mitigated
Desktop and Remote Sensing methods									
No Desktop and Remote Sensing	No impacts are anticipated	0	0	0	0	0	NA	none	NA
Desktop and Remote Sensing as proposed	No significant impacts are anticipated	0	0	0	0	0	NA	none	NA
Borehole Drilling									
No core hole drilling	No impacts would occur, but there would be no advancement in information on the potential petroleum resource.	0	0	0	0	0	NA	none	NA
Future exploration without guidance and planning from stratigraphic core holes	As will be discussed in this EIA (and future), but to a much greater extent as more work would be required in order to acquire the same of level data on the resource.	0	0	0	0	0	Mostly	Very limited	To a large degree
The different methods of core hole drilling are so similar as to have no significant or determining differences	-								
Seismic Surveys									
No seismic survey	No impacts would occur, but there would be no	0	0	0	0	0	NA	none	NA

ALTERNATIVE	IMPACT	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT:		
		INTENSITY	EXTENT	DURATION			Can be reversed	Causes irreplaceable loss	Can be avoided/ managed/ mitigated
	advancement in information on the potential petroleum resource.								
Future drilling without guidance and planning from Seismic surveys	As will be discussed in EIA, but to a greater extent as more drilling would be required in order to acquire the same of level data on the resource.	-	-	-	-	-	-	-	-
Land use									
Vibratory truck survey	Access to private land and the associated inconvenience, damage to infrastructure, interference with land use, safety and security risk.	L	VL	VL	L	L	Almost always	Very unlikely	Yes
Explosive-shot survey		VL	VL	VL	L	VL	Almost always	Very unlikely	Yes
Vibratory truck survey	The disturbance of productive ground for extended periods or long-term damage to the productivity of that ground.	L	VL	VL	L	L	Almost always	Very unlikely	Yes
Explosive-shot survey		L	VL	VL	L	L	Almost always	Very unlikely	Yes
Vibratory truck survey	Risk of exploration starting a veld fire that causes significant loss and damage to assets	VL	M	VL	L	VL	Mostly	Possible	Yes
Explosive-shot survey		L	M	VL	L	L	Mostly	Possible	Yes
Vibratory truck survey	Risk of injury to public	VL	VL	VL	VL	VL	Almost always	Very unlikely	Yes
Explosive-shot survey		L	VL	VL	VL	VL	Almost always	Very unlikely	Yes

ALTERNATIVE	IMPACT	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT:		
		INTENSITY	EXTENT	DURATION			Can be reversed	Causes irreplaceable loss	Can be avoided/ managed/ mitigated
Soils									
Vibratory truck survey	Vehicles driving and activities on soils damaging soil structure and/or causing compaction or erosion	L	VL	VL	L	L	Almost always	Very unlikely	Yes
Explosive-shot survey		VL	VL	VL	L	VL	Almost always	Very unlikely	Yes
Vibratory truck survey	**Contamination of soils**	VL	VL	VL	VL	VL	Almost always	Very unlikely	Yes
Explosive-shot survey		L	VL	VL	VL	VL	Almost always	Very unlikely	Yes
Noise and Vibration									
Vibratory truck survey	Structural damage as result of use of vibrations/explosives	L	VL	VL	VL	VL	Almost always	Very unlikely	Yes
Explosive-shot survey		L	VL	VL	VL	VL	Almost always	Very unlikely	Yes
Groundwater									
Vibratory truck survey	Contamination of groundwater by drilling fluids	-	-	-	-	-	NA	none	NA
Explosive-shot survey		VL	VL	VL	VL	VL	Mostly	Very unlikely	Yes
Surface Water									
Vibratory truck survey	Contamination of surface water	VL	VL	VL	L	VL	Mostly	Very unlikely	Yes

ALTERNATIVE	IMPACT	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT:		
		INTENSITY	EXTENT	DURATION			Can be reversed	Causes irreplaceable loss	Can be avoided/ managed/ mitigated
Explosive-shot survey		L	VL	VL	L	L	Mostly	Very unlikely	Yes
Vibratory truck survey	Damages to beds and banks of watercourses	M	L	VL	L	L	Mostly	Very unlikely	Yes
Explosive-shot survey		L	L	VL	VL	VL	Mostly	Very unlikely	Yes
Ecology and Biodiversity									
Vibratory truck survey	Damage or destruction of the vegetation, habitat and the disturbance or loss of species of conservation concern	M	L	VL	L	L	Mostly	Very unlikely	Yes
Explosive-shot survey		L	L	VL	VL	VL	Mostly	Very unlikely	Yes
Heritage									
Vibratory truck survey	Disturbance of heritage resources by exploration	M	VL	VL	L	L	Mostly	Very unlikely	Yes
Explosive-shot survey		M	VL	VL	L	L	Mostly	Very unlikely	Yes
Air Quality									
Vibratory truck survey	Increase in dustfall levels from disturbed area and vehicle traffic.	L	VL	VL	L	L	Almost always	Very unlikely	Yes
Explosive-shot survey		L	VL	VL	L	L	Almost always	Very unlikely	Yes

5.9 POSITIVE AND NEGATIVE IMPACTS OF THE PROPOSED ACTIVITY AND ALTERNATIVES

This section presents a discussion of **advantages** and **disadvantages** of the different alternatives that are identified in Table 5-5. These discussions should be read with the corresponding descriptions of the baseline environment in Section 5.4 and the alternatives in Section 5.1. The reader is reminded that the aim of this Section is to compare the environmental impacts and risks of the potential alternatives of the project for the purpose of selecting the preferred alternative(s). Only those impacts which differentiate the alternatives are documented.

5.9.1 DESKTOP AND REMOTE SENSING METHODS

Advantages and Disadvantages:

The Desktop and Remote Sensing are not anticipated to have any detectable environmental impacts. The flying of light aircraft for the FTG surveys would result in some noise and the emission of fuel combustion products. Due to the sparse distribution and temporal nature of this activity, the impacts are not considered material.

If exploration is to be undertaken it is in fact essential that the Desktop and Remote Sensing proposed for year 1 and 2 of the exploration work programme take to place inform the core hole drilling and seismic survey. Only with the information derived from these methods would it be feasible to undertake the limited drilling programmes and seismic surveys (as is proposed) and still achieve an exploration result of value. Thus the Desktop and Remote Sensing is a vital part of the proposed exploration with negligible impacts.

5.9.2 CORE HOLES

The proposed exploration would only use stratigraphic core holes, with no permeability or pressure testing wells being considered for this approval. Stratigraphic core holes are drilled only for the purpose of obtaining information pertaining to specific geological, structural and stratigraphic information that might lead towards the discovery of petroleum. No production would be allowed from the stratigraphic core holes and could not physically be undertaken due to the narrow diameter. Thousands of such boreholes have been drilled across South Africa during mineral prospecting in the past hundred years. The majority of water boreholes on farms have been drilled with the same type of equipment and very similar methods.

Rotary core drilling and percussion/reverse circulation drilling are the two most commonly used methods for stratigraphic core holes in prospecting/exploration drilling. Both produce a relatively narrow diameter hole which can be used to run an electrical log (Gamma Ray, Spontaneous Potential, Resistivity, etc). The methods both result in a similar outcome and are therefore alternatives that can reasonably be used to achieve the required results. The primary difference from a functional perspective is that the Rotary

core drilling produces a cylindrical core of rock for examination. The percussion/reverse circulation drilling delivers the drillings to surface in a chip form. Having an intact core sample allows for better interpretation of stratigraphy and in-situ parameters and is therefore preferred. The depth of percussion/reverse circulation drilling is limited by the air compressor capacity.

Advantages and Disadvantages

From an environmental perspective there are no significant advantages or disadvantages of the one technique over the other. Thus in most cases the choice of method would be informed by the information requirements, availability of the equipment, the practicality of implementation and the cost. In hydrocarbon exploration it is necessary to have the rock core intact and be able to drill to significant depths, thus rotary core drilling is preferred.

5.9.3 SEISMIC SURVEYS

Vibratory truck (Vibroseis) and explosive-shot are the two most commonly used methods for onshore, 2D seismic surveys. The methods both result in a similar outcome and are therefore alternatives that can reasonably be used to achieve the required results. The choice of method is informed by the availability of the equipment, the practicality of implementation, the environmental sensitivity of the survey terrain and the cost. The section below compares the advantages and disadvantages of the two methods from an environmental perspective.

