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# PETROLEUM AGENCY SOUTH AFRICA

## ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

Submitted in support of application for a exploration  
right



SOUTH AFRICAN AGENCY FOR THE  
PROMOTION OF PETROLEUM EXPLORATION  
AND EXPLOITATION (PASA) LTD

14/01/2010

Client Name: Petromax NCBSP

P. Meyer

Registration: Department of Energy (DUEZ) (Act 28 of 2002)

**Applicant:** Msix (Pty) Ltd

**District:** Magisterial district of Chris Hani, Eastern Cape Province

**Mineral:** Natural Gas

**Version:** 1

**Date:** January 2010

## PREAMBLE

Please note that Msix follows a uniform approach to all their natural gas projects. This approach enables us, as a small upcoming entrepreneur to manage our commitments and actions more effectively. Therefore you will find that the approach to the exploration as well as to the Environmental Management Plan is aligned between the various applications, as also some of the standard mitigation measures. Please be ensured that we have compiled each of these documents separate and each document and process has received the attention it deserves. Further to this please do not hesitate to contact Msix for any further explanations, changes, or additional information.

### CHECKLIST: PREPARATION OF AN EMPR IN SUPPORT OF EXPLORATION RIGHT APPLICATION

Item	Covered (Yes/No)	Comment
The submission of the EMPR must be stipulated timeframes of 120 days from the date of the acceptance letter by the Agency as per section 79(4)(b) of the MPRDA.	Yes	120 day date is on 4 January 2010, Extension was approved by PASA to submit on 14 January 2010 due to December break and closing of offices.
Baseline information concerning the affected environment should be established, to determine protection, remedial measures and environmental management objectives as required by section 39(3)(a).	Yes	Please refer to par 5
Have the investigation, assessment and evaluation of the impacts of proposed exploration operations been conducted on the environment, socio-economic conditions of directly affected people and heritage resources as required by section 39(3)(b)?	Yes	Please refer to par 7 for the investigation, assessment and evaluation of impacts
Was an environmental awareness plan to inform the workforce of environmental risks been developed as per section 39(3)(c)? This should be supported by allocation of roles and responsibilities for all identified	Yes	Please refer to par 8.5 for the environmental awareness plan

Item	Covered (Yes/No)	Comment
actions to be undertaken during the implementation of the EMPR.		
Is there a clear description of the manner in which the applicant intends to remedy, control and manage pollution or environmental degradation as per section 39(3)(d)(i-ii)?	Yes	Please refer to par 8.3 and 8.4
Demonstration of how the applicant intend to comply with waste management standard and practices for both domestic, general and hazardous wastes materials as required under section 39(3)(d)(iii).	Yes	Please refer to par 4.2.8 and 8.3
Rehabilitation and closure plans with clear environmental objectives as per Regulations 61 & 62 of the MPRDA.	Yes	Please refer to par 4.2.9 and 8
Public participation process - consult with all interested and affected parties (attach proof of notification, notes from meetings and results of such consultation — as required by section 79(4)(a). Concerns should be addressed adequately and where applicable, working agreements with affected parties (e.g. holders of prospecting/mining rights) are attached to the EMPR.	Yes	Please refer to par 6
Overlaps with other issued rights (prospecting & mining) - either as part of consultation process, applicants are required to consult and identify potential environmental risks and liabilities between the two parties which may arise from prospecting or exploration activities, parties are advised to develop and sign working agreements in this regard.	No	No overlapping communicated to applicant by either PASA or DMR.
The applicant must give an undertaking by means of signature on the report indicating that he/she understand the conditions of the EMPR and thereby agree to the execution and implementation of the EMPR, giving effect to section 38(2).	Yes	Please refer to par 10
The applicant must make financial provision for rehabilitation and management of negative	Yes	Please refer to par 9

Item	Covered (Yes/No)	Comment
environmental impacts, thereby giving a clear calculation and breakdown of issues considered as per section 41(1).		
The applicant must give full description of the proposed exploration and its associated activities e.g. the anticipated number of drill holes, extent of surface area to be disturbed, facilities and structures to be erected on site, (the impacts of such activities shall also be tied to the above financial provision).	Yes	Please refer to par 4.2
Consideration of any other applicable statutory environmental legislations with the EMPR implementation e.g. the National Environmental Management Act 107 of 1998, National Water Act 36 of 1998, National Heritage Resources Act 25 of 1999, etc.	Yes	Please refer to par 3
The applicant must also indicate the frequency of monitoring and performance assessment reporting of the EMPR to the Agency as required by Regulation 55 of the MPRDA.	Yes	Please refer to par 8.6
The applicant must also consider inclusion of other environmental issues on the EMPR as prescribed under Regulations 51-52 of the MPRDA.	Yes	The report has been compiled in terms of the Regulations.
The applicant should remember that an EMPR would only be approved in terms of section 39(4) by the Minister provided: It complies with all other requirements reading with section 39(4) and furthermore) in case there is recommendation for EMPR approval, the applicant shall be required to lodge a financial provision "based on an advised methodology" before it's approved.	Noted	

# EXECUTIVE SUMMARY

## Background Information and Project Motivation

Msix (Pty) Ltd seeks to explore for natural gas in Eastern Cape Province, South Africa. The proposed area of exploration is situated north west of Sterkstroom and south east of Queenstown.

Exploration for coal bed methane will be carried out in phases:

- Phase 1: Desktop Study
- Phase 2: One Well Spot Test Drilling
- Phase 3: Collation of Results and Evaluation
- Phase 4: Pre-Feasibility and Feasibility

The application for an exploration right was lodged with the Petroleum Agency South Africa in terms of regulations as set out in section 79, 80, 81 and 82 of the Mineral and Petroleum Resources Development Act, 2002. The Petroleum Agency South Africa (PASA) accepted the application on 28 August 2009 and required that public consultation be conducted and an environmental management programme be developed.

Coal bed methane or CBM, is an abundant fossil energy resource which is found in association with nearly all coal beds where it is formed as a by-product of the coal formation process. The methane gas is adsorbed within the structure of the coal and is kept there by overburden and hydraulic pressure. CBM can be extracted by pumping water out of the coal bed thereby reducing the pressure and allowing the gas to escape to the surface. The purpose of the exploration will be to explore for CBM in the Eastern Cape Province area.

CBM could provide South Africa with a significant source of cleaner alternative energy & can be used in applications such as cooking, heating and the generation of electricity. At the moment, about 87 percent of South Africa's energy is generated using coal. Short term projections of the electricity supply and demand indicate a shortfall in peak electricity generation capacity by 2006 and in the country's base-load capacity by 2010. CBM exploration efforts are thus strategically important in identifying and assessing potential sources of natural gas which could provide alternative energy sources to address South Africa's growing demand. In addition methane gas provides a cleaner form of energy than coal and oil as it gives off less carbon dioxide per unit of energy released while producing more heat per gram than other complex hydrocarbons.

A coalbed methane industry would create jobs, attract billions of rand in investment, reduce fuel imports and create new industries.

### Project Description

The proposed exploration programme will be carried out in four phases. The first phase involves a desktop study in order to identify target sites for exploration drilling. This will include a review of available information, the creation of geological and financial models and the identification of target sites for the sampling of the coal bed methane resource.

The second phase of exploration will require the drilling of one well test spot borehole to a depth of between 200 and 700 m. Construction activities shall be conducted during daylight hours only (normally between 06h00 and 18h00 Mondays to Fridays), unless under special circumstances in which case the permission of the landowners must be obtained. Drilling at each site is likely to take about 3 weeks. The footprint of disturbance for an exploration rig and equipment is generally less than 1 000 m<sup>2</sup> and sites will be accessed using existing farm roads where available.

Phase three will deal with the collation of the results and the evaluation thereof. Assuming the targeted coal seams are encountered during drilling, cores will be raised to the surface and sections inserted into sampling canisters. The samples will be taken to a laboratory for testing and analysis. Once the drilling and sampling of a borehole is complete the hole will be sealed using cement. If the site is to be used in the future the hole will be capped with a borehole plinth. On completion of the drilling and sampling, all equipment will be removed and the compacted surfaces will be scarified. Soils that have been contaminated with oils or greases will be remediated in-situ. Natural vegetation re-establishment will be monitored and supplemented as necessary.

The fourth and last phase will be the pre-feasibility phase and determining the feasibility of the proposed project.

### Environmental Impact Assessment and Management Programme

This report was prepared in terms of legislation applicable to a project of this nature, i.e.:

- No. 28 of 2002: Mineral and Petroleum Resources Development Act (MPRDA)
- No. 36 of 1998: National Water Act (NWA)
- No. 107 of 1998: National Environmental Management Act (NEMA)

- No. 39 of 2004: NEMA: Air Quality Act (AQA)
- No. 45 of 1965: Atmospheric Pollution Prevention Act (APPA)
- No. 10 of 2004: NEMA: Biodiversity Act
- No. 84 of 1998: National Forest Act
- No 25 of 1999: National Heritage Resources Act
- SANS 1929 of 2005: South African National Standards, Ambient air quality – Limits for common pollutants, 2005
- GN No. R.527 of 23 April 2004: Mineral and Petroleum Resources Development Regulations
- GN No. 704 of 4 June 1999: Regulation on use of water for mining and related activities aimed at the protection of water resources
- GN No. R.385, 386 and 387 of 2006: Environmental Impact Assessment Regulations

The Environmental Impact Assessment (EIA) was performed through a desk top study utilising the following information:

- State of the Environment reports (where available) and Strategic Environmental Assessments
- Review of reports done for similar projects in other areas
- Review of existing environmental reports for the study area
- Environmental Potential Atlas data from the Department of Water and Environmental Affairs
- Integrated Development Plan of the District and Local Municipality
- Topo-cadastral, geological and soil maps covering the exploration area at scales ranging from 1:50 000 to 1:250 000
- Reference material as listed in Section 9 of this report

## Conclusions

No impacts of high significance have been identified for exploration activities within the proposed exploration application area. The current assessment is however limited by the fact that target drilling sites will only be identified in Phase 2 of the exploration programme. An environmental site assessment of each target site must be conducted to ensure that site specific impacts are kept to a minimum. There needs to be flexibility in the relocation of the sites in order to ensure that sensitive sites are avoided as far as possible. Given the limited number of drill sites, the potentially small area of disturbance and the short duration of activities at any particular site there is no environmental reason why the proposed exploration activities should not continue.

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## LIST OF ABBREVIATIONS

BID	Background Information Document
CBM	Coal Bed Methane
CGS	Council for Geoscience
DME	Department of Minerals and Energy
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
IAP	Interested and Affected Party
MPRDA	Mineral and Petroleum Resources Development Act 28 of 2002
MSD	Material Safety Data
PASA	Petroleum Agency South Africa

## GLOSSARY

Adsorbed	Accumulated on the surface of a solid.
Camp site	The demarcated area at which drilling employees are accommodated while working at a drilling site. The area includes the cooking and ablution facilities.
Diagenesis	The physical, chemical or biological alteration of sediments into sedimentary rock at relatively low temperatures and pressures that can result in changes to the rock's original mineralogy and texture.
Drilling site	The demarcated area within which all drilling and sampling machinery, vehicles and equipment operate while excavating a borehole.
Exploration area	The Eastern Cape area in which, Msix has lodged an exploration right application for coal bed methane with the Petroleum Agency SA.
Exploration activities	Includes all drilling, sampling and related activities that may be undertaken at a drilling site.
Exploration right	As defined in the Mineral and Petroleum Resources Development 28 of 2002.
Fracking	Colloquial term in the petroleum industry for creating fractures in rock near the bottom of a well. It usually requires pumping a fluid into the well at high pressure.

## 1 APPLICANT DETAILS

Name of Project:	Application for an Exploration Right for Natural Gas
Reference No.:	30/5/2/3/2/135 ER
Name of Report:	Environmental Impact Assessment & Environmental Management Programme
Name of Applicant:	Msix (Pty) Ltd
Responsible Person:	Gabriel Amos / Lizinda Grobbelaar
Postal Address:	PO Box 13509 Sinoville, Pretoria, 0129
Telephone:	012 543 9093
Facsimile:	012 543 9610
E-mail:	<a href="mailto:Lizinda@gmail.com">Lizinda@gmail.com</a>
Land Owners:	Full list of title deeds included in application document. See Annexure B for a list of land owners

## 2 INTRODUCTION

Msix (Pty) Ltd is proposing to explore for coal bed methane around the Chris Hani area in the Eastern Cape Province, South Africa. The exploration project lies between Sterkstroom (which is situated North West) and Queenstown (which lies south east).

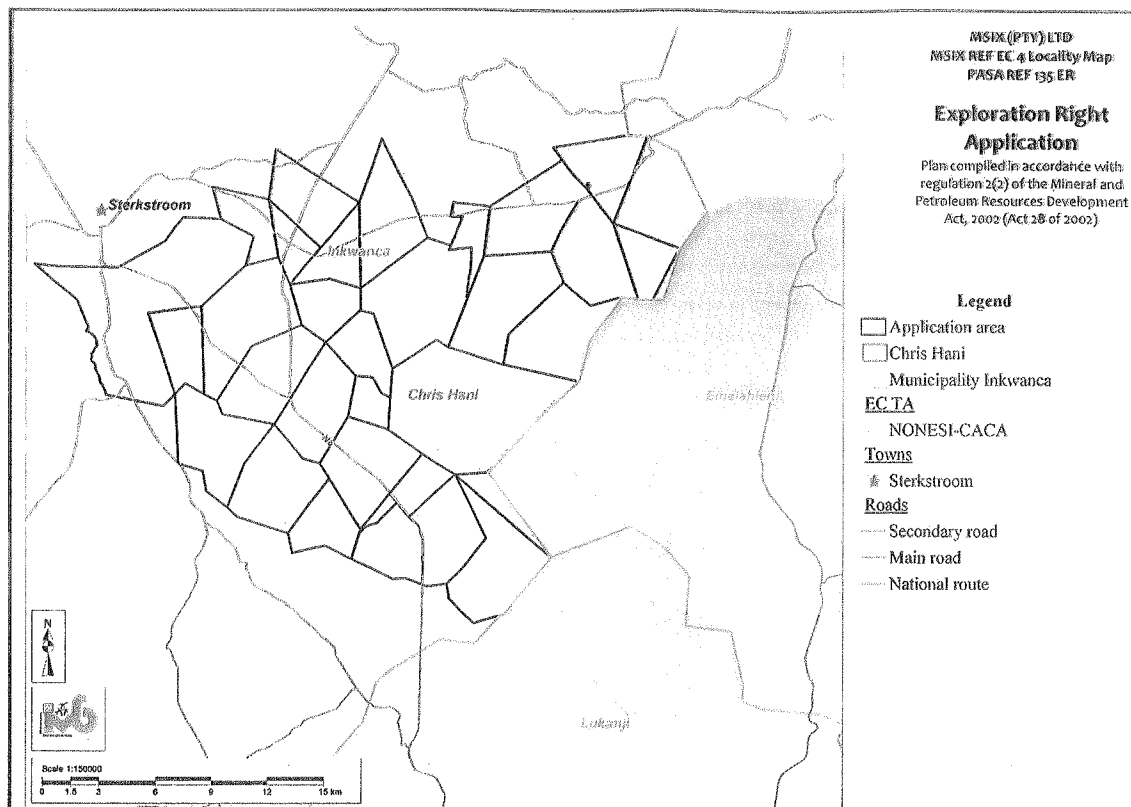


Figure 1: Regional Location of the Exploration Right Application Area

Coal and coal bed methane (CBM) are abundant, complimentary, fossil energy resources found in many areas of the world, including South Africa. CBM is a natural gas, which is found in association with nearly all coal beds where it is formed as a by-product of the coal formation process by both maturation and burial processes (coalification and diagenesis). The methane gas is adsorbed within the structure of the coal and is bound to the cleats and pores within the coal by a combination of molecular and hydraulic pressures. Groundwater within the coal bed contributes to this pressure. CBM can be released by drilling into the coal seam, pumping out the water, thereby releasing the pressure and encouraging the gas to flow to the surface. In some cases various forms of stimulation such as fracking may be required to encourage gas flow. The escaping gas is then captured for use.

Methane is a relatively clean form of energy and can be used to generate electricity or provide heat for domestic and industrial purposes. Once extracted methane can be easily contained and safely used in many applications.

The exploration process is a phased, iterative process and includes the evaluation of all available data, the creation of geological models and culminates in the drilling of boreholes at identified target sites. Exploration for CBM requires an exploration right in terms of Section 79 of the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA).

The application for an exploration right was lodged with the Petroleum Agency South Africa in terms of regulations as set out in section 79, 80, 81 and 82 of the Mineral and Petroleum Resources Development Act, 2002. The Petroleum Agency South Africa (PASA) accepted the application on 02 September 2009 and required that public consultation be conducted and an environmental management programme be developed.

In accordance with the conditions defined by PASA, the results of the consultation with affected parties and the environmental management programme must be submitted to PASA on or before 14 January 2010.

### **3 METHODOLOGY**

#### **3.1 Terms of Reference**

Msix (Pty) Ltd undertake to meet the requirements of informing an environmental authorization decision from PASA for exploration for coal bed methane in the proposed exploration area. In accordance with Section 79, (4) of the MPRDA the applicant of an exploration right is required to submit an environmental management programme in terms of Section 39 of the Act. The EIA and EMP Reports are structured as a consolidated document and the results of the public consultation are included within this document. The EMP Report has been compiled in accordance with Section 39 of Act as well as the Draft Environmental Management Plan Guideline Document for Petroleum Exploration and Production (PASA, 2006).

#### **3.2 Environmental Impact Assessment**

This report was prepared in terms of legislation applicable to a project of this nature, i.e.:

- No. 28 of 2002: Mineral and Petroleum Resources Development Act (MPRDA)
- No. 36 of 1998: National Water Act (NWA)
- No. 107 of 1998: National Environmental Management Act (NEMA)
- No. 39 of 2004: NEMA: Air Quality Act (AQA)
- No. 45 of 1965: Atmospheric Pollution Prevention Act (APPA)
- No. 10 of 2004: NEMA: Biodiversity Act
- No. 84 of 1998: National Forest Act
- No 25 of 1999: National Heritage Resources Act
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The Environmental Impact Assessment (EIA) was performed through a desk top study utilising the following information:

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- Review of reports done for similar projects in other areas
- Review of existing environmental reports for the study area
- Environmental Potential Atlas data from the Department of Water and Environmental Affairs
- Integrated Development Plan of the District and Local Municipality
- Topo-cadastral, geological and soil maps covering the exploration area at scales ranging from 1:50 000 to 1:250 000
- Reference material as listed in Section 9 of this report

### 3.3 Public Consultation

The following methodology has been utilized:

#### 3.3.1 Identification of Interested and Affected Parties

As per the requirements of the MPRDA, Msix has undertaken to notify and consult with land owners and affected parties. Opportunities for interested and affected parties to register were created through advertisements and notices, as well as search title deed information and contact details. A background information document (BID) was developed which explained the locality, application and process being followed, this document was made available to interested and affected parties who registered. Registered interested and affected parties were also requested to note potential interested and affected parties that could/should be contacted as part of the process.

- **Advertisements and Notices:** Advertisements were placed in a local newspaper.
- **Searches on national databases for land owner contact details:** Additional to the advertisements and notices placed, the project team utilized national databases such as

the deeds office, Masters office, ITC, Cipro company database and others to obtain land owners contact details.

- **Written notices - Background Information Document:** A background information document (BID) explaining the project and the exploration right application process was compiled. The BID included a response sheet, which provided persons with the opportunity to register as IAPs and provide comment, raise issues and concerns and ask questions. The sheet also requested that the respondent list additional persons that might be interested in the project.
- **Telephone calls:** Where contact details were sourced, I&APs were called to send application information, BID and a request to register through to the parties.

### 3.3.2 Registration of IAPs

All I&APs that could be traced were registered on an I&AP database / list. All information regarding the application, availability of reports, etc is distributed to I&APs on this list.

### 3.3.3 Compilation of Issues and Responses

I&APs are invited to submit comments on the application, these issues and comments raised by Interested and Affected Parties are included in the Issues and Response table. If issues are received after the submission date of this report, these will be forwarded to the Agency.

### 3.3.4 Review of Draft Report

The draft Environmental Impact Assessment and Environmental Management Programme Report for the project is made available to all interested and affected parties for review in parallel to the submission of the document to PASA. Comments received on the report are forwarded to Petroleum Agency as an addendum.

## 4 PROJECT DESCRIPTION

The proposed exploration work programme will be carried out in 4 phases.

### 4.1 Location

The project farms are situated in the Eastern Cape Province, and falls within the registration district of Chris Hani District Municipal areas. Sterkstroom border the project north west of the area, and Queenstown borders the south eastern side of the project area.

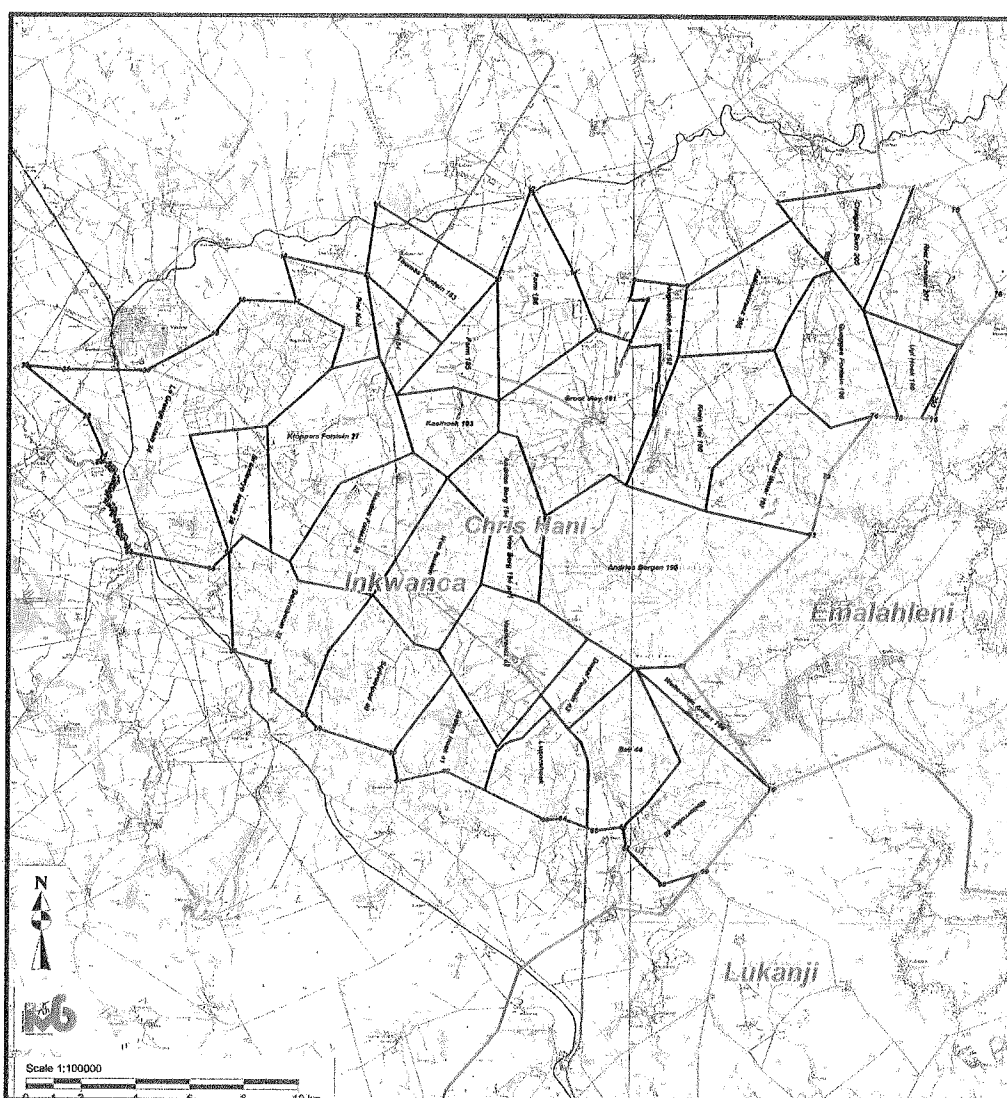


Figure 2: Application area

The major land use activities in the area are privately and communally owned with various farming activities. The surface ownership is attached as Annexure B.



## 4.2 Detailed Project Description

It is envisaged that the phases of work will consist of four phases:

- **Phase 1: - Desktop Study (Month 0—6):** Msix will acquire data from all test boreholes drilled by past prospectors in their search for coal. Once assembled, this information will be professionally analyzed and used to determine the quantum of additional data (gravity, seismic, borehole as appropriate), which may be required to effectively manage the technical development risk. Once the aforementioned data has been acquired the farms will be incorporated into the current Msix exploration work programme by:
  - Utilizing state of the art geology mapping software and generate subsurface maps that will spatially identify the thickness, gas content, rank, thermal maturity, ash content and permeability of the coals underlying the prospect.
  - Utilizing the maps to determine the ideal locations in which to drill five-spot test wells.
  - Completing this portion of the Exploration Work Programme within six (6) months of obtaining an Exploration Right.
  
- **Phase 2: - Five-spot test drilling (month 6 to 18):** With these maps in hand, Msix will further test the geological merit by drilling 'five-spot' test wells. In each of these five-wells, Msix will drill one well and if the first drilling proves to be viable, a further four (4) wells approximately 200 meters apart will be drilled, completing the five-spot test wells. These wells will be drilled using standard practices for wells drilled in coal-bed methane projects that are successfully producing. The applicant will:
  - Drill wells to a depth sufficient to penetrate all known coal seams
  - All wells will have diameters no less than 4 ¾ inches;
  - Msix will survey the coals using electric logs commonly used in the oil and gas industry;
  - Case the wells with steel lining;
  - Cement the casing into the drill hole
  - Perforate the lining in the highest quality coal seams;
  - Fracture stimulate the wells as needed;
  - Install pumping equipment to remove water from the wells; and
  - Install metering equipment to measure the volumes of water and methane produced from the wells.

Msix will then begin de-watering the coal in the wells carefully monitoring water and methane production in order to ascertain the level at which gas flows freely. Msix will carefully measure the amounts of methane and water produced from the wells and determines the commercial viability of the coal-bed methane of the application area. Msix

will complete this portion of the Exploration Work Programme within eighteen (18) months of obtaining an Exploration Right.

- **Phase 3: - Collation of Results and Evaluation (Month 18 to 24):** Msix will evaluate the results of previous phases.
- **Phase 4: - Pre-Feasibility and Feasibility (Month 24 to 36):** After completing the five-spot test evaluation, if Msix determines that the exploration area is capable of producing commercial amounts of coal-bed methane, Msix will embark upon a full-scale development project that will drill additional wells near the five-spot test wells. Msix will begin this development phase within six (6) months of completing its evaluation of the five-spot test wells and will continue until the prospect has been developed to a level that will sustain the designed production rate. Further drilling will take place to sustain the gas field draw down rate. The development wells will be drilled and completed using the same practices described above. However, Msix may determine that other technology may be useful in the development of the prospect and reserves the right to use any such technology that it finds useful. The intention of the exploration programme is that once wells drilled on the prospect lands are determined to be capable of producing methane in commercial quantities, converting the methane to liquids, generating electricity, or any other means of consumption which Msix may find commercial will be employed.

#### 4.2.1 Requirements during the Exploration Programme

- **Access to land:** Access will be negotiated on an ad hoc basis with the land owners involved as soon as potential target sites are identified. A written land access agreement will be signed between Msix and the land owner. The agreement will deal with the location and expected duration, access to the sites including possible additional access routes, right to drill boreholes and remove core, establishment of temporary structures, water use and consideration.
- **Personnel Requirements:** Drilling rigs will be managed by a site supervisor who would be simultaneously responsible for all drilling operations. The number of employees required to operate a drill rig is variable but is normally not more than 10 persons for a deep hole. The rig will be run on a double shift basis and will operate 24 hours a day.
- **Housing and Infrastructure Requirements:** Driller's accommodation is normally at a camp site adjacent to the drilling site and will be arranged on an ad hoc basis with the land owner. All access and accommodation on farms will be conducted in terms of a written agreement with the land owner. Tented or caravan accommodation is normal in South Africa for drillers. A local site office may be established in one of the areas convenient to

the exploration sites. However, most of the test work will be conducted from an on-site caravan or the samples will be transported to a laboratory. Drilling sites will, be accessed using existing farm tracks and roads where available. It may however, be necessary to create additional access routes to specific sites and this will be done in terms of a written agreement with the land owner.

- **Water Use:** The drilling activity will release groundwater which will be pumped to a storage dam. All other non-potable water requirements of the project will be supplied from this storage dam. Potable water will be obtained locally through an agreement with the land owner or brought to site via containers. Approximately 5 000 litres of water per day is envisaged to be the average water requirement per drilling site, if drilling conditions are reasonably good and the formation is solid. The water requirements are however dependent on the site specific conditions. If faults or cracks are encountered during drilling, significant increases in water losses could be expected for short periods of time. The water used in drilling forms a sludge which will be collected in a sludge pond for later disposal at an appropriately licensed facility. The daily water requirements for the operation of the drilling rig will fall within the water volumes permitted by the General Authorizations (No. 1191 in the Government Gazette No. 26187 published on 26 March 2004) issued by the Department of Water Affairs and Forestry for the taking of water from a resource. No water use license will thus be required for the exploration project.
- **Waste Management:** All waste generated at the drilling site will be collected in plastic or steel drums and removed from site and disposed at an appropriate waste facility. Hazardous waste will be collected and stored separately, and disposed of at an appropriate registered facility. Chemical toilets will be provided for the employees and the sewage disposed of at the nearest waste tip or sewage facility, or as required by the local authority.
- **Rehabilitation:** Msix will aim to rehabilitate all drill sites, access routes as well as temporary camp sites as close as possible to the condition pre-exploration, at all times complying with the land access agreement signed with the land owners.