Issue: Access to private land and the associated inconvenience, damage to infrastructure, safety and security risk.

Seismic surveying requires the teams and equipment to access the defined survey lines to survey and prepare the route; to layout the equipment; to implement the survey and recording; to then remove the equipment and to potentially remediate any disturbances. Access is thus required to private property and sometimes where an orientation in which access routes do not exist. Access may be required multiple times and includes a wide range of equipment and vehicles. The vibrations caused could damage built infrastructure.

Advantages and Disadvantages

Both the Vibratory truck survey and Explosive-shot survey method would result in the same issues, each method having some advantages and disadvantages. Both methods generate controlled vibrations which are not generally known to cause structural damage. The Vibroseis method can be cheaper and more efficient to implement and would have less and shorter duration point-source impact than the explosive method. The vehicles are also larger and heavier. It is, however less flexible and requires a wider operating footprint. Thus the potential for damage to soils, vegetation and infrastructure would be marginally greater.

The Explosive-shot method requires smaller equipment which is more portable, only requires point-source disturbances and does not require direct linear access to be implemented. That being said, the disturbance at each shot-hole point is likely to be of large extent and require more rehabilitation. As explosives are being used a safety zone is required at the time of detonation. Overall the greater flexibility and more isolated (point-source type) impact of the explosive-shot method probably has less impact.

Issue: The disturbance of productive ground (interference with land use) for a period or long-term damage to the productivity of that ground.

Seismic surveying across lands which are in use may result in conflict and possibly loss of income. Also the access by heavy equipment and the application of the vibrating source may compact soils, thereby damaging the productivity of the soil.

Advantages and Disadvantages

Both the Vibratory truck survey and Explosive-shot survey method would result in the issue, each method having some advantages and disadvantages. The disturbance to land use is of very short duration and can generally be timed not result in direct conflict with income generating use. The heavier vehicles, wider area of disturbance and possible surface compaction of the Vibroseis trucks are disadvantages of the Vibratory truck method. The smaller, more portable equipment, limited point-source disturbance and flexible access probably renders the Explosive-shot method preferable.

Issue: Risk of exploration starting a veld fire that causes significant loss and damage to assets

Seismic surveying requires the teams and equipment to access the defined survey lines. The people and equipment on the land could pose a fire hazard, particularly in the drier winter months. In certain areas an uncontrolled veld fire could be damaging.

Advantages and Disadvantages

Both methods pose a small, but real risk. The Explosive-shot method may have slighter greater risk as the drilling requires a longer-period of on-site activity. The blast is unlikely to pose a fire risk as it takes place underground.

Issue: Risk of injury to public.

Seismic surveying requires the use of heavy machinery and some activities which could pose a health and safety risk to the land users and public. Travel during mobilisation, often on smaller district and country roads, can result in risk.

Advantages and Disadvantages

Both methods pose a small, but real risk. The Vibratory truck method uses bigger vehicles that may have slighter greater risk, although they would travel slowly. The vibratory action itself poses no real risk,

except directly adjacent to the vehicle. During drilling of the shot hole and explosion of the charge there would be safety risks but these are effectively managed through access control. There is no significant difference between the methods.

Issue: Contamination of soils.

Seismic surveying requires the use of heavy machinery and vehicles which operate with fuels and hydraulic fluids. Spillages could occur either from equipment failure or during refuelling.

Advantages and Disadvantages

The risk of soil contamination is generally small as the machinery does not carry large volumes of fuels or hydraulic fluid. The Vibratory truck method has more vehicles moving slowly across the landscape but they are seldom static for long periods. Drilling of the shot holes requires intensive activity at a fixed point for a short period. Overall the two methods carry a similar risk although the Explosive-shot method has a higher risk at the shot-hole sites.

Issue: Structural damage and nuisance as result of use of seismic vibrations

Seismic surveys are undertaken with the express purpose of generating and recording seismic vibrations. Significant energy is applied to generate the vibrations however; the vibrations are specifically generated as low frequency, long-wave length and directed into the earth. Generally the application of the energy does not cause significant vibration or noise away from the vibration source. There could be risk that the vibration energy results in damage to structure or infrastructure. There is a remote possibility that the vibrations could also cause damage to the geology in areas where caverns and sinkhole are prevalent.

Advantages and Disadvantages

Both the Vibratory truck and Explosive-shot methods generate vibrations to enable the seismic survey. The energy from both methods is applied very specifically and in a controlled manner to generate seismic vibrations in the earth. Monitoring from around the world of the vibrations generated generally indicate that structural damage is very unlikely at horizontal distances of even greater than 1 m from the source. The annoyance risk from vibrations could be present at greater distances, but not much further than 20m from the source. For both methods it is common practice to maintain a reasonable buffer between the vibrating source and infrastructure. There is no significant difference between the methods except for the fact that explosives should not be detonated in residential areas.

Issue: Contamination of groundwater by drilling fluids

The Explosive-shot method requires the drilling of holes for the placement of the explosive shot. These holes are generally shallow (depths from a few to 70m below surface). During drilling there may be drilling fluids used and potential for down-hole spillage of hydrocarbons which could impact groundwater.

The detonation of explosives would also release nitrates and other chemicals, possibly in the aquifer zone.

Advantages and Disadvantages

The Explosive-shot method has slightly higher risks to groundwater when compared to the Vibratory truck method. These risks comprise very small point sources which are transient in nature and unlikely to have a real impact on groundwater.

Issue: Contamination of surface water

Seismic surveying requires the use of heavy machinery and vehicles which operate with fuels and hydraulic fluids. Spillages could occur either from equipment failure or during refuelling. If the spillages were to happen in close proximity to surface water resources this could result in contamination.

Advantages and Disadvantages

The risk of soil contamination is generally small as the machinery does not carry large volumes of fuels or hydraulic fluid. Drilling of the shot holes requires intensive activity at a fixed point for a short period. The application of buffers from water resources is used to negate the risk. Water may be used during drilling of shot-holes and release of the dirty water could pose a risk to surface water resources. Overall the two methods carry a similar risk to surface water although drilling activity could increase the risk if undertaken near to surface water resources.

Issue: Damages to beds and banks of watercourses

Seismic surveying requires the teams and equipment to access the defined survey lines. Such survey lines are likely to cross watercourses, sometimes where access routes do not exist. Access may be required multiple times and includes a wide range of equipment and vehicles. The activity could damage the beds and banks of watercourses.

Advantages and Disadvantages

Both seismic survey methods could result in damages to beds and banks of watercourse. The Vibroseis method uses large and heavier vehicles and has less route flexibility (i.e. required to operate linearly). The Explosive-shot method requires smaller equipment which is more portable, only requires point-source disturbances and does not require direct linear access to be implemented. Thus the potential for damage to the beds and banks of watercourses is slightly greater with the Vibratory truck method.

Issue: Damage or destruction of the vegetation, habitat and the disturbance or loss of species of conservation concern

Seismic surveying requires the teams and equipment to access the defined survey lines to plan and prepare the route; to layout equipment; to implement the survey and recording; to then remove the equipment and to potentially remediate any disturbances. Access would be required to cross land which may be of ecological or biodiversity value, and sometimes where there are no access routes. Access may be required multiple times and includes a wide range of equipment and vehicles. In general it would not be necessary to clear vegetation from the survey lines, although in forested and bushy areas some vegetation removal maybe required for vehicular access and to enable the vibratory source to be in contact with the ground.

Advantages and Disadvantages

Both methods generate controlled vibrations which are not generally known to cause significant disturbance to ecological function. The Vibroseis method is less flexible in routing, requires a wider operating footprint and needs linear access. The vehicles are also larger and heavier. Thus the potential for damage to vegetation and ecology is greater.

The Explosive-shot method requires smaller equipment which is more portable, only requires point-source disturbances and does not require direct linear access to be implemented. That being said, the disturbance at each shot-hole point is likely to be of greater intensity and require additional rehabilitation. Overall the greater flexibility and more isolated (point-source type) impact of the explosive-shot method probably has a lower impact.

Issue: Disturbance of heritage resources by exploration

The access, physical disturbance to surface and vibrations of seismic surveys could result in risks to heritage resources. In general the risk would only arise if the seismic survey took place directly on or at a heritage resource.