Area	Action
Camp site	The area where the camp site was situated will be cleared of all foreign material, and the top soil will be restored where it was removed.
Access roads	All access roads will be restored where it was removed
Waste materials	All waste materials will be collected and stored in an appropriate

Area	Action
	manner. The containers will be removed off-site and disposed of at the nearest appropriate facilities.
Hazardous waste	All hazardous waste will be kept separate in appropriate containers. The containers will be removed off-site and disposed of at the nearest appropriate facility.
Plants & Vegetation	All plants and vegetation disturbed by the exploration activities will be re-established. This will include the areas where temporary accommodation was established, any access roads where the current roads were not sufficient, as well as any drilling site
Drilling wells	On completion of the drilling activities, boreholes with production potential will be sufficiently capped. Wells that do not have production potential will be sealed and closed
Drill site	The drill site will be cleared of all incidental chemicals, oils and other imported materials. The top soil will be repaired and vegetation will be re-established
Sludge	During the drilling operations, a sludge pond will be created. This pond will be pumped out and the sludge will be disposed of at the nearest appropriate waste facility.

### 4.3 Motivation for the Project

The District has a comparative advantage in agriculture (including forestry) and services (construction, retail trade services and community services). This is despite the strong growth in the finance, manufacturing and transport sectors.

The District economy is driven by the community services sector, trade (and services) sector and agriculture. The transport sector achieved the highest growth rate of 4.3% between 1996 and 2005, which is highly indicative of the strategic location advantage that the district enjoys in terms of rail and road transport, and as a distribution centre for the former Transkei area. The finance and trade sectors have also grown significantly at 3.8% pa and 3% respectively. Whilst the mining and electricity sectors experienced a negative growth, agriculture and manufacturing outputs have been positive although nominal.

CBM exploration efforts are strategically important in identifying and assessing potential sources of natural gas which could provide alternative energy sources to address South Africa's growing demand. In addition methane gas provides a cleaner form of energy than

coal and oil. Methane has a very low heat of combustion and produces more heat per gram than other complex hydrocarbons while giving off less carbon dioxide per unit of energy released.

Mining activities in South Africa have already resulted in and are still resulting in the release of large amounts of methane gas into the atmosphere. This is resulting in significant losses of an energy resource and the uncontrolled release of a greenhouse gas. Extraction of CBM prior to mining will enable this energy resource to be utilised and consequently reduce the emissions of greenhouse gases.

CBM gas can be used in many commercial and industrial applications, including but not limited to:

- Power generation (ESKOM or independent power producers);
- Town gas;
- Manufacture of fertiliser;
- Glass and metal manufacture;
- Sasol Synfuels;
- Steel Reduction; and
- Compressed natural gas.

## **5 DESCRIPTION OF THE AFFECTED ENVIRONMENT**

### **5.1 Regional Setting**

The farms are situated in the Eastern Cape Province. It falls within the magisterial districts of Wodehouse and Queenstown. Sterkstroom borders the project area on the south western side.

The proposed exploration area falls under Inkwanca Local Municipality, comprising of approximately 3583km<sup>2</sup> and is situated 60km north-west of Queenstown. The towns of Molteno and Sterkstroom comprise the urban component of the municipal area with Molteno being the administrative district.

### **5.2 Land Tenure**

The majority of the land within the exploration area is privately owned land. The title deed information obtained from the office of the Surveyor General was included with the exploration right application, submitted to PASA. Please consult this documentation for

detailed information pertaining to land tenure. A list of the land owners is attached as Annexure B.

### 5.3 Geology

#### 5.3.1 Geological Setting

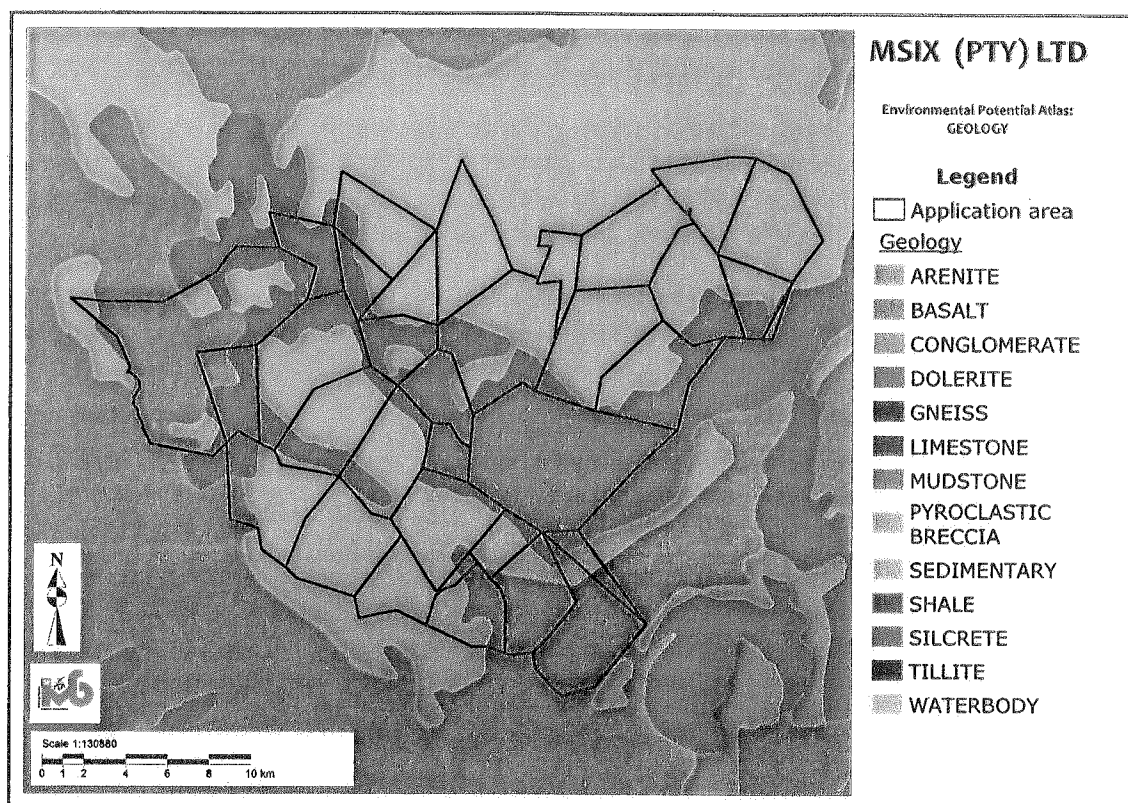


Figure 3: Geology

The surface geology of the proposed project farms consist mainly of Dolerite and Arenite with traces of Mudstone. See the map above.



### 5.5.2 Temperatures

Summer temperatures from 30 degrees C to an average minimum of 15 degrees C. Winter temperatures from 15C to as low as – 5C. The lowest ever temperature in South Africa was recorded in this municipality – 18,6 degrees Celcius. Extreme winter temperatures with snow is common is north-westly with southeasterly to south-westerly winds prevailing during winter months.

Climate trends associated with the Red Apedal Soils, indicates that an annual rain fall of 834 mm can be expected, while the small margin between a minimum of 804 mm and a maximum of 865 mm gives the impression that the average is a reliable statistic.

## **5.6 Topography**

Inkwanca municipality area is characterized by low lands with steep slopes and mountains in the north and north-west. Gradience range from approximately 1100m of Sterkstroom to 2200m in the Stormberg area. Slopes of less the 5% on 20% of the land in the Molteno area with more gentle slopes in the Sterkstroom Region, especially to the south.

The figure below shows that the top northern part of the proposed project area consist of irregular undulating lowlands with hills and the remaining section of lowlands with mountains.



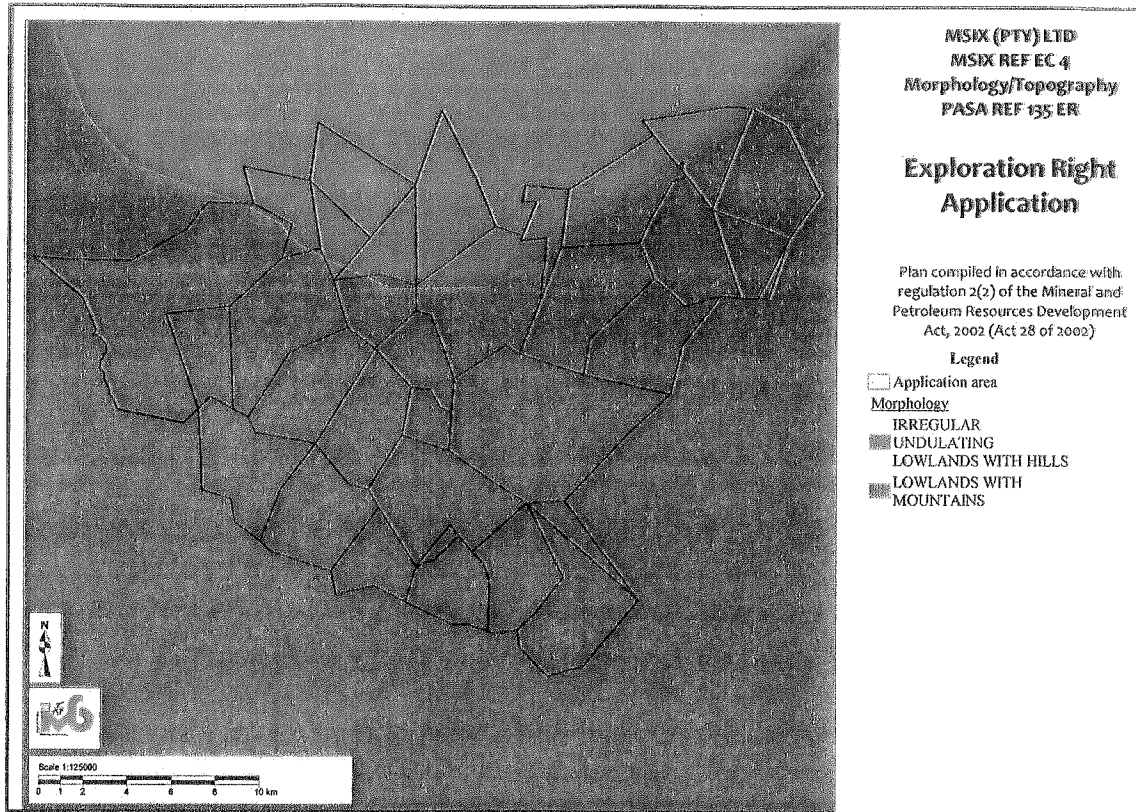


Figure 5: Topography

5.7 Land Use and Land Capability

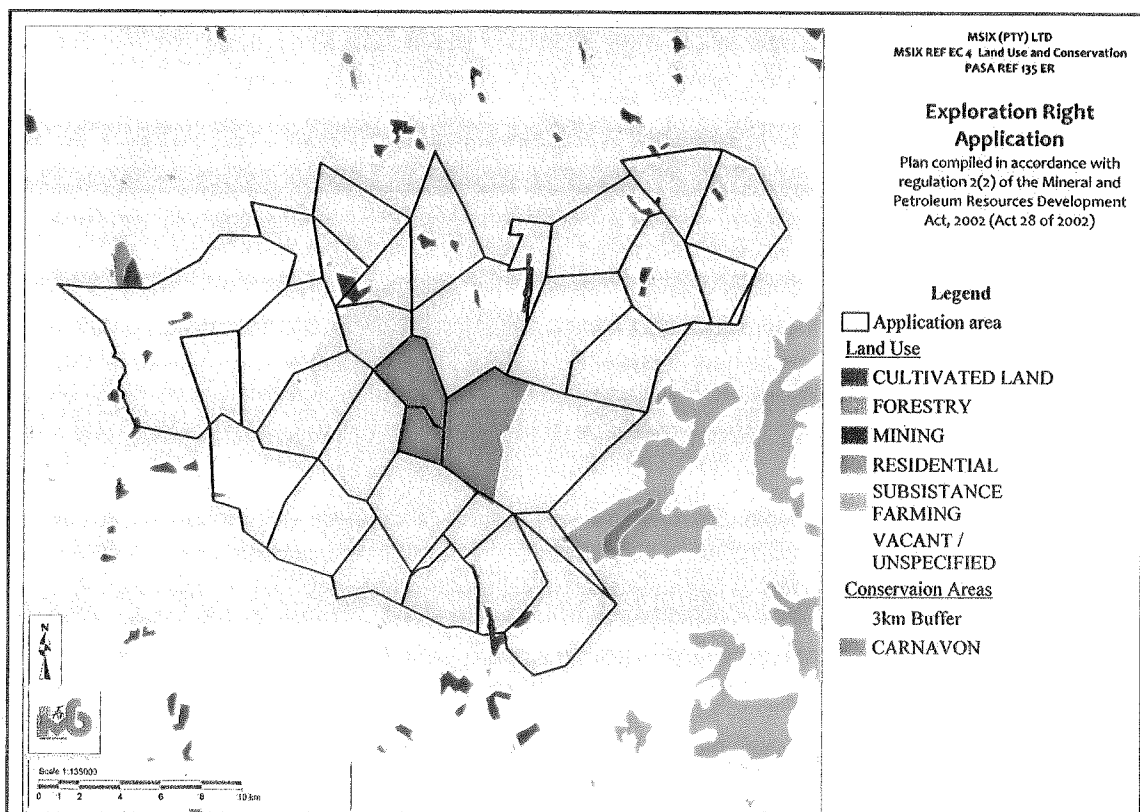


Figure 6: Land use

64% of land in the Eastern Cape is used for stock farming, including beef cattle, sheep, goats and game. Crops are farmed on 20% of the land and include maize, vegetables, pineapples and citrus. Commercial forestry makes up 5% of land use and only 1% of land is set aside for conservation. However, the ENPAT data indicates that majority of the project area is listed as vacant or unspecified land. Small scattered areas of cultivated land do exist, but from the data, it is evident that this is not a commercial agricultural area.

The North-Western portion of the Inkwanca municipal area, i.e. the area surrounding Molteno is generally classified as non-arable with limited potential.

## 5.8 Ecology

### 5.8.1 Vegetation

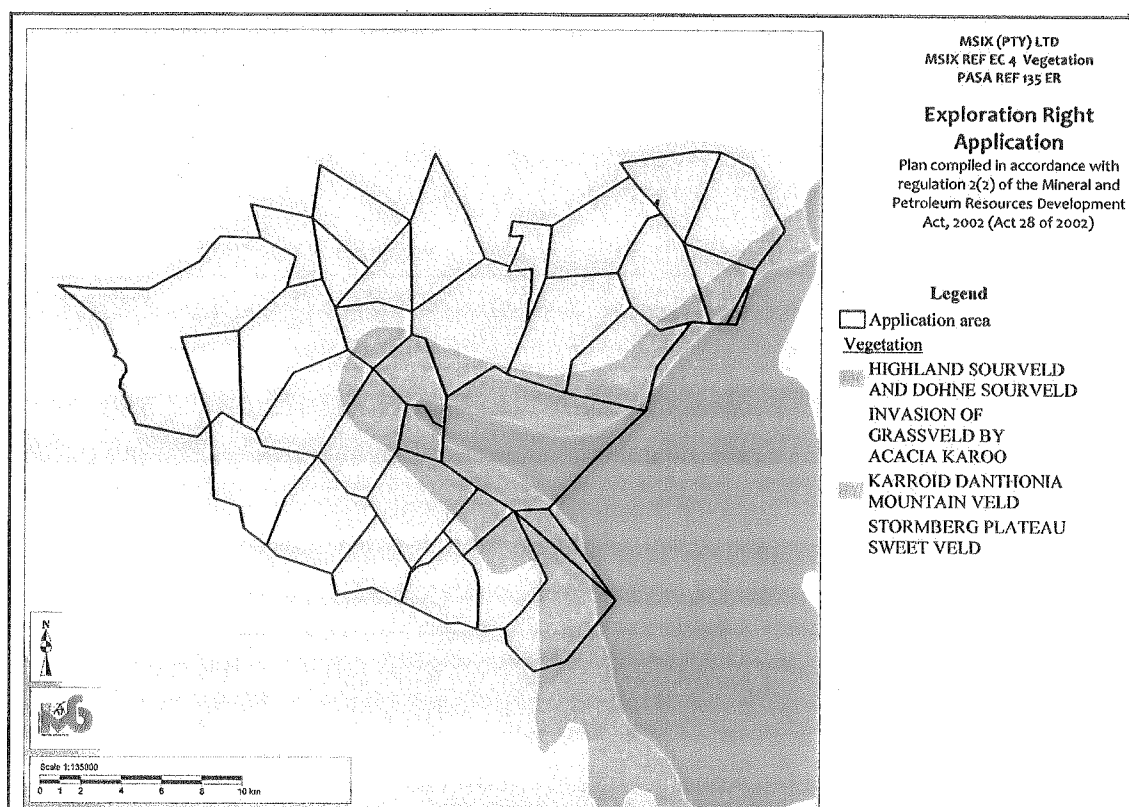


Figure 7: Vegetation types

The vegetation in the proposed exploration area consists mainly of grass veld areas invaded with acacia karoo. Some portions are made up of Karroid Danthonia Mountain veld with traces of highland sourveld and dohne sourveld, limited to the eastern part of the proposed exploration area.

### 5.8.2 Inkwanca Municipal area vegetation

Vegetation in the study area is typical of Grassland Biome, which is a characteristic on the high central plateau of South Africa. A single layer of grasses dominates grasslands; however, the amount of cover depends on rainfall and the degree of grazing. The study area is characterized by the South-eastern Mountain Grassland, which dominates most of the area, Subarid Thorn Bushveld and Moist Upland Grassveld in the southern region, Eastern Mixed Nama Karoo and Dry Sandy Highveld Grassland in the small portions of the northern region.

#### **SOUTH-EASTERN MOUNTAIN GRASSLAND**

**Key Environmental Parameters:** This sweet grassland type is important land owing to suitable winter grazing. However, injudicious, selective grazing can convert it to sourveld or result in the invasion of karriod of Fynbos elements.

**Economic Uses:** Mainly grazing for sheep and cattle.

#### **DRY SANDY HIGHVELD GRASSLAND**

**Key Environmental Parameters:** This grassland merges with the bordering Kalahari Thornveld to the west. Ackocks mapped the area west of Wesselsbron as Kalahari Thorveld, probably due to the sandy soils of Kalahari origin, but floristically and structurally the vegetation today is Dry Grassland.

**Economic Uses:** The erratic summer rainfall makes this a high-risk area for agronomy. Crops, such as maize, have replaced the grazing for which this area is better suited.

#### **EASTERN MIXED NAMA KAROO**

**Key Environmental Parameters:** The north east region of Eastern Mixed Nama Karoo is the only Karoo type in which fire is important in shaping the communities. This type has the highest rainfall of all the Karoo types and thus ecotonal to grassland. As a result it is very sensitive to grazing pressure and, depending on stocking density and rainfall conditions may resemble either grassland or Karoo.

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Economic Uses: It is too dry for crop production; however, this is the prime sheep and goat grazing area, producing much wool and meat. Irrigation along the Orange River is important; some of the dams on the range River occur in this vegetation type.

#### MOIST UPLAND GRASSLAND

Key Environmental Parameters: This vegetation type is often evident on disturbed, ploughed or heavily overgrazed and degraded sites, indicating the secondary status of many of the representative plant communities. Poor grazing management of these grasslands encourages unpalatable grasses and the invasion of herbaceous weeds.

Economic Uses: The area is mainly used for grazing, though crop farming (maize) and forestry are also important economic activities. Hiking trails are popular in the Eastern Cape.

#### SUBARID THORN BUSHVELD

Key Environmental Parameters: Fire and grazing are ecological processes within this vegetation type. This is summer rainfall grassland, which is invaded by Sweet Thorn Acacia Karroo.

Economic Uses: The economic uses of this vegetation are mainly grazing.

5.8.3 Fauna

## MAMMALS

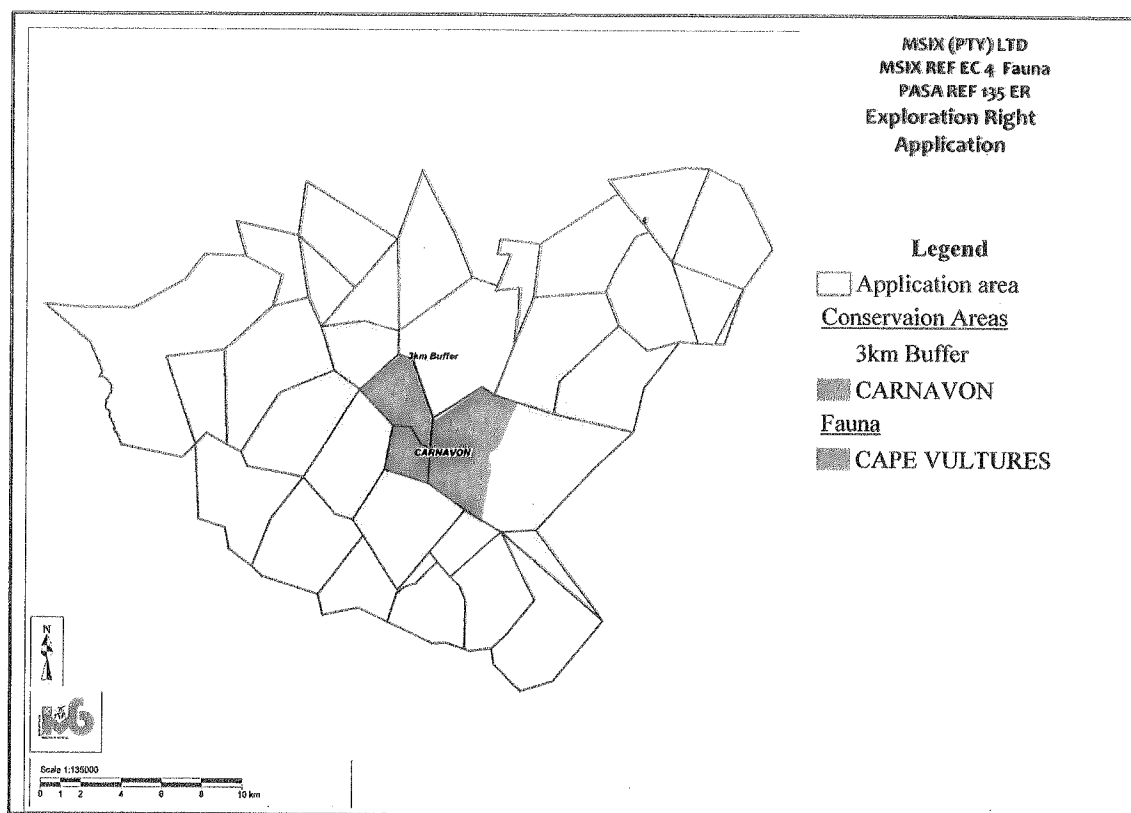


Figure 8: Sensitive Fauna

The list below consists of threatened large to medium sized mammals that might be present in the proposed application area. (Smithers, 1986)

Table 1: Species list

Latin Name	Name	Status
<i>Proteles cristatus</i>	Aardwolf	Rare
<i>Felis nigripes</i>	Black-footed cat	Rare
<i>Felis serval</i>	Serval	Rare
<i>Panthera pardus</i>	Leopard	Rare
<i>Philantomba monticola</i>	Blue duiker	Rare
<i>Mellivora capensis</i>	Honey badger	Vulnerable
<i>Felis lybica</i>	African wild cat	Vulnerable
<i>Orycteropus afer</i>	Aardvark	Vulnerable
<i>Manis temminckii</i>	Pangolin	Vulnerable

Latin Name	Name	Status
<i>Felis nigripes nigripes</i>	Small-spotted cat	Rare

Cape Vulture breeding areas are located within the application area.

## 5.9 Protected Areas and Sensitive Sites

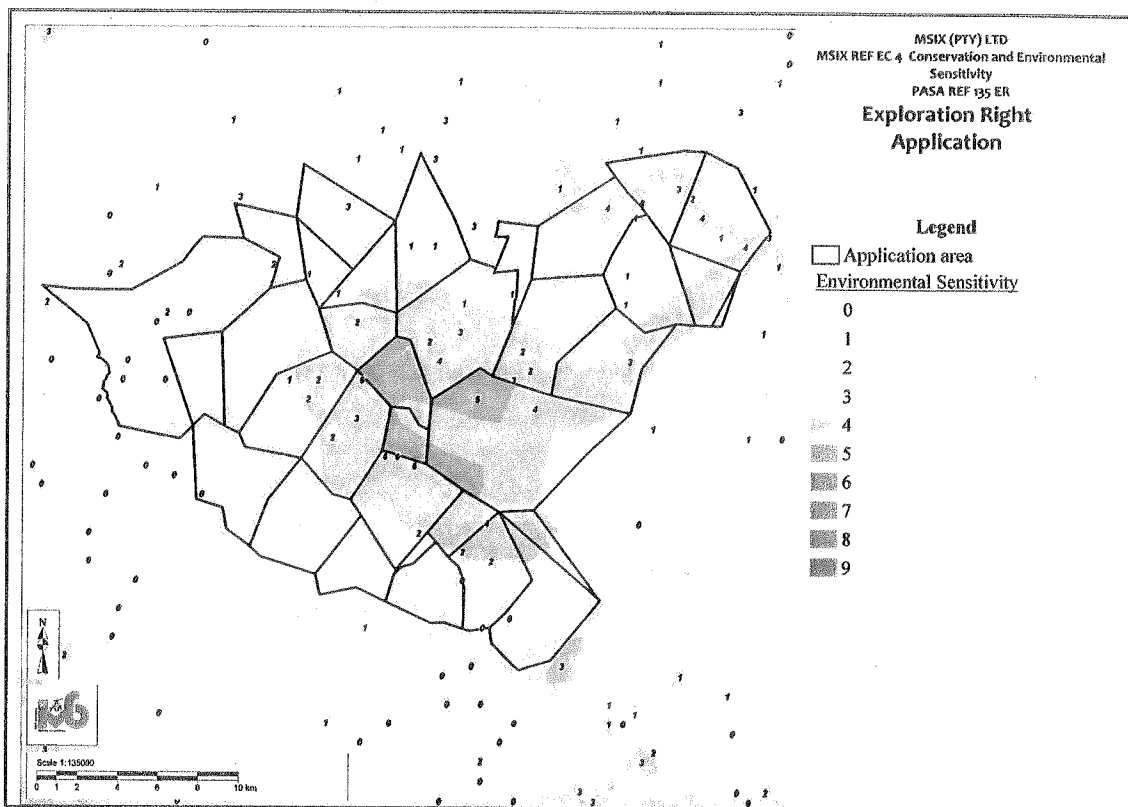


Figure 9: Site Sensitivity

The proposed exploration area falls within a low sensitivity area. Where sensitivity increases to 5 and 6 on the scale areas can be steer clear of in order to avoid these more sensitive areas. The central sensitive area has cape vulture breeding areas. This area will be avoided.

## 5.10 Surface Water and Rivers

The Colonial Office in London did not support these developments, and on 5 December 1836 the proclamation of the Province, as well as all treaties arising from it, were declared null and void, and the eastern frontier was returned to the Keiskamma River. Following the frontier war from 1846 to 1848, better known as the War of the Axe, the Ceded Territory was proclaimed the Division of Victoria on 23 December 1847, and on the same day the proclamation of British

Kaffraria pushed the Cape-Xhosa boundary line to the Great Kei River, thereby returning it to its position in 1836.

This was extended in 1848 by the annexation of additional territory between the White Kei and Black Kei Rivers (which runs through the western part of the proposed exploration area), later to become the Division of Queenstown.

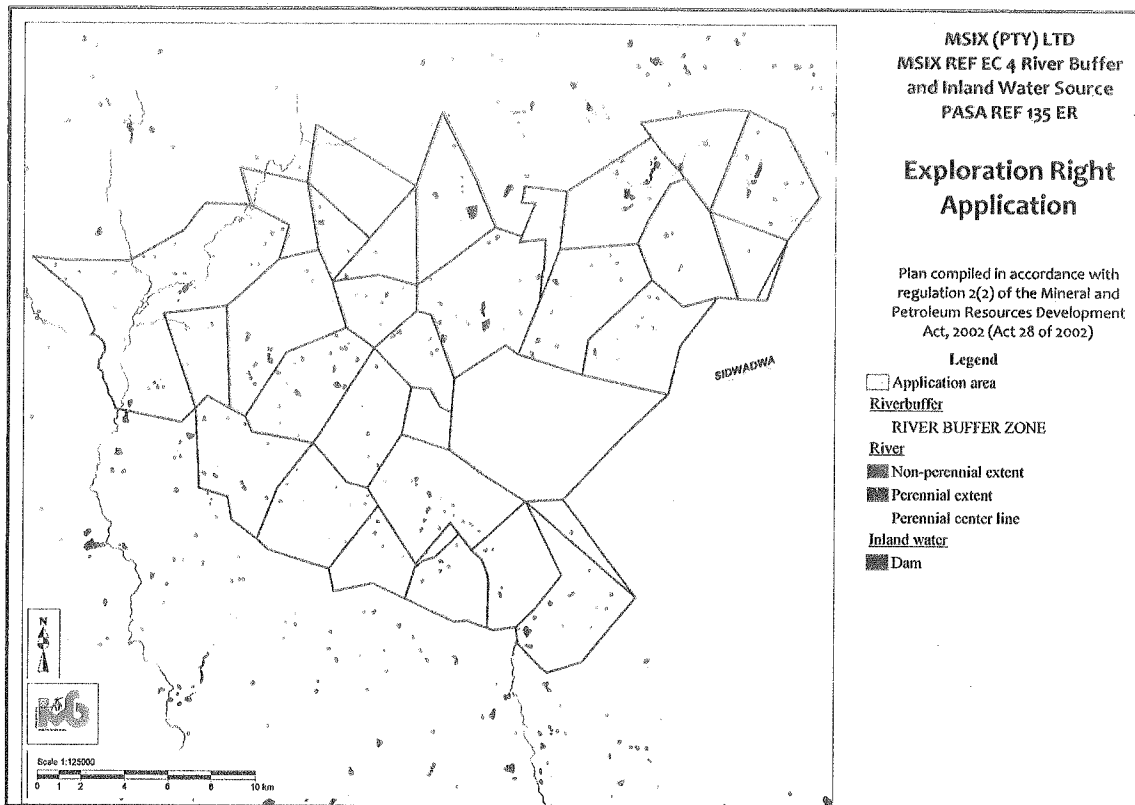


Figure 10: River Buffer Zones

There are no wetlands present on the proposed exploration area.