Advantages and Disadvantages

Both methods generate controlled vibrations which are not generally known to cause significant disturbance to structures provided they are further than 1m from the source. The Vibroseis method is less

flexible in routing and requires a wider operating footprint with larger and heavier vehicles. The disturbance at each shot-hole point is likely to be of greater intensity. Overall the greater flexibility and more isolated (point-source type) impact of the explosive-shot method would probably have a lower impact then the Vibratory truck survey.

Issue: Increase in dustfall levels from disturbed area and vehicle traffic.

The seismic survey requires the teams and equipment to access the defined survey lines. A variety of machinery and vehicles would be involved. In many areas the access would be via gravel roads and farms tracks. Dust would be generated.

Advantages and Disadvantages

Both the Vibratory truck survey and Explosive-shot survey method may result in dust generation with no significant difference between the methods.

5.10 POSSIBLE MITIGATION MEASURES AND THE LEVEL OF RESIDUAL RISK

The primary mitigation applied to the early-phase exploration would be to use non-invasive, remote sensing techniques as much as possible and to refine the information on where to conduct field exploration. This will reduce the level of invasive activity required and should also improve the accuracy of the planned locations for the physical exploration activity, thereby further reducing the requirement for physical exploration activity. The Rhino Oil and Gas exploration work programme is structured to include the use of non-invasive, remote sensing techniques in year 1 and year 2.

This would reduce the level of invasive activity required and improve the accuracy of the planned locations for the physical exploration activity, thereby further reducing the requirement for physical exploration activity. Rhino Oil and Gas' exploration work programme is structured to include the use of non-invasive, remote sensing techniques in year 1 and year 2.

Where physical, on-site exploration activity is proposed, environmental impacts and risks could result. Such impacts are generally expected to be of low significance as the proposed early-phase exploration activities are small in total extent and of short duration. Nevertheless they could result in impacts if exploration used inappropriate methods; was undertaken at sensitive sites; or operations were poorly executed. The primary mitigation to limit environmental impacts and risks would be the appropriate siting of any exploration activity at a locality that is of low sensitivity. This would be achieved through desktop GIS-based screening and then a site assessment by a suitably qualified environmental scientist to confirm the conditions of the proposed location. The final site location should, if necessary, be adjusted to avoid identified sensitivities and the final site plan should be submitted to PASA for approval. These specific requirements for such detailed site assessments would be identified in the EIA phase and included in the EMPr. Given that the precise location of exploration sites is reasonably flexible, it should

always be possible to locate the activity at a site of low sensitivity, thereby mitigating the majority of impacts.

Secondarily, mitigation would be achieved by the use of the most appropriate methods to undertake exploration. To a large degree exploration techniques across the world have developed to minimise environmental risks. Thus current techniques and equipment available results in lower risk than exploration did a decade ago. Finally, when physical exploration activity is undertaken, mitigation to reduce environmental impacts and risks can be applied through operational management and the adoption of environmental best practice. There is much that can be applied in this regard (e.g. using above-surface tanks rather than excavated sumps for drilling fluids) and this would be documented in the EIA and EMPr.

The level of residual risk from the proposed early-phase exploration, undertaken with the necessary management and mitigation is likely to be low. This assessment would be refined during the EIA phase with specialist input as appropriate.

5.11 OUTCOME OF THE SITE SELECTION MATRIX

It is not yet possible to select routes or sites for any of the on the ground activities that would be required. The specific locality of on-the-ground activities (e.g. core hole drilling and seismic surveys) can only be identified once the initial phases of exploration have been undertaken and the targets identified.

The nature of early-phase exploration activities is such that the target sites are not bound to fixed locations but can be adjusted as required. This provides the operator with flexibility to move the on-the-ground activities to avoid local sensitivities. The operator would commit, through the environmental management programme, to avoid all areas with specific sensitivities (e.g. residences, wetlands, watercourses etc), with buffers where required. Thus a GIS-based site selection and physical site inspection exercise would be required for each proposed site or route. The specific requirements for such detailed site assessments would be identified in the EIA phase and included in the EMPr.

5.12 MOTIVATION WHERE NO ALTERNATIVE WERE CONSIDERED

Not applicable.

5.13 THE PREFERRED ALTERNATIVES

It is anticipated that the Rotary (diamond) core method would be the preferred technology for core borehole drilling. However the use of Percussion/reverse circulation drilling cannot be eliminated entirely as this may be a better method in particular circumstances. For the proposed seismic surveys each of the

Explosive shot-hole method and Vibroseis method may be employed, depending on the local circumstances.

6 ANTICIPATED ISSUES AND IMPACTS

A scoping-level identification of environmental impacts (physical, biological, social and economic) associated with the proposed early-phase exploration has been undertaken. The full range of issues, concerns and comments are presented in Table 5-1, while all of the submissions received by SLR are included in Appendix 6. A number of key issues have been identified to date with the SLR project team having taken cognisance of input from I&APs. These are presented, together with responses by the SLR project team, in detail in Section 5.4.

Impacts that may result and which will be assessed during the EIA phase are summarised below. No importance is to be assigned to the order in which these are presented. These impacts will be assessed in detail during the EIA phase using the methodology described in Section 7.3. Management and mitigation measures for all of the significant impacts identified will be included in the draft EMPr, which will be presented with the EIA Report.

6.1 PHYSICAL IMPACTS

6.1.1 EFFECT ON GEOLOGY

There is a remote risk that during exploration the drilling or seismic survey could damage the geology. The vibrations generated during seismic surveys could destabilise certain geologies and pose risks to faults, underground caverns or mine workings. The potential impact on the geology is described further in Section 5.4.10.

The potential impact on the geology and the issue related to faults and seismic sensitivity will be further investigated and assessed in the next phase of the EIA. The aim will be to provide an overview of the expected geology in the region, with details on the geological profile and structural features as well as information on the physical and chemical properties of relevant formations. Complete details of the seismic outputs will be sourced from service providers. The investigation will draw on literature from local and international experience of similar seismic survey methods. If necessary a vibration specialist and or seismologist will be consulted. The outcome will be to identify areas which may have specific properties that render them sensitive to disturbance and to determine exclusion criteria (including buffers / no-go areas) that should be applied when identifying and assessing sites for physical exploration. The determination of the buffers or areas to avoid will draw on literature from local and international experience of similar seismic survey methods.

6.1.2 EFFECT ON SOILS

The physical disturbance of exposed soil surfaces may increase the risk of erosion (by wind and water), while the repetitive movement of vehicles and machinery over such surfaces could compact soils. These impacts may collectively affect the surface hydrology, damage soil structure, decrease infiltration rates and water retention capacity, and retard the regeneration of vegetation or soil productivity. Seismic vibrations could alter soil structure with similar effects. Leaks and spills from vehicles, machinery and handling of potential pollutants (e.g. fuel and lubricants) during on-site activities may also potentially contaminate the soil. The potential impact on soils is described further in Section 5.4.11.

The potential impact on soils will be further investigated and assessed in the next phase of the EIA, with opinion from a specialist (see Section 7.5.4 for the terms of reference). The goal will be to provide an understanding of the regional soil types and their specific properties. The soils will be mapped at a regional scale and the key features of these described to identify soil types which may be incompatible with the proposed exploration. Complete details of the seismic outputs will be sourced from service providers. The effects of the proposed seismic surveys on soil properties will be researched from local and international literature on seismic surveys. If necessary a vibration specialist and or seismologist will be consulted. The outcome will be to identify any soils which have specific properties that render them sensitive to disturbance and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration.

6.1.3 EFFECT ON WATER RESOURCES

6.1.3.1 Altered hydrogeological regime and groundwater availability

Most agricultural activities in the region use groundwater and may be partly or wholly dependent of groundwater. Any changes to the quality or quantity of groundwater in near surface aquifers may affect adjacent users who rely on groundwater for domestic and agricultural use. Activities during exploration, including shot hole preparation and core hole drilling, might result in some interaction with groundwater that could impact groundwater availability and quality. The potential impact on groundwater availability and quality is described further in Section 5.4.8.

The impact on groundwater will be assessed based on the findings of the specialist groundwater assessment. The aim will be to identify the key features of the groundwater resources within the application area and to understand the extent, nature, status and use of these. The outcome will be to define which regions are incompatible with the proposed exploration activities related to the groundwater resources and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration. The full terms of reference for the groundwater assessment are presented in Section 7.5.2.

6.1.3.2 Altered surface water hydrological regime

The region comprises the headwaters of a number of very important river systems which supply large quantities of water for human consumption, agricultural and industrial use. Thus potential changes to the surface water hydrological regime (surface flow, drainage patterns, sediment load and availability) could have secondary impacts on water users and the terrestrial and aquatic environment. The potential impact on surface water resources is described further in Section 5.4.9.

The impact on surface water will be further investigated and assessed in the next phase of the EIA. The aim of this assessment will be to identify the different surface water features within the application area and to understand the extent, status, quality and use of these features. The assessment will detail, at a broad scale, the various water resources, the use and sensitivity thereof. The impacts will be considered in terms of the risks posed by the exploration activities. The outcome will be to define which water resources and uses are incompatible with the proposed exploration and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration.

6.1.3.3 Contamination of surface and groundwater resources

Contamination of surface or groundwater could occur as a result of the use of drilling fluids during drilling, and accidental spillages and leaks of fuels, hydraulic fluids and chemicals. The potential impact on water resources is described further in Sections 5.4.8.2 and 5.4.9.2.

The impact relating to contamination will be assessed based on the findings of the surface water study and specialist groundwater assessment (see section 7.5.2 for the terms of reference). The aim will be to identify features of the resource that are sensitive to contamination. In addition to determining exclusion criteria, the outcome will be to define rules and methods that should be applied during physical exploration.

6.1.3.4 Water Consumption

Water would be required for the drilling operations. The water could be acquired commercially or abstracted from a local surface water resource such as a river or dam. This could impact water availability to the environment and other user. In some catchments in the region the water resource is fully allocated. The potential impact of water consumption is described further in Section 5.4.8.3.

The impact relating to the consumption of water will be assessed based on the findings of the surface water study and specialist groundwater assessment (see section 7.5.2 for the terms of reference). In addition to determining exclusion criteria, the outcome will be to define rules and methods that should be applied during physical exploration.

6.1.4 EFFECT ON INFRASTRUCTURE

6.1.4.1 Vibrations

Air blasts (airborne shock waves), air overpressure and ground vibration generated by during seismic data acquisition (underground detonation of explosives or Vibroseis) may cause structural damage to infrastructure, including buildings, groundwater boreholes or affect the stability thereof. The potential impact of these vibrations is described further in Section 5.4.15.1.

The potential impacts of the energy generated during a seismic survey will be further investigated and assessed in the next phase of the EIA. The risks from vibrations will considered with input from a specialist (see Section 7.5.5for the terms of reference). The goal will be to ascertain the risks of the seismic energy generated on different structure and the safe stand-off/buffer distances. The risks of seismic surveys to infrastructure will be researched from local and international literature. The outcome will be to define the acceptable stand-off/buffer distances and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration.

6.1.4.2 Physical damage

The proposed exploration activities could result in damage (accidental or deliberate) to infrastructure such as fences, gates, culverts, pipes and roads. The potential impact related to damage is described further in Section 5.4.15. Issues relating to compensation are discussed in Section 5.4.20.

This impact will be further investigated and assessed in the next phase of the EIA. The aim will be to provide an improved understanding of any damage that could occur during exploration and to provide for mechanisms to prevent these. The outcome will be to determine rules and methods that should be applied during physical exploration and to detail how compensation would be managed.

6.2 BIOLOGICAL IMPACTS

6.2.1 EFFECT ON VEGETATION

Vegetation would be cleared or disturbed as a result of the proposed exploration activities, including creation of new access routes / tracks, establishment of work platforms, etc. Vegetation disturbance could also promote the establishment of alien invasive plant species on site, which may out-compete the natural indigenous vegetation. The potential impact on the vegetation is described further in Sections 5.4.7.1 and 5.4.7.3.

The impact on the vegetation will be assessed based on the findings of the specialist biodiversity assessment (see Section 7.5.1 for the terms of reference). The aim of this assessment will be to identify the different biodiversity features within the application area and to understand the extent, nature and conservation value of these features. The assessment will map, at a broad scale, sensitive vegetation

types, sensitive habitat types (such as ridges, wetlands and rivers), threatened ecosystems, areas of conservation importance (protected areas, Ramsar sites, CBAs, etc.) and other features of high sensitivity. The outcome will be to define which biodiversity units are incompatible with the proposed exploration techniques and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration. The full terms of reference for the biodiversity assessment are presented in Section 7.5.1.

6.2.2 EFFECT ON FAUNA

6.2.2.1 Loss of or disturbance to faunal habitats

An indirect impact related to the clearance or disturbance of vegetation (see Section 6.2.1 above) is the loss or disturbance of habitats of faunal significance. Some of the natural habitats within the region hosts a wide variety of faunal species with a number of these species being protected or of conservation importance. The loss of habitat could affect conservation targets as well as fauna. The potential impact on faunal habitat is described further in Section 5.4.7.1.

This impact will be assessed based on the findings of the biodiversity assessment (see Section 7.5.1 for the terms of reference). The aim of this assessment will be to identify the habitats within the application area and to understand the extent and status of these. The assessment will map, at a broad scale, sensitive habitat types, threatened ecosystems and areas of conservation importance (protected areas, Ramsar sites, CBAs, etc.). The outcome will be to define which habitats are incompatible with the proposed exploration techniques and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration. The full terms of reference for the biodiversity assessment are presented in Section 7.5.1.

6.2.2.2 Disturbance to and mortality of fauna

In addition to the indirect impact on fauna as a result of loss or damage to natural vegetation (faunal habitat), animals in the vicinity of the proposed exploration activities may be affected by increased human presence/activity, and noise and vibration generated by vehicles, shot hole drilling and the use of explosives. In addition to the general disturbance of fauna, those species that cannot effectively vacate the area by themselves may suffer direct mortality due to increased traffic on-site or site clearing. The potential impact relating to disturbance to and mortality of fauna is described further in Section 5.4.7.2.

The impact on terrestrial fauna will be assessed based on the findings of the specialist biodiversity assessment (see Section 7.5.1 for the terms of reference). The aim of this assessment will be to determine which species, particularly those of conservation concern, would be sensitive to the impacts of the exploration activities. The known distribution and key habitats/sites for such species within the application area will be mapped at a broad scale. The outcome will be to define which species don't

tolerate disturbances such as are likely during exploration and to determine the preferred habitats/sites for these species. Exclusion criteria that should be applied when identifying and assessing sites for physical exploration will be determined. The full terms of reference for the biodiversity assessment are presented in Section 7.5.1.

6.3 SOCIO-ECONOMIC IMPACTS

6.3.1.1 Heritage

The proposed exploration activities could result in the loss of or damage to heritage resources (including archaeological, palaeontology and cultural heritage sites). The potential impact on heritage resources is described further in Section 5.4.12.

The impact on heritage resources will be assessed based on the findings of the heritage assessment. The aim of this assessment will be provide an understanding of the heritage resources that are known or which have the potential to occur in the region. This assessment will consider, amongst others: rock art; war sites; Late Iron Age and Historical Period settlements (stone walling and graves); Early, Middle and Late Stone Age sites; Historical buildings, transport routes and tree borders; sites related to oral history and living heritage. Heritage and palaeontological resources will be mapped at a regional scale and the key features of these described. The outcome will be to describe and map heritage and palaeontological resources at a regional scale and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration. The full terms of reference for the heritage assessment are presented in Section 7.5.3.

6.3.1.2 Effect on existing land uses

Exploration activities would occupy land area, which could have an impact on current land uses, e.g. farming, forestry plantation, mining, etc. Exploration activities would preclude other land uses for the duration of each exploration period. Potential impacts include:

- Prevention or disruption of current land use activities;
- Impacts to crops, plantations and livestock/game;
- Potential change in land use value and loss of productivity; and
- Related loss of income.

These potential impacts are described further in Sections 5.4.13 (land tenure and access) and 5.4.14 (land use). Issues relating to compensation are discussed in Section 5.4.15.