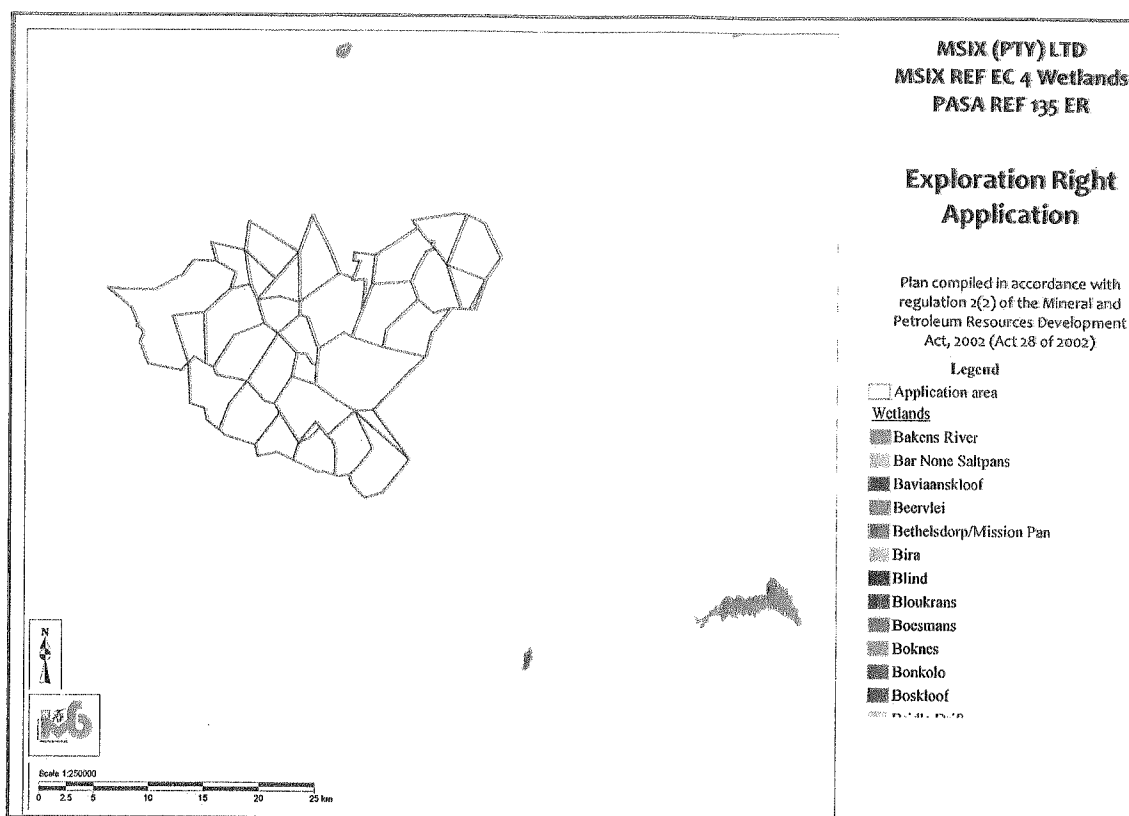


Figure 11: Wetlands in proposed exploration area

### 5.11 Air Quality

The Eastern Cape Province does not appear to be a priority area as far as air quality is concerned, as is evidenced by the number and type of industries in the Province. Monitoring of air quality in the Eastern Cape Province is performed on a fragmented basis as no co-ordinated monitoring network exists. Monitoring is currently concentrated in and around the Port Elizabeth area, as was recently started in the East London area as well. No comprehensive assessment of air quality in the Province is therefore possible. Where data exist, only very limited assessments of localised air quality could be done. Available data indicate that both sulphur dioxide and nitrogen dioxide levels in the Port Elizabeth area are below World Health Organisation guidelines (WHO, 1999). Monitoring of particulate matter in specific areas (Motherwell, Coega) has shown some exceedances of both South African and United States Environmental Protection Agency (US-EPA) guidelines. However, construction activities taking place in the vicinity of the monitoring could have contributed to this (Guastella, 2003).

### 5.12 Noise

Farms within the exploration area are mostly privately owned and generally quiet. No major noise sources apart from the general road traffic, was identified in the area.



### 5.13 Cultural Heritage

No known culturally significant areas exist within the project area. The map below indicates that a Cape Vulture colony does however within the project area.

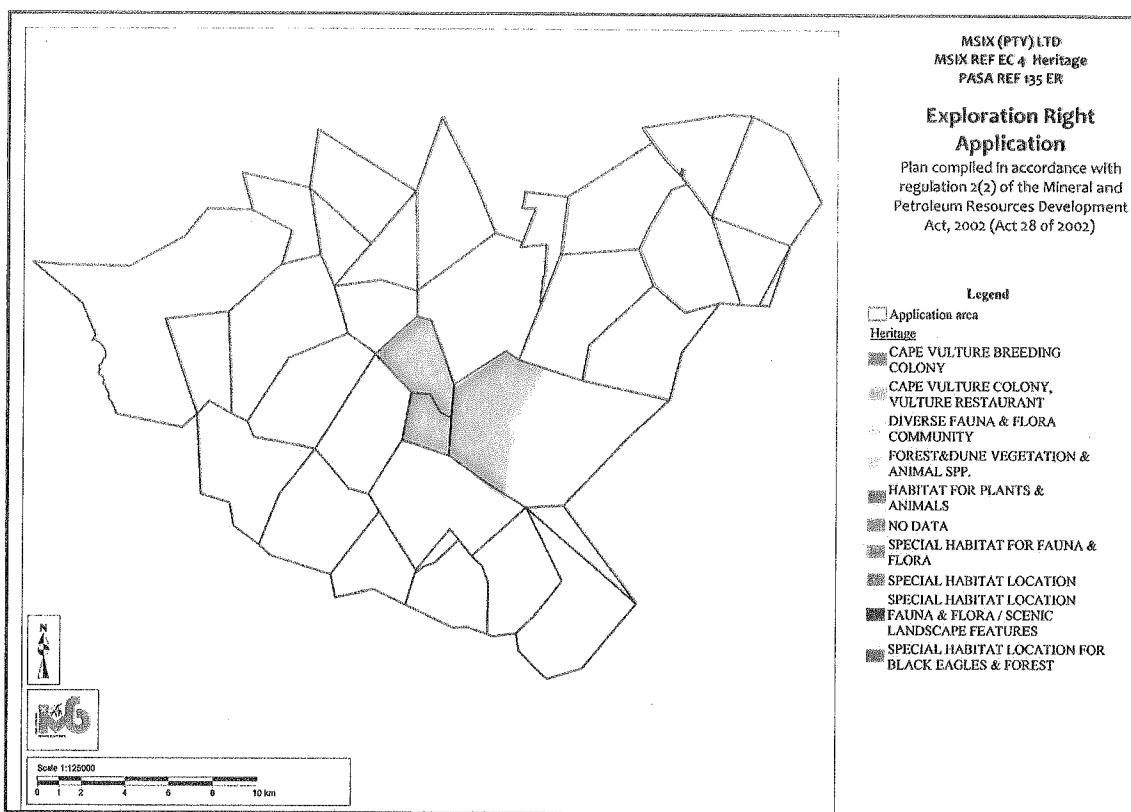


Figure 12: Heritage

### 5.14 Social and Economic Environment

The Eastern Cape Province represents an amalgamation of a number of areas, which previously had been artificially separated into three nominally independent sovereign states; the *Transkei* and *Ciskei* Republics, and the *Republic of South Africa*.

The project area is located in the north-eastern sector of the Eastern Cape.

The quality of life in rural villages is generally low. It is marked by poverty and a lack of access, services and amenities. It is characterized by the following:

- Most people are unemployed and rely on social grants and remittances from family members working elsewhere
- The economy revolves around the pension payment day every month
- Agriculture is restricted to a low-level maize production for own use

- Livestock is farmed in the traditional manner and not commercially. The livestock is of a low quality with little value. In most areas grazing land is overgrazed and invaded by alien vegetation.

Because of this, many families have resettled elsewhere in nearby towns, other larger urban centers in the Eastern Cape, Cape Town and Gauteng. However, this is not to say that they have given up their rural lifestyle. In many instances the link to the rural areas remains. In the rural areas of the former RSA, it is found that farm workers are forced off farms. They move to nearby towns. As most of them have cattle, it puts pressure on the Commonage of these towns, which has resulted in most towns having inadequate grazing on their Commonage.

The Inkwanca Local municipality plays a role in the proposed exploration area.

#### 5.14.1 Inkwanca Local Municipality

The Inkwanca Municipal Area, comprising approximately 3583<sup>2</sup>km is situated 60km north-west of Queenstown. The towns of Molteno and Sterkstroom comprise the urban component of the municipal area with Molteno being the administrative district.

The Inkwanca Municipal area is characterized by a large commercialized farm land with large scale cattle, sheep, goat and game farming. The area is suitable for this type of agriculture given its harsh climate conditions, rainfall and vegetation characteristics.

The rural population comprises a small portion of the total population in the study area and most of the residents are urbanized with high proportional urban population figures.

#### POPULATION /AGE

*Table 2: Population and Age statistics*

Age	Rural	Molteno	Nomonde	Masakhe	Sterkstroom	Total
0-9	813	277	1786	1131	119	4127
10-19	552	400	2437	1542	219	5151
20-55	1908	803	4030	2422	417	9580
56+	135	177	563	430	85	1389
<b>Total</b>	<b>3408</b>	<b>1657</b>	<b>8817</b>	<b>5525</b>	<b>840</b>	<b>20247</b>

Approximately 50% of the population is within the economic active group, aged 20 – 64. 17% of the population lives in the rural area, indicating high level of urbanization. Molteno has the

greatest population concentration, comprising approximately 50% of the total population or 10474..

*Table 3: Households and Population*

Category	Families	Population
Rural	1148	3408
Molteno	2569	10474
Sterkstroom	1758	6365
<b>Total</b>	<b>5475</b>	<b>20247</b>

Total of 5475 families reside in the study area. This constitutes an average family size of approximately 4 persons. Molteno represents the highest family sizes in the municipal area with the rural area the lowest at approximately 3 persons per family. Population distribution between the urban and rural area clearly demonstrates high level of urbanization and high level of commercial farming activities.

## **6 RESULTS OF PUBLIC CONSULTATION**

This section presents a summary of the issues that have been identified by stakeholders during the EIA process. Stakeholder consultation is an ongoing process and more issues are expected to be raised as the project progresses.

The application area includes 33 farms and covers an area of 43137.063 ha. With the help of the Deeds Office, the Masters Office, Cipro Company Registration as well as the different agricultural unions the information of the owners was sourced.

### 6.1.1 Identification of Interested and Affected Parties

As per the requirements of the MPRDA, Msix has undertaken to notify and consult with land owners and affected parties. Opportunities for interested and affected parties to register were created through advertisements, as well as search title deed information and contact details. A background information document (BID) was developed which explained the locality, application and process being followed, this document was made available to interested and affected parties who registered. Registered interested and affected parties were also requested to note potential interested and affected parties that could/should be contacted as part of the process.

#### ADVERTISEMENTS AND NOTICES

An advertisement was placed in the The Herald newspaper requesting potential interested and affected parties to register with the public participation office to obtain additional information. Please refer to Annexure C for a copy of the advertisements.

#### SEARCHES ON NATIONAL DATABASES FOR LAND OWNER CONTACT DETAILS

Additional to the advertisements and notices placed, the project team utilized national databases such as the deeds office, Masters office, ITC, Cipro company database and others to obtain land owners contact details. These contact details were called to make contact with land owners. In some cases this was successful in others the contact details were either old or incorrect.

#### WRITTEN NOTICES - BACKGROUND INFORMATION DOCUMENT

A background information document (BID) explaining the project and the exploration right application process was compiled. The BID included a response sheet, which provided persons with the opportunity to register as IAPs and provide comment, raise issues and concerns and ask questions. The sheet also requested that the respondent list additional persons that might be interested in the project. A copy of the Background Information Document is attached as Annexure D.

#### TELEPHONE CALLS

A number of potential interested and affected parties were contacted telephonically and informed of the project. Parties were then forwarded the BID in order for them to register as interested and affected party.

#### 6.1.2 Registration of IAPs

Details of all persons and organizations that were contacted and to who information was made available are included in the IAP database/list. Those whom returned the response sheet were registered as IAPs and receive further information regarding the project. Please refer to Annexure E for details.

#### 6.1.3 Compilation of Issues and Responses

Issues and concerns relating to the application for an exploration right for coal bed methane in the application area have been captured by means of discussions brought about by the Background Information Document made available, advertisements placed and telephonic conversations held with I&APs. Theses issues and comments raised by Interested and Affected

Parties are included in the Issues and Response table attached as Annexure E. The above mentioned situation is evident in the issues that have been raised:

- Job opportunities
- Impacts on Groundwater sources
- Impact on land use activities
- Bush clearing and impact on environmental sensitive areas

## 7 ENVIRONMENTAL IMPACT ASSESSMENT

### 7.1 Potential Impacts

#### 7.1.1 Geology and topography

It is highly unlikely that drilling into, and extracting a small core from, the coal seams will impact on the geological strata in any significant manner. The boreholes will be sealed with cement following completion of drilling.

#### 7.1.2 Soils, land use and land capability

The potential impact of the proposed mining operation on the existing soils, land capability and land use are described collectively. Given the short duration (3 weeks per hole) and limited extent (1,000 m<sup>2</sup>) of the exploration drilling, the impact is likely to be low estimated to be low and of local extent.

It is important however to note that exposed soil is often prone to erosion by water and the necessary attention to rehabilitation of disturbed areas will be given after completion of the drilling at each position. Re-vegetation of exposed areas for long-term dust and water erosion control is commonly used and is the most cost-effective option. Plants used for re-vegetation should be indigenous to the area, hardy, fast-growing, nitrogen-fixing, provide high plant cover, be adapted to growing on exposed and disturbed soil (pioneer plants) and should easily be propagated by seed or cuttings. Prior to drilling the topsoil will be stripped and stockpiled in a dedicated area for use during rehabilitation after completion of drilling. Incidental hydrocarbon spillages could potentially impact on the soils and the necessary procedures for rehabilitation will be put in place. The soils in the working areas and along access roads will be compacted through vehicle movement, and will be ripped after drilling is completed.

### 7.1.3 Biodiversity

Damage or destruction of the vegetation, habitat and the loss of plant and faunal species of conservation concern could result from exploration activities. However, given the short duration (3 weeks per hole) and limited extent (1,000 m<sup>2</sup>) of the exploration drilling, the impact is likely to be low estimated to be low and of local extent. The following important principles will however be applied with site selection:

- No site within 50m of any drainage line, 100m of a major stream / river
- No sites within sensitive areas such as wetlands
- 50m from large trees

Poaching of fauna and flora will be prohibited and the importance of conserving the natural resources will be communicated to the employees on a regular basis. Thus, provided that sufficient rehabilitation is performed after drilling, the impact on the biodiversity is considered to be low and of low significance.