Although the proposed exploration activities, which would be localised and of short duration, are not expected to have a significant effect on any existing land uses, this impact will be further investigated and assessed in the next phase of the EIA. The inputs of a specialist on the land uses must at risk will be considered (see Section 7.5.4for the terms of reference). The aim will be to identify the current land uses within the application area in order to get an understanding of the extent, nature and duration of the

different uses. Land uses will be mapped, at a broad scale, to the greatest degree possible using available ground cover and other GIS data. The outcome will be to identify specific land uses that render them sensitive to disturbance and to determine exclusion criteria (including buffers / no-go areas) that should be applied when identifying and assessing sites for physical exploration. Further outcomes would be to determine rules and methods that should be applied during physical exploration and to detail how compensation will be managed (see Section 5.4.20).

6.3.1.3 Effect on ambient noise levels

Various activities (e.g. vehicles, detonation of seismic shots, drilling, etc.) would increase noise levels in the immediate vicinity, which may disturb or be a nuisance to landowners or adjacent residents. The region generally has low ambient noise levels and increased exploration activity could change this, albeit for short durations. The potential impact related to increased noise levels is described further in Section 5.4.16.

This impact will be further investigated and assessed in the next phase of the EIA. The noise risks on receptors will considered with input from a specialist (see Section 7.5.5 for the terms of reference). The aim will be to provide an improved understanding of the levels of noise that could be generated during exploration and to relate these to potential impacts on receptors. This will be undertaken using local and international literature. The outcome will be to determine exclusion criteria (including buffers) that should be applied when identifying and assessing sites for physical exploration. Management measures to prevent or minimise noise generation will also be investigated.

6.3.1.4 Effect on air quality

Ambient air quality may be affected by:

- Dust fallout resulting from the movement of vehicles to and from exploration sites on unsurfaced roads, which would contribute to elevated particulate matter levels in the air on a local scale;
- Emissions generated by vehicles and other combustion-driven equipment (e.g. generators) that release nitrogen oxides (NO_X), carbon dioxide (CO_2), carbon monoxide (CO) and volatile organic compounds (VOC); and
- The escape or release of gas from stratigraphic core holes.

The potential impact on ambient air quality is described further in Section 5.4.17.

This impact will be further investigated and assessed in the next phase of the EIA. The risks to air quality will considered with input from a specialist (see Section 7.5.6 for the terms of reference). The aim will be to provide an improved understanding of the levels of emissions that could be generated during exploration and to relate these to potential sensitive receptors. This will be undertaken using local and international literature. The outcome will be to determine key management measures that should be

applied to prevent or minimise emissions. If the assessment concludes that significant emissions (by volume or risk) are likely then consideration will be given to investigate health risks.

6.3.1.5 Effect on safety and security

Public / landowner safety and security could be compromised or impacted by the following:

- Activities at exploration sites are potentially dangerous due to, *inter alia*, increased traffic volumes, heavy machinery and detonation of explosives. Thus members of the public could be injured if access to exploration sites is not controlled;
- The increased number of people in the area could result in increased crime in the vicinity of the proposed exploration activities, either through direct theft by contractors and staff or through undeterred access onto private land through gates that are left open or fences that are removed / damaged; and
- Accidental veld fires. The extensive natural vegetation of the region provides high fuel loads for veld fires, which can have a devastating effect on landowners with risks to human life and livestock, damages to infrastructure and loss of winter grazing.

These potential impacts are described further in Section 5.4.18.

The impacts on safety and security will be further investigated and assessed in the next phase of the EIA. The aim will be to provide an improved understanding of those activities that could compromise pubic and landowner safety and security, and to determine management criteria that should be applied during the proposed onsite exploration activities to separate receptors from the risk.

6.3.1.6 Effect on local economy due to job creation and direct revenues

Contribution to the local economy could occur through the creation of direct employment opportunities and generation of direct revenues as a result of using local businesses for support services and supplies. Alternatively, if exploration detracts from or compromises the main attractions of the region then it could result in a reduction in external inputs to the local economy. These potential impacts are described further in Sections 5.4.19.

The impact on the local economy will be further investigated and assessed in the next phase of the EIA. The aim will be to provide an improved understanding of the main socio-economic activities, indicators and issues within the region, and then relate these to potential economic opportunities and costs provided by the proposed project. An economic specialist may be consulted for inputs.

6.3.1.7 Financial implications for land owners

Farmers expressed concern that exploration activities could impact their use of land or resources and thereby affect their income. Farmers requested information on how compensation would be made for access and loss of income. Exploration activity on farms could result in damages that may cause a loss

of income or which require rehabilitation in order to prevent long term environmental degradation. Who would be responsible for rehabilitation post any exploration activity and how would the rehabilitation be funded? See Sections 5.4.20 (Compensation) and 5.4.21 (rehabilitation and liability) for further discussion on the impacts.

The impacts on natural resources (vegetation, groundwater and surface water are discussed in preceding sections). The potential for loss of income by agricultural users will be considered in the EIA. The requirements and methods for compensation for access and loss of income will be further investigated and assessed in the next phase of the EIA. The quantum of the necessary financial provision for rehabilitation, closure and on-going post decommissioning management of negative environmental impacts will be assessed in terms of the Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, (GN R 1147). The method of providing the provision will be detailed in the EIA report.

6.4 LOCAL LIMITATIONS TO EXPLORATION

6.4.1.1 Regulatory restrictions

As identified by many I&APs, there are numerous instances where legislation, regulation, guidelines and best practice prohibit (or recommend against) particular activities from taking place due to the risks that those activities are likely to pose to the environment. Such constraints are generally applicable over much of KZN and are specifically applicable to certain exploration and production activities. As a result of these restriction or constraints there may be very little area in KZN available for exploration or production activities.

The EIA will investigate the relevant constraints which would influence the area where the early-phase exploration could take place. These constraints would be documented and a set of criteria produced to delineate all of the areas where the proposed exploration would not be allowed or not be appropriate. Each of the restriction criteria will be set out in the EMPr and the applicant informed thereof.

6.4.1.2 Lack of available water

It has been indicated that many of the catchments in which the exploration is proposed are effectively closed with regards the allocation of water to users. The effect of this is that there is no water available for use for exploration activities that require water.

Rhino Oil and Gas would need to be aware of such constraints for their planning as the lack of water could influence where exploration activities are undertaken. The EIA would investigate the relevant water constraints and restrictions and confirm how these would influence the undertaking of the early-phase exploration.

6.4.1.3 Public opposition

As documented in this report, there is strong public opposition in KZN to gas exploration in general and this project in particular. The result of this is that Rhino Oil and Gas does not have (and appears unlikely to get) a social licence to operate. While there is no legal bearing to a 'social licence' Rhino Oil and Gas must be aware that the undertaking of any activities for the project could well be hampered by the public opposition. Such opposition could take many forms including negative publicity, public protests, refusal to provide services, vandalism and damage to property.

In a similar vein, many landowners consulted during the EIA process have indicated that they would deny Rhino Oil and Gas access to their properties. Rhino Oil and Gas must be aware that in spite of holding an exploration right (if granted) which has legal bearing, without access to the land it is not possible to access their right. Significant negotiation and possible legal action in light of the Sections 54 and 55 of the MPRDA may be required.

Public opposition and the reasons therefore will be documented in the EIA in an attempt to provide Rhino Oil and Gas with an indication of the challenges that they would face in implementing their exploration right.

7 PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT

This chapter describes the nature and extent of further investigations to be conducted by SLR and the specialists in the EIA, and sets out the proposed approach to the EIA process.

The main objectives of the EIA process, as set out in Appendix 3 to the EIA Regulations 2014, will be to, through a consultative process -

a) determine the policy and legislative context of the proposed exploration activities and record how the proposed activity complies with and responds to the policy and legislative context;
b) describe the need and desirability of the proposed exploration activities, including the need and desirability of the activity in the context of the preferred location(s);
c) identify the location of the development footprint within the preferred site(s) based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment ;
d) determine the
    (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and the
    (ii) degree to which these impacts -
    (aa) can be reversed;
    (bb) may cause irreplaceable loss of resources, and
    (cc) can be avoided, managed or mitigated;
e) identify the most ideal location for the proposed exploration activities based on the lowest level of environmental sensitivity identified during the assessment ;
f) identify, assess, and rank the impacts the proposed exploration activities will impose on the site(s) through the life of the activity ;
g) identify suitable measures to avoid, manage or mitigate identified impacts; and
h) identify residual risks that need to be managed and monitored

7.1 ALTERNATIVES TO BE CONSIDERED

The project scope to be considered and assessed in the EIA is the 3-year exploration work programme as proposed by the applicant (see Section 2.3.1). The no-go alternative will also be considered in the EIA. No further alternatives are to be considered beyond the scoping report.