### 7.1.4 Surface and groundwater resources

The main potential impacts of exploration activities on surface and water include the contamination of the resource(s) as a secondary impact resulting from soil contamination or erosion. Since the primary impact is considered to be moderate to low and easily mitigated, there is no major concern that the exploration activities will result in any significant risk to water resources.

Water use will be limited to the possible extraction of water from existing boreholes for the operation of the drilling rig. The amount of water extracted will be limited and not in contravention of the conditions defined in the General Authorisation issued by the Department of Water Affairs and Forestry (No 1191 published in the Government Gazette no. 26187 dated 26 March 2004).

Drilling will create a small connection between geological strata that may be a conduit for water movement. This is unlikely to have a residual impact as unsuccessful boreholes will be sealed with cement. Successful exploration boreholes that are to be revisited will be lined, and any water carrying zones sealed off, thereby preventing the transmission of ground water from upper aquifers to those lower in the sequence and especially from those in the coal seams.

No exploration activities must be allowed within 100m of the main streams and rivers, or within 50m of any other drainage line (non- perennial tributaries).

#### 7.1.5 Air quality

The impact on air quality and air pollution of fugitive dust is dependent on the quantity and drift potential of the dust particles (USEPA, 1996). Large particles settle out near the source causing a local nuisance problem. Fine particles can be dispersed over much greater distances. Fugitive dust may have significant adverse impacts such as reduced visibility, soiling of buildings and materials, reduced growth and production in vegetation and may affect sensitive areas and aesthetics. Fugitive dust can also adversely affect human health. Sensitive receptors include landowners, farm workers and local communities.

Potential sources of dust include the drilling process, increased vehicle movement on unpaved roads. Dust emission will vary from day to day depending on the level of activity, and the prevailing meteorological conditions. However, as drilling is a wet process, minimal impact is expected. Thus, given the short duration and low level of activity expected during exploration, no significant adverse impacts are anticipated on the sensitive receptors. Impact of fugitive dust emissions on employees on site could however be significant and the necessary protective equipment must be provided to employees.

The release of gas from exploration boreholes is of concern if the boreholes are not sealed sufficiently on completion of drilling. Boreholes that are to be used for further investigation are to be capped when there are no drilling activities taking place. Boreholes not to be used in the future are to be sealed, with a significant impermeable cement seal which ensures that no gas will escape.

#### 7.1.6 Ambient noise

Typical noise rating levels produced by a drill rig varies between 87 and 92 dBA. According to SANS Code of Practice 10103:2004, "The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, Annoyance and Speech Communication", it is highly probable that the noise is annoying, or otherwise intrusive to the community, or a group of persons, if the rating level of the ambient noise under investigation exceeds the residual noise by 7 dBA or more. Sensitive receptors include landowners, farm workers, and local communities.

### 7.1.7 Heritage and cultural resources

Provided that all known heritage resources are avoided and clearly demarcated (fenced) to prevent any damage, there will be no impact associated with the exploration activities. In the unlikely event that heritage resources are encountered during drilling, the exploration activities will be ceased immediately and the incident reported to an approved archaeologist for his advise.

### 7.1.8 Socio-economic aspects

Positive impacts of the exploration project will include the creation of employment and the stimulation of the local economy through the purchase of supplies. These impacts will be of low significance as employment opportunities are limited and temporary and would have a minimal impact on the development of the local and regional economies. The potential negative impacts associated with the exploration project include:

- Impact on land use activities
- Communities – noise, dust
- Poaching
- Fire creation

**Msix is a historically disadvantaged company entering the Gas exploration industry. The shareholders and board of directors consist of HDSA's and women entering the gas exploration industry. Although the company is new in the industry, they are utilising a network of specialists to mentor and advise on the aspects of gas exploration to ensure their further skills development and secure establishment as a business in the industry. The company, being an HDSA and women owned and controlled company believe in the development of HDSA and especially women in the mineral and petroleum industries through mentorships, procurement opportunities, skills development, career-path development and talent management programmes.**

## **7.2 Risk Assessment**

The system used for ranking of the risks associated with the proposed exploration project is outlined below:

#### **EXTENT**

Site:	Impact limited to drill site
Local:	Impact limited to site and surrounding area
Region:	Impact affecting broader area



**DURATION**

Short-term: Impact only present over short term, e.g. during exploration

Long-term: Impact only present over long-term (permanent)

**PROBABILITY OF OCCURRENCE**

Low: Unlikely that impact will occur

Medium: Impact may occur

High: Impact will definitely occur

Undefined: Cannot be determined

**IMPACT SIGNIFICANCE**

None: Hardly any discernable impacts to occur

Low: Small impact or disturbance over a small area

Medium: Limited impact expected and / or disturbance over a small area

High: Detrimental impact expected and / or disturbance over a large area

*Table 4: Risk assessment table*

Nature of Impact	Extent	Duration of Impact	Probability of Occurrence	Significance	
				Without Mitigation	With Mitigation
Geology and Soils	Site	Short-term	Low	Low	None
Land Use and Land Capability	Site	Short-term	Medium	Low	None
Fauna and Flora	Site	Short-term	High	Low	None
Hydrology / Surface Water	Local	Short-term	Medium	Low	None
Geohydrology	Local	Short-term	Medium	Low	None
Air Quality	Local	Short-term	High	Medium	Low
Noise	Local	Short-term	High	Medium	Low
Heritage and Cultural Resources	Site	Short-term	Low	Low	Low
Socio-Economic	Region	Short-term	High	Medium	Low

## 8 ENVIRONMENTAL MANAGEMENT PROGRAMME

### 8.1 Environmental Objectives

#### 8.1.1 Operational (short-term) objectives

- To limit erosion and impact on the topsoil
- To prevent impact on the biodiversity in the area
- To prevent the deterioration of water quality
- To prevent impacts to cultural and heritage resources
- To limit the impact on landowners and surrounding communities

#### 8.1.2 Long-term (post-exploration) objectives

- To rehabilitate disturbed areas to sustainable end land use, as close as possible to the original conditions
- Promote the rapid re-establishment of natural vegetation and restoration of site ecology

### 8.2 Environmental Management Plan

The Environmental Management Plan (EMP) is a tool that will facilitate appropriate environmental management during the exploration project and describes the environmental management measures required to minimise the environmental impacts.

Every effort will be taken by the Contractor(s) to minimise the impact of their exploration activities on the environment and on the affected parties. Should the Contractor(s) be in non-compliance with any of the forthcoming Environmental Management Measures and/or Procedures, a detailed motivation for non-adherence to the requirement must be compiled, based on a detailed risk assessment. The alternative management measures proposed by the Contractor (s) must be detailed and the potential impact quantified.

### 8.2.1 Topsoil conservation

- Topsoil will be removed prior to drilling and placed on a dedicated stockpile area within the working area.
- Topsoil will be placed separately from overburden (subsoil and rocky material).
- Strip and stockpile herbaceous vegetation, overlying grass and other fine organic matter along with the topsoil.
- Store stripped topsoil in an approved location and in an approved manner for later reuse in the rehabilitation process.
- Topsoil will be used for rehabilitation of the sump area as well as the drilling area after completion of drilling.

### 8.2.2 Storm water and erosion controls

The Contractor shall take reasonable measures to control the erosive effects of storm water runoff and shall take all reasonable measures to limit erosion and sedimentation due to the construction activities:

- The Contractor shall implement appropriate measures (berms, drains, trenches) to prevent overland flowing water from causing erosion.
- Any erosion channels developed during the exploration period or during the vegetation establishment period shall be backfilled and compacted, and the areas restored to the pre-construction condition or to a condition better than the pre-construction condition.
- Stabilisation of cleared areas to prevent and control erosion shall be actively managed. The method of stabilisation shall be determined in consultation with the Site Manager.
- Traffic and movement over stabilised areas shall be restricted and controlled, and damage to stabilised areas shall be repaired and maintained to the satisfaction of the Site Manager.
- Design slopes aimed at the prevention of soil erosion, of efficient storm water control, of the eventual re-establishment of vegetation and of ultimately achieving aesthetically acceptable landscapes.
- Plan for cut and fill slopes not exceeding a gradient of 1(V):3(H) wherever possible. In general, slopes steeper than 1(V):3(H) or slopes where the soils are by nature dispersive or sandy, must be stabilised.

- Re-establish grass cover as soon after topsoiling as soon as possible to prevent the erosion of the limited amounts of topsoil organic matter, clay and silt.

### 8.2.3 Contaminated water

The Contractor will set up a contaminated water management system, and a Method Statement is required in this regard. The Method Statement will state the collection facilities, which are to be used to prevent pollution, as well as the method of disposal of the contaminated water.

- All water management systems (clean and dirty water) will be designed for the 1:50 year flood event to prevent dirty water spillages from the dirty water system to the clean water system and visa versa.
- Contaminated water may under no circumstances be released to the natural environment.

### 8.2.4 Sensitive landscapes

- No exploration activities (including drilling, vehicle movement and sumps) may take place within a distance of 100m from any water resource or wetland area. No activities will take place within 50m of any floodplain areas or drainage lines.
- Access into wetland areas or other sensitive landscapes will be prevented by ensuring access remains on demarcated road systems.
- Training and awareness programmes must be implemented as part of the overall HSEC strategy to all employees and subcontractors regarding the importance and protection of sensitive environments and adherence to the EMP.

### 8.2.5 Fauna and flora

- No poaching or undue destruction of fauna and flora will be allowed.
- Natural trees, shrubs and grass species will be retained as far as possible.
- The works area will be limited to an area of 1,000m<sup>2</sup>. No natural vegetation outside the works area will be damaged.
- The Contractor will control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes.
- Fires during autumn and winter should be controlled.
- A philosophy of limited interference would apply to the remaining natural areas, as well as the rehabilitated areas. Vehicle movement will be restricted to existing roads or along the boundaries of cultivated fields.

### 8.2.6 Noise

- The Contractor shall limit noise levels, e.g. install and maintain silencers on machinery.
- Construction activities shall be conducted during daylight hours only (normally between 06h00 and 18h00 Mondays to Fridays), unless under special circumstances in which case the permission of the landowners must be obtained.
- Noise zones (during construction and operational phases) will be clearly demarcated by means of signs at the entrance and exit to the noise zone. Workers within a noise zone will be required to wear personal protective equipment (PPE) such as ear plugs.

### 8.2.7 Dust

- The Contractor shall take all reasonable measures to minimize the generation of dust as a result of exploration activities.
- Appropriate dust suppression measures shall be used when dust generation is unavoidable, e.g. dampening with water/spray trucks.
- Erosion control measures such as intercept drains, contour bank canals, grassed waterways and toe berms would be implemented where required.
- During drilling and rehabilitation activities, the necessary PPE must be provided to the employees.
- Mitigation measures that will be applied to vehicles include adherence to all road regulations, e.g. speed limits and ensuring headlights are on all the time to increase visibility.

### 8.2.8 Cultural and historical resources

- Ensure the awareness of employees and subcontractors on the importance of protecting natural and cultural heritage resources.
- Under no circumstances shall archaeological or palaeontological objects or material be destroyed, damaged, excavated, altered, defaced or otherwise disturbed without the necessary permits.
- Identified heritage resources will be avoided and clearly demarcated and fenced to prevent any damage.
- Regular visit to these sites will be included in the environmental monitoring programme to establish any impacts on the identified sites. In the case of any

impacts, appropriate mitigation measures must be established and implemented immediately.

- Should any archaeological or palaeontological objects or material be detected during the exploration activities, this will be reported to the Site Manager immediately.
- Exploration activities must stop immediately when finding cultural and historical resources.
- Any findings will be reported immediately to an archaeologist, who will then provide further guidance on any additional requirements.

#### 8.2.9 Rehabilitation

- After completion of the exploration activities, the disturbed areas will be shaped (levelled), ripped, treated and re-vegetated as soon as possible.
- The final rehabilitated area will be designed such as to ensure a free-draining landform.
- All disturbed (and other specified) areas associated with the exploration activities, including temporary access routes and roads, compacted during construction must be ripped and/or scarified.
- Do not rip and/or scarify areas under wet conditions, as the soil will not break up.
- Allow for a maintenance period of one year following practical completion, unless otherwise specified.

#### 8.2.10 Socio-economic issues

Socio-economic mitigation measures during the exploration project will include the following:

- Employ local residents wherever possible.
- Ensure that the drivers of exploration vehicles adhere to traffic regulations.
- Ensuring that all contractors are aware of the location of all service infrastructure (such as pipeline, electricity transmission & distribution lines, etc.) and heritage resources and that such infrastructure is not disturbed or damaged.
- Limit exploration activities to daylight hours and to weekdays.
- Agreement with the landowners will be reached on access and compensation procedures prior to entering on their sites.

Msix is a historically disadvantaged company entering the Gas exploration industry. The shareholders and board of directors consist of HDSA's and women entering the gas exploration industry. Although the company is new in the industry, they are utilising a network of specialists to mentor and advise on the aspects of gas exploration to ensure their further skills development and secure establishment as a business in the industry. The company, being an HDSA and women owned and controlled company believe in the development of HDSA and especially women in the mineral and petroleum industries through mentorships, procurement opportunities, skills development, career-path development and talent management programmes.

#### 8.2.11 Health and safety

- The Mine Health and Safety Act, 1996 (Act 29 of 1996) will apply during the exploration project and the contractor will develop a suitable and sufficiently documented health and safety plan prior to commencement of the project.
- Exploration will be managed with the express intention of preventing accidents from happening, but will have emergency facilities available in the event of an accident occurring. An emergency contingency plan will be developed by the contractor and implemented during exploration.
- Drilling will be limited to daylight hours.
- A list of contact numbers and their relatives will be kept in the site office in case of emergency.
- A first aid kit will be kept on site.

#### 8.2.12 Fire prevention

- Fire fighting equipment, including fire-extinguishers and fire beaters, are to be kept at both the drilling and camp sites.
- Contact details of the landowners (including neighbouring farms), as well as the local fire department must be kept at both the drilling and camp sites.
- The making of fire for cooking, warmth or any other purposes, except in the demarcated eating area at the camp site, is to be prohibited.
- An emergency procedure will be developed in conjunction with the landowners and the local fire department – also refer to Emergency Procedures for surface fires in section 8.4.1.

### 8.2.13 Ablution facilities

- Chemical toilets will be provided by the Contractor on the drilling and camp sites.
- Washing facilities (showers) will be provided by the Contractor at the camp site.
- The exact location of the toilets shall be approved by the Site Manager prior to establishment.
- All portable toilets shall be secured to the ground to prevent them toppling over due to wind.
- The contractor must ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site.
- Discharge of waste from toilets into the environment is strictly prohibited.
- Drinking and washing water must be available close to the toilets.

### 8.2.14 Camp site

- A camp site will be established on the farm where drilling takes place. No other camp sites may be established without the prior permission of the Site Manager or the landowner.
- The Contractor will designate an appropriate eating area for his employees at the camp site.
- Chemical toilets will be provided by the Contractor at the camp sites.
- Washing facilities (showers) will be provided by the Contractor at the camp site.
- The Contractor will provide sufficient waste bins with lids at the camp site – also refer to Waste Management Procedure in section 8.3.3.
- Fire fighting equipment, including fire-extinguishers and fire beaters, are to be kept at the camp sites.