The location of the on-the-ground activities (e.g. core holes and seismic surveys) cannot be defined as these will be dependent firstly, on the outcomes of the initial exploration phases, and secondly on a site assessment, the methodology of which is to be defined in the EMPr.

7.2 EIA PROCESS

The EIA process for this project has been developed to ensure that it complies with Section 23 of GNR 982 and in particular Appendices 4 and 5 to the EIA Regulations 2014. A summary of the proposed EIA process and public consultation activities that will be undertaken during the EIA are provided below in Table 7-1.

TABLE 7-1: EIA TASKS AND TIMING

Phase	EAP activity	Opportunities for Consultation and Participation		SCHEDULE
		Competent Authorities	I&APs, State Departments and Organs of State	
Scoping	Submit Final scoping report to authority by 20 April 2016	Authority to Accept scoping report OR Refuse environmental authorisation (43 days of receipt)	Advise I&APs of authority decision on Scoping report	Nov 2015 to May 2016
Specialist Assessments and Input	EAP to manage specialist activities and receive inputs for EIA.		Ongoing land owner identification. Ongoing consultation, particularly with key stakeholders and Traditional Authorities	April to August 2016
EIA Phase	Assess environmental impacts and identify management measures. Compile draft EIA and EMP report			April to August 2016
	Submit draft EIA report to I&APs & authorities.	Review of draft EIA report (30 days). Comments to EAP	Review of EIA report (30 days). Comments to EAP	August/ September 2016
	Arrange meetings and consultations	Meetings with authorities during EIA if required.	Public Feedback Meetings. Focused consultation with I&APs or commenting authorities if required.	
	Address public comment and finalise EIA and EMPr reports			September 2016
Authority review and Authorisation Phase	Final EIA report to Authority (106 days from acceptance of scoping report).	Authority Acknowledge Receipt of EIA report (10 days).		September 2016
		Environmental Authorisation Granted / Refused (107 days).	Notifications to I&APs regarding environmental authorisation (granted or refused).	December 2016
Appeal Phase	EAP to provide guidance regarding the appeal process as and when required.	Consultation during processing of appeal if relevant.	Submit appeal in terms of National Appeal Regulations	variable

7.3 METHOD OF ASSESSING IMPACT SIGNIFICANCE

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the proposed project. The process involves consideration of, *inter alia*: the purpose and need for the project; views and concerns of I&APs; social and political norms, and general public interest.

7.3.1 IDENTIFICATION AND DESCRIPTION OF IMPACTS

Identified impacts will be described in terms of the nature of the impact, compliance with legislation and accepted standards, receptor sensitivity and the significance of the predicted environmental change (before and after mitigation).

7.3.2 EVALUATION OF IMPACTS AND MITIGATION MEASURES

The significance of environmental impacts will be rated before and after the implementation of mitigation measures. These mitigation measures may be existing measures or additional measures that may arise from the impact assessment and associated specialist input. The impact rating system considers the confidence level that can be placed on the successful implementation of mitigation. The proposed method for the assessment of environmental impacts is set out in the table below. This assessment methodology considers the following rating scales when assessing potential impacts (before and after mitigation):

- Consequence, which is a function of:
  - the intensity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources);
  - the extent of the impact;
  - the duration of the impact;
- probability of the impact occurring;
- reversibility of the impact; and
- the degree to which the impact can be mitigated.

TABLE 7-2: CRITERIA FOR ASSESSING IMPACTS

Note: Part A provides the definition for determining impact consequence (combining intensity, spatial scale and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D.

PART A: DEFINITION AND CRITERIA*	
Definition of SIGNIFICANCE	**Significance = consequence x probability**
Definition of CONSEQUENCE	**Consequence is a function of intensity, spatial extent and duration**

Criteria for ranking of the INTENSITY of environmental impacts	**VH**	Severe change, disturbance or degradation. Associated with severe consequences. May result in severe illness, injury or death. Targets, limits and thresholds of concern continually exceeded. Substantial intervention will be required. Vigorous/widespread community mobilization against project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.
	M	Moderate change, disturbance or discomfort. Associated with real but not substantial consequences. Targets, limits and thresholds of concern may occasionally be exceeded. Likely to require some intervention. Occasional complaints can be expected.
	L	Minor (Slight) change, disturbance or nuisance. Associated with minor consequences or deterioration. Targets, limits and thresholds of concern rarely exceeded. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.
	VL	Negligible change, disturbance or nuisance. Associated with very minor consequences or deterioration. Targets, limits and thresholds of concern never exceeded. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. Small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
Criteria for ranking the DURATION of impacts	**VL**	Very short, always less than a year.
	L	Short-term, occurs for more than 1 but less than 5 years.
	M	Medium-term, 5 to 10 years.
	H	Long term, between 10 and 20 years. (Likely to cease at the end of the operational life of the activity)
	VH	Very long, permanent, +20 years (Irreversible. Beyond closure)
Criteria for ranking the EXTENT of impacts	**VL**	A portion of the site.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours
	H	Local area, extending far beyond site boundary.
	VH	Regional/National

PART B: DETERMINING CONSEQUENCE							
INTENSITY = VL							
DURATION	Very long	**VH**	**Medium**	**Medium**	**Medium**	**High**	**High**

	Long term	H	Low	Medium	Medium	Medium	High
	Medium term	M	Low	Low	Medium	Medium	Medium
	Short term	L	Very low	Low	Low	Medium	Medium
	Very short	VL	Very low	Low	Low	Low	Medium

INTENSITY = L

DURATION	Very long	VH	Medium	Medium	High	High	High
	Long term	H	Medium	Medium	Medium	High	High
	Medium term	M	Low	Medium	Medium	Medium	High
	Short term	L	Low	Low	Medium	Medium	Medium
	Very short	VL	Very low	Low	Low	Medium	Medium

INTENSITY = M

DURATION	Very long	VH	Medium	High	High	High	Very High
	Long term	H	Medium	Medium	High	High	High
	Medium term	M	Medium	Medium	Medium	High	High
	Short term	L	Low	Medium	Medium	Medium	High
	Very short	VL	Very low	Low	Medium	Medium	Medium

INTENSITY = H

DURATION	Very long	VH	High	High	High	Very High	Very High
	Long term	H	Medium	High	High	High	Very High
	Medium term	M	Medium	Medium	High	High	High
	Short term	L	Medium	Medium	Medium	High	High
	Very short	VL	Low	Medium	Medium	Medium	High

INTENSITY = VH

DURATION	Very long	VH	High	High	Very High	Very High	Very High
	Long term	H	High	High	High	Very High	Very High
	Medium term	M	Medium	High	High	High	Very High
	Short term	L	Medium	Medium	High	High	High
	Very short	VL	Low	Medium	Medium	High	High
			VL	**L**	**M**	**H**	**VH**
			A portion of the site	Whole site	Beyond the site boundary, affecting immediate neighbours	Local area, extending far beyond site boundary.	Regional/ National
			EXTENT				

PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	VH	Medium	High	High	Very High	Very High
	Probable	H	Medium	Medium	High	High	Very High
	Possible/ frequent	M	Low	Medium	Medium	High	High
	Conceivable	L	Low	Low	Medium	Medium	High
	Unlikely/ improbable	VL	Very low	Low	Low	Medium	Medium

	VL	L	M	H	VH
	CONSEQUENCE				

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
Very High	Potential fatal flaw unless mitigated to lower significance.
High	It must have an influence on the decision. Substantial mitigation will be required.
Medium	It should have an influence on the decision. Mitigation will be required.
Low	Unlikely that it will have a real influence on the decision. Limited mitigation is likely to be required.
Very Low	It will not have an influence on the decision. Does not require any mitigation

***VH = very high, H = high, M= medium, L= low and VL= very low and + denotes a positive impact.**

7.4 ASPECTS TO BE ASSESSED

The environmental aspects relevant to the anticipated impacts as described in Section 6 will be considered and investigated in the EIA phase.

7.5 PROPOSED SPECIALIST STUDIES

The following sections outline the terms of reference for the specialist studies that will be undertaken. These are based on the outcomes of the scoping study. Specialist reports will be structured in terms of Appendix 6 of the EIA Regulations 2014. It must be noted that although the work described in the following sections will be undertaken by specialists, the extent of the study area means that a desktop approach is the only feasible method for the work. Each specialist will be tasked to identify the features and categories of their environmental field which must be understood when planning core hole sites and of seismic survey routes. Site specific assessments to implement the specialist recommendations will be undertaken when the locality of drill sites and the routing of seismic survey lines are being finalised. The requirement for this approach will be presented in the EMPr.

Should it be deemed necessary that additional specialist studies are required; terms of reference will be drawn up and these will be included in the EIA report.

7.5.1 BIODIVERSITY

A desktop analysis of the receiving environment which may be affected by the proposed exploration activities will be undertaken by an ecologist in order to understand the extent, nature and status of biodiversity features. All relevant databases will be utilised to ensure that all environmental policies are considered. In this regard specific mention is made of the SANBI databases (such as relevant provincial databases and the NFEPA database) or any available fine scale plans for the region. The desktop study will also include the assessment of sensitive habitat types (such as ridges, wetlands and rivers), threatened ecosystems, protected areas and other sensitive biophysical areas. Necessary background

information will also be sourced from the relevant nature conservation authorities regarding threatened plants and animals recorded for the area. Biodiversity units (vegetation, habitat), areas of conservation importance (protected areas, Ramsar sites, CBAs) and features of high sensitivity to disturbance (species occurrence etc) will be mapped, at a broad scale, to the greatest degree possible using available ground cover and other GIS data.

A sensitivity plan will be developed based on the findings of the desktop ecological assessment to indicate sensitive areas in the study area. The results of the study will lead to a sensitivity report describing any potential ecological constraints and presenting management and mitigation measures for inclusion into the EMPr.

The outcome will be to define which biodiversity units and uses are incompatible with the proposed exploration and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration.

The specific terms of reference for the biodiversity assessment are as follows:

- Identify, map and describe the extent, nature and status of biodiversity features (including geology, soil, vegetation and surface water resources), sensitive habitat types (such as ridges, wetlands and rivers), threatened ecosystems, protected areas and other sensitive biophysical areas in the exploration right area, based on available literature, existing databases (e.g. SANBI, NFEPA and other provincial databases) and any fine scale plans for the region;
- Identify any species of special concern (vegetation and fauna) *viz.* species with conservation status, endemic to the area or threatened species that exist or may exist on site;
- Identify and investigate ecological / biodiversity processes that could be affected (positively and/or negatively) by the proposed project;
- Develop a sensitivity plan (low, medium and high significance) based on the findings of the desktop review and describe any potential ecological constraints relating to identified sensitive areas;
- Determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration during the detailed site assessment;
- Identify other practicable mitigation measures to reduce any potential negative impacts and indicate how these could be implemented and managed during exploration; and
- Provide guidance for the requirement of any permits or licences.

7.5.2 GROUNDWATER

A desktop analysis of the receiving groundwater environment which may be affected by the proposed exploration activities will be undertaken by a geohydrologist in order to provide understanding of the key groundwater features. The aim will be to identify the groundwater resources within the application area

and to understand the extent, nature, status and use of these. Taking into consideration the extent of the study area, a desktop groundwater assessment study will be undertaken by a geohydrologist to establish:

- General distribution of groundwater levels in the delineated area,
- Seasonal fluctuation of groundwater levels;
- Classification of groundwater potential for the area, aquifer types and depths;
- Presence of major catchment areas and possible interaction between surface and groundwater
- Current (baseline) regional conditions for groundwater ;
- Recommendations for later phase groundwater work that should be done if exploration proceeds.

The proposed methodology for achieving the objectives of the desktop study consists of:

- Interrogation of the National Groundwater Database (DWS) to determine presence of water supply and monitoring boreholes within the delineated study area.
- Extraction of water level records and determination of the approximate groundwater levels.
- Extraction of groundwater quality records and delineation of possible zones of higher concentration for various groundwater constituents.
- Spatial processing of national groundwater maps
- Spatial geo-processing for groundwater resources in the study area.

Aquifers and water use will be mapped to the greatest degree possible using available ground cover and other GIS data. The outcome will be to define the levels of compatibility of the proposed exploration activities with the groundwater resources and to determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration.

The specific terms of reference for the groundwater assessment are as follows:

- Identify, map and describe groundwater resources / aquifers in the exploration right area, based on available literature, existing databases and any fine scale plans for the region;
- Describe the ecological condition, sensitivity, ecological importance and conservation value of all identified groundwater resources / aquifers;
- Develop a sensitivity plan (low, medium and high significance) based on the findings of the desktop review and describe any potential ecological constraints relating to identified sensitive areas;
- Determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration during the detailed site assessment;
- Identify other practicable mitigation measures to reduce any potential negative impacts and indicate how these could be implemented and managed during exploration; and
- Provide guidance for the requirement of any authorisation, permits or licences (e.g. General Authorisation or Water Use Licence).

7.5.3 HERITAGE

Taking into consideration the extent of the study area, a desktop heritage study will be undertaken by a registered archaeologist / heritage consultant. The goal will be provide an understanding of the heritage resources that are known or which have the potential to occur in the region. This will consider, amongst others: rock art; war sites; Late Iron Age and Historical Period settlements (stone walling and graves); Early, Middle and Late Stone Age sites; Historical buildings, transport routes and tree borders; sites related to oral history and living heritage. Heritage and palaeontological resources will be mapped at a regional scale and the key features of these described. The method for heritage assessment consists of several steps. The first step will be a desktop assessment with the specialist consulting their own database, built-up over several years and includes, and is not exclusive or complete:

- Previous heritage surveys (pre-2013);
- Archaeological sites;
- Palaeontological sites;
- Listed provincial and national monuments;
- Listed historical cemeteries;
- Listed general heritage sites;
- Sites from 1st edition topographical maps; and
- Sites from 1st edition aerial photographs (when available).

Consultation with the relevant authorities to address battlefields and historical sites. The work may include consultation with an historical architect, a palaeontologist, and an historian where necessary. The more recent addition of SAHRIS allows one to see if an area has recorded sites or has been surveyed. SAHRIS also allows for a brief palaeontological assessment.

The desktop study will use various historical maps (1st edition topographical and aerial photographs) that can pinpoint human settlements that occurred before increased urbanisation and commercial industry. Aerial photographs from 1937 and 1942 topographical maps will be used to indicate older buildings and human settlements. This is important as the maps will indicate the potential for human graves, regardless of the current land use.

Identified sites will be grouped according to low, medium and high significance for the purpose of reporting. Where heritage sites of medium and high significance are identified a management plan would be developed. This might be specific to a site or as a general management plan for the area. Guidance on how to manage chance finds of heritage resources will also be detailed.

The specific terms of reference for the heritage assessment are as follows:

- Identify, map and describe heritage resources (including archaeology, palaeontology and cultural heritage) in the exploration right area, based on available literature, existing databases and any fine scale plans for the region;
- Determine the sensitivity and conservation significance of any sites of archaeological, palaeontology or cultural heritage significance affected by the proposed project;
- Develop a sensitivity plan (low, medium and high significance) based on the findings of the desktop review and describe any potential heritage constraints relating to identified sensitive areas;
- Determine the need to undertake initial archaeological surveys (i.e. fieldwork) of specific and selected sites to confirm sensitivity plan;
- Determine exclusion criteria that should be applied when identifying and assessing sites for physical exploration during the detailed site assessment;
- Identify other practicable mitigation measures to reduce any potential negative impacts and indicate how these could be implemented and managed during exploration; and
- Provide guidance for the requirement of any heritage permits or licences.

7.5.4 SOILS AND LAND COVER

Taking into consideration the extent of the study area, a desktop soils and land cover study will be undertaken by a specialist. The aim will be to identify the different land uses and regional soil types within the application area and to understand the extent, nature and status of these. Soils and land uses will be mapped, at a broad scale, to the greatest degree possible using available ground cover and other GIS data.

The outcome will be to identify soil types or properties and land uses within the area which are incompatible with the proposed exploration. Exclusion criteria that should be applied when identifying and assessing sites for physical exploration will be defined.