## **8.3 Environmental Procedures**

### 8.3.1 Handling, use and storage of materials

The Contractor will ensure that any delivery drivers are informed of all procedures and restrictions (including "no go" areas) that need to be complied with on site. The Contractor will ensure that these delivery drivers are supervised during off-loading by someone with an adequate understanding of the requirements of the site procedures.



Materials will be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to sand, stone chip, fine vegetation, refuse, paper and cement, will have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor will be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.

All manufactured material will be stored within the Contractor's camp, and out of the rain. All lay down areas outside of the construction camp will be subject to the Site Engineer's approval.

Hazardous chemical substances used during construction will be stored in secondary containers. The relevant Material Safety Data Sheets (MSDS) will be available on Site. Procedures detailed in the MSDS will be followed in the event of an emergency situation. For potentially hazardous substances that are to be stored on site, the Contractor will provide a Method Statement detailing the substances/materials to be used, together with the storage, handling and disposal procedures of the materials.

### 8.3.2 Hydrocarbon management

Hydrocarbons (petrol, diesel, oils/lubricants) must be managed in the following manner:

- All oil and other petroleum products must be stored in a bunded area with a containment capacity of the product being stored plus 10%.
- Decanting facilities must be available for decanting purposes at all times. Decanting facilities must be bunded appropriately to prevent spillages. Decanting must be done in such a way that no spillages occur whilst filling or emptying any containers. All portable diesel bowsers shall be used, filled, pumped, emptied, decanted and transported in such a way to prevent spillages of any kind.
- The maintenance of any petroleum liquid (e.g. oil, petrol and diesel) and grease supply pipes must be done in such a manner as to prevent any spillages to the environment.
- All machines, equipment and tanks (including mobile compressors and diesel bowsers) that have got the potential to leak oil shall be inspected and kept in good condition at all times. Leaking equipment will be repaired immediately or removed from the Site.
- Drip trays will be provided for stationary plant (such as compressors) and for "parked" plant (such as diesel bowsers, vehicles).
- The handling of drip trays and management of volume of oil levels in drip trays will be such that they will not overflow into the environment. If any spillages of oil did occur,

it shall be cleaned immediately after the spillage occurred. Also refer to Spill Management Procedure in section 8.3.4.

- Under no circumstances will the selling of empty drums for other uses be allowed.

### 8.3.3 Waste management

The Contractor will take full responsibility for the management of waste in his/her area of responsibility and that the waste management procedure as described below is implemented effectively. He/she will ensure that no littering or illegal disposal of waste takes place in his/her area of responsibility and that all employees and/or subcontractors reporting to him/her are aware of the waste management procedure and are adequately trained to implement the procedure.

The following classifications of waste will be used during the exploration project:

- General waste – compactable and non compactable
- Hazardous (hydrocarbons / chemicals) waste
- Sewage effluent (chemical toilets)

The general and hazardous waste streams will be segregated and disposed of in appropriate designated receptacles. All waste will be disposed off-site, including sewage effluent at approved landfill sites or sewage works (chemical toilets).

General principles for the management of waste include:

- No on-site burying, dumping or burning of any waste materials, vegetation litter or refuse shall occur.
- All solid waste shall be disposed of off site at appropriate landfill sites.
- Appropriate waste disposal facilities will be provided on site. These will be removed on a regular basis.
- The disturbed areas will be cleared of all rubble, rubbish and unused products on an ongoing basis.
- Hydrocarbons and/or chemicals required during the drilling will be stored in secured bunded areas. Accidental spillages will be cleaned as per the guidelines stipulated in the Material Safety Data Sheet (MSDS) of the spilled product.
- All used oil generated on site shall be pumped to appropriate storage tanks for removal and safe disposal and/or recycling.
- Suitable spill kits and absorbent materials shall be available at all times for the containment and clearing of any spills.

- In the event of spillage or pollution the incident must be reported immediately to ensure prompt action is taken.
- Any chemicals shall be disposed of as stipulated in the particular product's MSDS. This includes the destruction of containers if prescribed.

#### 8.3.4 Spill management

##### DEFINITIONS

- Minor Risk Incident - Minor spills are those which can be controlled, contained and cleaned up with the help of the people on site. Minor effects on biological or physical environment. Minor short to medium term damage to small area of limited significance.
- Major Risk Incident - Significant spills are those in which human hazard is evident, the spill cannot be contained and / or has led to contamination of a water resource and / or other sensitive location e.g. drain. Moderate short to medium term damage, widespread with some impairment of ecosystem function, possible fire hazard, explosion or danger to health.
- Emergency - Means an accidental situation involving the release or imminent release of dangerous goods or other substances that could result in serious adverse effects to the health and/or safety of persons or the environment. An emergency may be the result of human cause or natural occurrences including, but not limited to, process upsets, controlled reaction, fires, explosions, threats, structural failures, floods, storms, etc.
- Dangerous Goods - Means goods that include explosives, compressed and liquefied gasses, flammable and combustible materials, as well as radioactive materials.
- Hazardous Substance - Includes any toxic, harmful, corrosive, irritant or asphyxiate substance, or mixture of such substance for which an occupational exposure limit is prescribed, or which could create a hazard to human health or the environment.
- MSDS - Means Material Safety Data Sheet of the product or substance

##### SPILL MANAGEMENT PROCEDURE

###### Minor Risk Incident

- Assess the situation and determine the hazard and extent of the spill, taking into account the quantity of the spillage and the danger of the substance. Refer to MSDS of the substance spilled to identify hazard.

- Contact the Site Manager, detailing the substance, quantity, severity, location and possible environmental impact.
- Demarcate the area where the substance was spilled.
- Contain the spill with the correct control measures i.e. sand, spill-sorb, bunding, spill-kits, etc. Refer to the MSDS of the substance spilled for correct handling and control of the spill.
- The Site Manager must contact the relevant person(s) to attend to the situation.

#### Major Risk Incident or Emergency

- Assess the situation and determine the hazard and extent of the spill, taking into account the quantity of the spillage and the danger of the substance. Refer to MSDS of the substance spilled to identify hazard.
- Raise the alarm and evacuate the area.
- Contact the Site Manager, detailing the substance, quality, severity, location and possible environmental impact.
- Demarcate the area where the substance was spilled.
- If possible try to contain the spill with the correct control measures i.e. bunding, etc. Ensure not to endanger anyone or yourself by doing this. Refer to MSDS of the substance spilled for correct handling and control of the spill.
- The Site Manager must contact the relevant person(s) to attend to the situation.

### **8.4 Environmental Emergency Plan**

An environmental incident is defined as “an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed”.

Some environmental emergencies have been identified that could during the exploration project, in the event of which immediate remedial action must be undertaken, namely:

- Occurrence of surface fires, including veld fires.
- Compromising of dirty water management structures such as berms.
- Hydrocarbon spills or leaks from machinery on the surface.

#### 8.4.1 Surface fires

In the event of a fire, the procedure to be followed is provided in Section 18 of the National Veld and Forest Fires Act, 1998 (Act 101 of 1998). The said Act provides for the

notification of relevant affected parties, access to land on which a fire is burning for the purpose of extinguishing it, and requires that the fire protection officer of the area be informed, as well as those of surrounding areas to which the fire may spread. An emergency procedure will be developed in conjunction with the landowners and the local fire department to ensure in the event of a surface fire, the requirements of the National Veld and Forest Fires Act will be met.

#### 8.4.2 Compromising of surface or groundwater protection measures

All compromised berms and other surface or groundwater protection measures will immediately be repaired and stabilised to avoid further contamination of clean areas with dirty water and the impacts associated therewith. Also refer to Spill Management Procedure in section 8.3.4.

#### 8.4.3 Hydrocarbon spills or leaks from machinery

All areas affected by spills of hydrocarbons will be remedied immediately. Soil rehabilitation by land farming, or other means will be initiated immediately, and the necessary measures will be taken to ensure that pollution of surface water and groundwater does not occur. Also refer to Spill Management Procedure in section 8.3.4.

### **8.5 Environmental Awareness**

The successful implementation of the EMP is dependent on training and awareness of all personnel working on the drilling site. The environmental awareness plan aims at:

- promoting general environmental awareness amongst all employees;
- informing all personnel of environmental policies, procedures and programmes applicable to the exploration activities;
- providing general training on the implementation of environmental management actions; and
- providing job specific environmental training to ensure the protection of the environment.

The environmental awareness training programme will include:

Aspect	Output	Responsibility	Timeframe
Formal appointment of Project Environmental Officer	Appointment	Msix Project Manager	2 months prior to commencement of on site activities
Identification of environmental risks associated with each job	List of environmental risks per job category	Project Environmental Officer	1 month to prior commencement of on site activities
Preparation of detailed Environmental Emergency Procedures and Environmental Code of conduct	Environmental Code of conduct  Environmental Emergency Procedures	Project Environmental Officer	Prior to exploration project start-up
Environmental induction of new employees Induction to include: Typical and specific environmental risks Emergency Procedures (Spillage of a fuel, oil, lubricant or any other chemical substance, surface fires)	Induction manual  Proof of induction completed per employee	Project Environmental Officer	Prior to commencement of exploration  Ongoing for each new employee appointed
Signed Emergency Procedures and Code of conduct by all inducted employees	Signed copy of documents on HR file	Project Environmental Officer  Human Resource Manager	Ongoing for each new employee appointed
Training on the implementation of emergency procedures where necessary	Proof of training conducted	Project Environmental Officer  Human Resource Manager	Prior to on site activities and thereafter once per month for the duration of the exploration

Aspect	Output	Responsibility	Timeframe
			programme
Job specific training on addressing specific job-related risks and emergencies	Proof of training conducted	Project Environmental Officer  Human Resource Manager	On arrival of new employees and thereafter once per month for the duration of the exploration programme
Conduct monitoring checks and audits on employees' knowledge and performance of environmental risks and emergencies	Monitoring & Audit checklists  Completed checklists	Project Environmental Officer  Project Manager	Monitoring checks – once per month Audit – Once every three months

## 8.6 Environmental Monitoring and Auditing

Internal environmental inspections / audits will be performed on a monthly basis to ensure compliance with this EMP. In the event that there is any non-compliance, an action plan to rectify the situation will be developed in conjunction with the Contractor and implemented as per the stipulated timeframes. Management of the action plan will be documented and are therefore auditable during the annual EMP performance assessment.

Assessment of the rehabilitation undertaken and the performance against this EMP will be by all stakeholders, namely the Site Manager, the drilling contractor and the surface owner and will be done immediately after drilling operations was ceased on site. This assessment will be documented and signed-off by all parties.

Annual external audits will be performed by a qualified environmental specialist, which will be submitted to the Petroleum Agency SA, and will serve the purpose of the required EMP performance assessment.

## 8.7 Roles and Responsibilities

The Contractor will be fully responsible to ensure compliance with this EMP. He/she will report directly to the Site Manager.

The Site Manager (CoAL representative) is a qualified geologist, with the express capability of managing a project of this nature and complexity. It will be his responsibility to ensure that the Contractor complies with the requirements of this EMP, and that the environmental monitoring and auditing are performed as stated in section 8.6.

## 9 FINANCIAL PROVISION

The amount that is necessary for the rehabilitation of damage caused by the exploration activities for both pre-mature and final closure is estimated below. For the pre-mature closure estimate an assumption was made that at any particular time a maximum of one drill site will be active. Rehabilitation of drilling sites will be ongoing as part of the exploration activities and a similar assumption is therefore applicable to final closure. The quantum for both pre-mature and final closure would therefore be the same, the calculation of which is given below.

*Table 5: Rehabilitation Calculation*

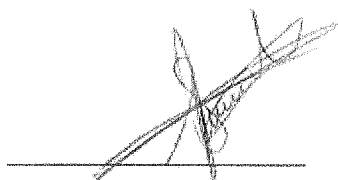
Activities	Unit	Quantity	Rate	Cost
<b>Drill Sites</b>				
Sealing of boreholes with concrete	Boreholes	5	R 200.00	R 1,000.00
Contouring & ripping of levelled areas	m <sup>2</sup>	200	R 3.00	R 600.00
Remediation of contaminated soil	m <sup>2</sup>	50	R 90.00	R 4,500.00
Seeding	m <sup>2</sup>	100	R 2.00	R 200.00
Disposal of wastes				R 2,000.00
<b>Access Roads</b>				
Ripping of compacted areas	m <sup>2</sup>	300	R 3.00	R 900.00
Seeding	m <sup>2</sup>	300	R 1.00	R 300.00
<b>Camp Sites</b>				
Removal of infrastructure				
Ripping of compacted areas	m <sup>2</sup>	200	R 3.00	R 600.00
Seeding	m <sup>2</sup>	200	R 1.00	R 200.00
<b>Management Costs</b>				R 0.00
Rehabilitation management	Hrs	18	R 350.00	R 6,300.00
<b>Monitoring and Maintenance</b>				
Follow-up monitoring	Hrs	8	R 350.00	R 2,800.00
Physical weed removal	Labourer	2	R 150.00	R 300.00
Planting / seeding, application of fertilizer	m <sup>2</sup>	300	R 1.00	R 300.00
<b>Total (excl VAT)</b>				<b>R 20,000.00</b>



**10 UNDERTAKING**

I, Gabriel Amos, the undersigned and duly authorised thereto Msix (Pty) Ltd, have studied and understand the content of the environmental management programme and hereby duly undertake to adhere to the conditions as set out therein including any amendments approved by the Petroleum Agency SA, as well as the requirements of the Mineral and Petroleum Resources Development Act (No 28 of 2002) and the regulations thereto.

Signed at Pretoria this 14<sup>th</sup> day of January 2010.