The specific terms of reference for the soils and land cover assessment are as follows:

- Identify, map and describe soil resources / land use in the exploration right area, based on available literature, existing databases and any fine scale plans for the region;
- Describe the condition, value, importance and sensitivity of the identified soils and land uses resources / aquifers;
- Develop a sensitivity plan (low, medium and high significance) based on the findings of the desktop review and describe any potential constraints relating to identified sensitive areas;
- Determine exclusion criteria for soils and land use that should be applied when identifying and assessing sites for physical exploration during the detailed site assessment; and
- Identify other practicable mitigation measures to reduce any potential negative impacts and indicate how these could be implemented and managed during exploration.

7.5.5 NOISE AND VIBRATION

A specialist will be appointed to undertake a literature review of the noise and vibration that could be expected from the proposed exploration activities. The goal will be provide an understanding of the noise and vibration levels that such activities generate in order to enable the interpretation of risk to receptors and infrastructure. The specialist would also be tasked with identifying receptors that would be sensitive to the noise and or vibration that the proposed exploration activities could generate. A seismologist may also be consulted to provide understanding of the risk of the seismic energy to geological structures. The outcome would be to determine exclusion criteria/buffers that should be applied when identifying and assessing sites for physical exploration during the detailed site assessment. Other practicable mitigation measures to reduce any potential negative impacts would be identified.

7.5.6 AIR QUALITY

A specialist will be appointed to undertake a literature review of the gaseous emissions that could be expected from the proposed exploration activities. The aim will be to provide an understanding of the volumes and types of emissions that could be generated during exploration and to relate these to potential sensitive receptors. The specialist would also be tasked with identifying receptors that would be sensitive to the gaseous emissions that the proposed exploration activities could generate. The outcome would be to determine practicable mitigation measures to reduce any potential negative impacts.

If the risk requires, the specialist will contribute to determining exclusion criteria/buffers that should be applied when identifying and assessing sites for physical exploration during the detailed site assessment.

7.6 INTEGRATION AND ASSESSMENT

The specialist findings, recommendations and other relevant information will be integrated into the EIA report by SLR. The full specialist studies will be included as appendices to the EIA Report.

7.7 MEASURES TO AVOID, REVERSE, MITIGATE, OR MANAGE IDENTIFIED IMPACTS

A draft EMPr will be compiled and included as an appendix to the EIA Report. The EMPr will be structured in terms of Appendix 5 to the EIA Regulations 2014. The EMPr will provide recommendations on how to select, establish, operate, maintain and close the exploration activities through all relevant phases of the project life. The aim of the EMPr will be to ensure that the project activities are managed to avoid or reduce potential negative environmental impacts, and enhance potential positive environmental impacts. The EMPr will detail the impact management objectives, outcomes and actions as required, the responsibility for implementation and the schedule and timeframe. Requirements for monitoring of environmental aspects as well as compliance monitoring and reporting will also be detailed. The EMPr will also include the required environmental awareness plan.

If approved by the relevant authorities, the provisions of the EMPr are legally binding on the project applicant and all its contractors and suppliers.

7.8 CONSULTATION PROCESS IN EIA

7.8.1 WITH THE COMPETENT AUTHORITY

Any conditions of the approval of the Scoping report from the competent authority will be implemented in the EIA process. If requested, a site visit and meeting with the competent authority shall be held.

PASA will be invited to all public feedback meetings that will be held. The EIA / EMP reports will be submitted to PASA in both draft and final formats. The opportunities for consultation and participation of the Competent Authority are shown in Table 7-1.

7.8.2 PUBLIC PARTICIPATION PROCESS

A description of the tasks that would be undertaken during the EIA, with specific reference to the opportunities for consultation and participation for I&APs, relevant State Departments Organs of State and commenting authorities is detailed below and shown in Table 7-1.

7.8.2.1 Details of the engagement process

The key activities of the stakeholder engagement process in the EIA phase will include the following:

- On-going identification and notification of landowners and stakeholders;
- Registration of parties as I&APs;
- Notification to I&APs of the authority decision on scoping;
- Consultation with I&APs, key stakeholders and authorities;
- Consultation with mineral rights holders and land claimants;
- Collation of issues and concerns for inclusion in the EIA;
- Circulation of the EIA and EMP report for public review, with summaries in local languages.
- Public meeting/s to provide feedback on the findings of the EIA; and
- Notification of I&APs on the PASA decision and appeal process.

7.8.2.2 Communication with of I&APs

I&APs registered on the project database will notified of relevant events in the EIA process via electronic mail, post and bulk SMS. This will include when the EIA/EMP reports are available for public review; invitations to a public feedback meeting(s); and notification of the authority decision.

7.8.2.3 Information to be provided to I&APs

All new I&APs will be provided with relevant project information.

During the EIA phase a series of public feedback meeting(s) will be held to present and discuss the findings of the EIA with I&APs. These meetings will include a presentation by the EAP.

The EIA / EMPr report will be subjected to public review for a period of 30 days. A summary of the findings of the EIA report will be provided in English and Sotho and isiXhosa.

Once PASA has issued a decision on the application, I&APs on the project database will be informed accordingly of the decision, the reasons therefor and the fact that an appeal may be lodged in terms of the National Appeals Regulations, 2014.

7.9 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

7.9.1 FINANCIAL PROVISION

In terms of Section 24P of NEMA and associated regulations pertaining to the financial provision (GN. R1147), an applicant for Environmental Authorisation relating to exploration must, before the Minister of 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.

Rhino Oil and Gas would put in place the required financial provision for the proposed exploration activities. Rhino Oil and Gas will discuss the nature and quantum of the financial provision with PASA during the next phase of the EIA. The proposed nature and quantum of the financial provision will be presented in the EIA Report.

7.9.2 IMPACT ON THE SOCIO-ECONOMIC CONDITIONS OF ANY DIRECTLY AFFECTED PERSON

Exploration as proposed is not expected to have a significant effect on any landowner or occupier. This can be ensured by negotiating access with landowners and siting activities at agreed locations. Where necessary, compensation will be agreed with landowners for any economic loss.

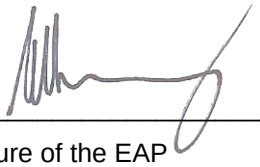
7.9.3 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT

None.

8 UNDERTAKINGS BY THE EAP

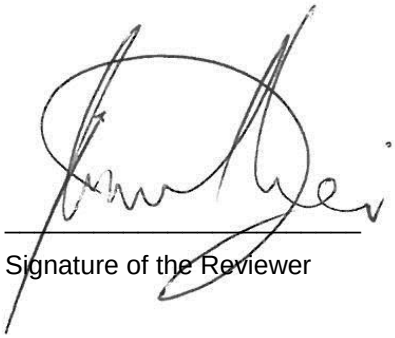
I, Matthew Hemming, the Environmental Assessment Practitioner responsible for compiling this report, undertake that:

- the information provided herein is correct;
- the comments and inputs from stakeholders and I&APs has been correctly recorded;
- information and responses provided to stakeholders and I&APs by the EAP is correct; and
- the I&APs and stakeholders have reviewed and commented on the Plan of Study for EIA and the level of agreement therewith has been correctly documented.



_____ Date: ____ 02 March 2016_____

Signature of the EAP



_____ Date: ___02 March 2016_____

Signature of the Reviewer

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APPENDIX 1: PROOF OF EAP REGISTRATION

APPENDIX 2: CURRICULUM VITAE OF EAP

APPENDIX 3: INCLUDED PROPERTIES

List of included Properties

(Separate electronic file)

APPENDIX 4: SITE PLAN

Locality plans for the boreholes sites are not yet available.

Route plans for the seismic surveys are not yet available.

APPENDIX 5: STAKEHOLDER ENGAGEMENT DOCUMENTS

5.1 Authority Correspondence

5.2 Land Owner Database

5.3 Stakeholder/I&AP Database

5.4 Copies and Proof of Adverts and Site Notices

5.5 Public Documents (BID, Letters, Presentations)

5.6 Press Coverage

5.7 Public meetings

APPENDIX 6: I&AP SUBMISSIONS

RECORD OF REPORT DISTRIBUTION

Project Number:	723.18034.00005
Title:	Scoping report for the proposed Exploration Right Application for Petroleum on various farms in the magisterial districts of Matatiele and Mt Fletcher, Eastern Cape
Report Number:	1.1
Proponent:	Rhino Oil and Gas Exploration South Africa (Pty) Ltd

Name	Entity	Copy No.	Date issued	Issuer

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