GABRIEL NELSON AMOS

Designation: DIRECTOR

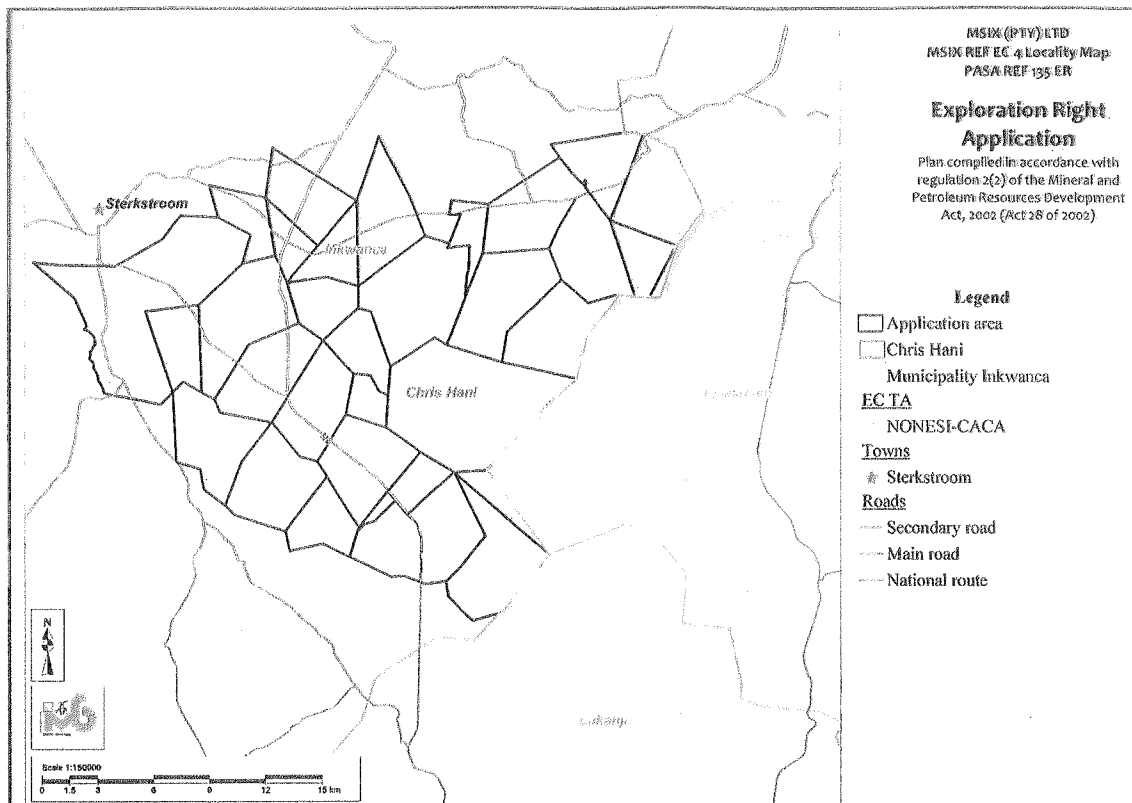
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# ANNEXURE A: LOCALITY MAP AND APPLICATION AREA



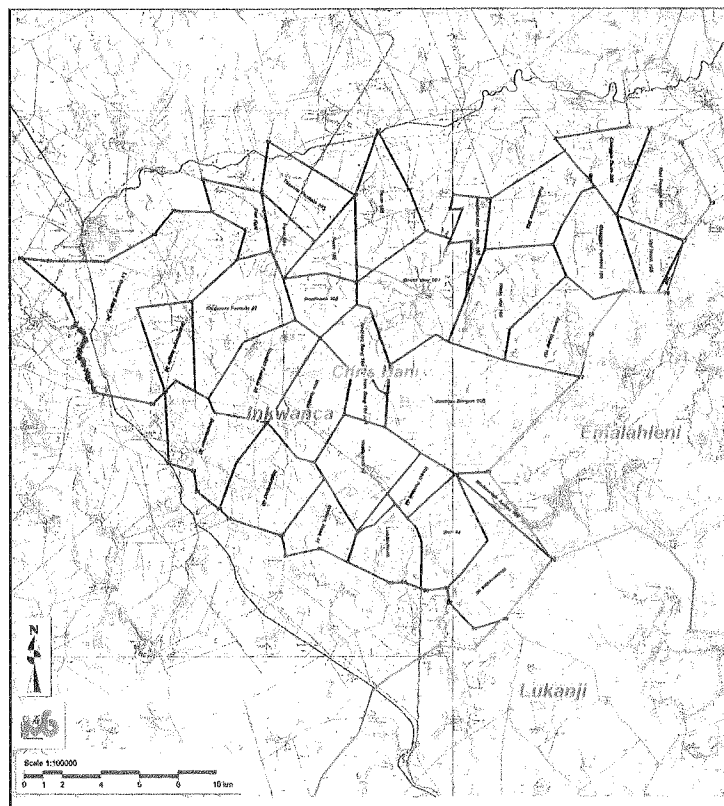
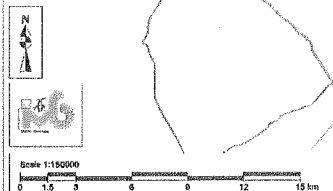
MSIX (PTY) LTD  
MSIX REF EC 4 Locality Map  
PASA REF 135 ER

**Exploration Right Application**

Plan compiled in accordance with regulation 2(2) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)

**Legend**

- Application area
- Chris Hani Municipality Inkwanza
- ECTA NONESI-CACA
- Towns
  - \* Sterkstroem
- Roads
  - Secondary road
  - Main road
  - National route



MSIX(PTY) LTD  
Application for Exploration: Natural Gas.  
MSIX REF EC4

Plan compiled in accordance with regulation 2(2) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)

REY	CAT	LOW	REY	CAT	LOW
31	308203732	26 823235536	41	31 614370135	26 547371353
31	308045691	26 845047365	42	31 614655546	26 546411864
31	31336787	26 80581130	43	31 615931608	26 540237407
31	313097421	26 811025231	44	31 617646388	26 549003607
31	31374488	26 770817528	48	31 618818209	26 540462820
31	31392377	26 79000701	49	31 621397608	26 531676215
31	313932503	26 74838348	47	31 62302052	26 531787029
31	314028737	26 73581182	48	31 623898287	26 531787029
31	314071237	26 749141308	48	31 624187142	26 532710647
31	314086878	26 73670688	50	31 625371303	26 53231888
31	314107026	26 72654564	51	31 626970614	26 534959769
31	314227821	26 716111888	52	31 62903397	26 532531524
31	314242351	26 89778428	51	31 63013887	26 531784188
31	314408888	26 85079182	54	31 63088888	26 54008803
31	314480856	26 448937712	53	31 642323238	26 538885582
31	314519184	26 8148384	58	31 65088448	26 53088632
31	314708560	26 819877120	57	31 67533888	26 611601027
31	3148442191	26 348877327	58	31 68089788	26 62847428
31	314851688	26 38881114	59	31 6823708	26 62847428
31	314887888	26 38748208	60	31 68236827	26 651715528
31	314904440	26 33984372	61	31 70482816	26 60007681
31	314923317	26 313128784	62	31 70128321	26 67828316
31	314948227	26 338786572	63	31 71692847	26 71692847
31	314978802	26 34492128	64	31 71682819	26 73273047
31	3150615047	26 34944574	65	31 72044644	26 735071640
31	315082378	26 34492128	66	31 73185514	26 74114493
31	316038077	26 347121212	67	31 73813812	26 74833252
31	3160427892	26 348811228	68	31 73781388	26 74221782
31	3160508473	26 34844888	69	31 73932007	26 73780782
31	3160822302	26 449237470	70	31 746707628	26 604816860
31	3160822302	26 449237470	71	31 74882844	26 73884828
31	3160822302	26 449237470	72	31 74882844	26 73884828
31	3160822302	26 449237470	73	31 74882844	26 73884828
31	3160822302	26 449237470	74	31 74882844	26 73884828
31	3160822302	26 449237470	75	31 74882844	26 73884828
31	3160822302	26 449237470	76	31 74882844	26 73884828
31	3160822302	26 449237470	77	31 74882844	26 73884828
31	3160822302	26 449237470	78	31 74882844	26 73884828
31	3160822302	26 449237470	79	31 74882844	26 73884828
31	3160822302	26 449237470	80	31 74882844	26 73884828
31	3160822302	26 449237470	81	31 74882844	26 73884828
31	3160822302	26 449237470	82	31 74882844	26 73884828
31	3160822302	26 449237470	83	31 74882844	26 73884828
31	3160822302	26 449237470	84	31 74882844	26 73884828
31	3160822302	26 449237470	85	31 74882844	26 73884828
31	3160822302	26 449237470	86	31 74882844	26 73884828
31	3160822302	26 449237470	87	31 74882844	26 73884828
31	3160822302	26 449237470	88	31 74882844	26 73884828
31	3160822302	26 449237470	89	31 74882844	26 73884828
31	3160822302	26 449237470	90	31 74882844	26 73884828
31	3160822302	26 449237470	91	31 74882844	26 73884828
31	3160822302	26 449237470	92	31 74882844	26 73884828
31	3160822302	26 449237470	93	31 74882844	26 73884828
31	3160822302	26 449237470	94	31 74882844	26 73884828
31	3160822302	26 449237470	95	31 74882844	26 73884828
31	3160822302	26 449237470	96	31 74882844	26 73884828
31	3160822302	26 449237470	97	31 74882844	26 73884828
31	3160822302	26 449237470	98	31 74882844	26 73884828
31	3160822302	26 449237470	99	31 74882844	26 73884828
31	3160822302	26 449237470	100	31 74882844	26 73884828

PROPERTY DESCRIPTION:  
Province: Eastern Cape  
District: Chris Hani  
Municipality: Inkwanza  
Registration Division: Sterkstroem

Figure 3 to 7F indicate the application area - refer to the attached documents for farm names  
The total extent of the pleered mine area is 43137,063 ha

MSIX (PTY) LTD Date:

- Legend**
- Application Area
  - \* Coordinate text
  - Farm bit
  - District municipalities
  - Local municipalities

# ANNEXURE B: LIST OF LAND OWNERS

Property	Registered Owner	Contact person
Andries Berg 194	National Government of Republic of South Africa	Regional Manager
Andries Bergen 195	Republiek van Suid-Afrika	Regional Manager
Andries Bergen 195	National Government of Republic of South Africa	Regional Manager
Annan Water 197	Republiek van Suid-Afrika	Regional Manager
Annan Water 197	Mzukisi Witness Jack	MZ Jack
Brandewyn leegte 28	Ian David Hansen	ID Hansen
Craigie Burn 200	Sophia Maria Creese	SM Creese
Craigie Burn 200	Herculaas Frederick Venter Kruger	HFV Kruger
Craigie Burn 200	Sophia Maria Creese	SM Creese
Craigie Burn 200	Herculaas Frederick Venter Kruger	HFV Kruger
Dell 44	Daniel Wentzel	D Wentzel
Dell 44	Unknown	
Doornboom 32	Unknown	
Dwaal Fontein 43	Daniel Wentzel	D Wentzel
Farm 184	Marthinus Johannes Steyn Jordaan	MJS Jordaan
Farm 185	Marthinus Johannes Steyn Jordaan	MJS Jordaan
Farm 186	Arthur Charles Creese	AC Creese
Farm 186	National Government of Republic of South Africa	Regional Manager
Farm 186	Transnet Ltd	Property Manager
Farm 186	Groot Vley Trust	The Trustee
Farm 260 Uys	Christopher Roy Callaghan	CR Callaghan
Groot Vley 191	National Government of Republic of South Africa	Regional Manager
Groot Vley 191	Groot Vley Trust	The Trustee
Hughenden Annex 192	Stephanne Trust	The Trustee
Hughenden Annex 192	Herculaas Frederick Venter Kruger	HFV Kruger
Kaalhoek 193	Jan du Plessis	J du Plessis
Kalkoenkrantz 266	Stephanus Phillipus Oelofse	SP Oelofse
Ketters Hoek 41	Van Vuuren Familietrust	The Trustee
Ketters Hoek 41	Nicholas Jacobus Corbett	NJ Corbett
Klein Vlei 190	Stephanne Trust	The Trustee
Klein Vlei 190	Merino Walk Trust	The Trustee
Kloppers Fontein 27	Border Workshop cc	PF Ernest
Kloppers Fontein 27		A de Beer
Kloppers Fontein 27	Oelofse Petrus Johannes-Trust	The Trustee
Le Grange Estate 24	Unknown	
Lusernhoeek 436	Hennie Wentzel	H Wentzel
Naudes Fontein 38	Unknown	
Piet Kuil	Border Workshop cc	Petrus Frederik Ernest
Quaggas Fontein 198	Quaggasfontein Trust	The Trustee
Quaggas Fontein 198	Smaldeel Trust	The Trustee
Quaggas Fontein 198	Hebron Trust	The Trustee
Riet Fontein 201	Sophia Maria Creese	SM Creese
Riet Fontein 201	Bloukrans Trust	The Trustee
Stylvoetpad 40	Selborne Trust	The Trustee



Property	Registered Owner	Contact person
Stylvoetpad 40	Marius Grobbelaar Corbett	MG Corbett
Stylvoetpad 40	Izak Johannes van Heerden	IJ van Heerden
Thomas Fontein 183	Transnet Ltd	Property Manager
Thomas Fontein 183	Schilderkrantz Trust	The Trustee
Thomas Fontein 183	Marthinus Johannes Steyn Jordaan	MJS Jordaan
Uyl Hoek 199	Christopher Roy Callaghan	CR Callaghan
Vaal Krantz 42	Nicholas Jacobus Corbett	Redvers Dixon Peverett
Weltevrede Annex 196	Wilfred James King	WJ King
Weltevreden 45	Hermanus Geyer	H Geyer
Weltevreden 45	Stefanus Jordaan Corbett	SJ Corbett
Wen fontein 39	Hennie Wentzel	H Wentzel
Wen fontein 39	Chulayo Maria Malepola	CM Malepola

# ANNEXURE C: ADVERTISEMENTS AND NOTICES

**APPLICATION FOR EXPLORATION RIGHT  
PUBLIC PARTICIPATION PROCESS**

Notice is given, in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002), for the "*Consultation with the landowners or lawful occupiers of the land and any other interested and affected party, which is the subject of the application*".

**PROPONENT:** Msix (Pty) Ltd

**PROJECT:** Msix Gas Exploration Rights

**REGISTRATION DIVISION:** Queenstown, Wodehouse

**AFFECTED FARMS:** Andries Berg 194, Andries Berg 194 pt 1, Andries Bergen 195, Annan Water 197, Brandewyn leegte 28, Craiggie Burn 200, Dell 44, Doornboom 32, Dwaal Fontein 43, Farm 184, Farm 185, Farm 186, Farm 260, Groot Vley 191, Hughenden Annex 192, Kaalhoek 193, Kalkoenkranz 266, Kettters Hoek 41, Klein Vlei 190, Kloppers Fontein 27, Le Grange Estate 24, Lusernhoeck, Naudes Fontein 38, Piet Kuil 26, Quaggas Fontein 198, Riet Fontein 201, Stylvoetpad 40, Thomas Fontein 183, Uyl Hoek 199, Vaalkrantz 42, Weltevrede Annex 196, Weltevreden 45 and Wen fontein 39

Land owners, lawful occupants and interested and / or affected parties are given the opportunity to access more information on the proposed activities and to give comments. Please submit your name, contact information and comments and/or requirements in writing to:

Msix (Pty) Ltd  
PO Box 13509, Sinoville, 0129  
Ms Fransis de la Rosa  
Tel: (012) 543 9093  
Fax: (012) 543 9610  
E-mail: [fransis@naledidev.co.za](mailto:fransis@naledidev.co.za)

***Background Information Documents available on request***

Ref: EC4M6

# CERTIFICATE OF PUBLICATION

Newspaper House  
19 Baakens Street  
Port Elizabeth 6001

Tel: 041 - 504 7911  
Fax: 041 - 586 2927



Tel: 041 - 504 7911  
Fax: 041 - 586 3315  
041 - 582 1794

Telegrams "Newhouse"

We certify that the attached advertisement appeared in the issue of  
The Herald/Weekend Post dated 8 December 2009

**Legals**

**APPLICATION FOR EXPLORATION RIGHT PUBLIC PARTICIPATION PROCESS**

Notice is given, in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002), for the "Consultation with the landowners or lawful occupiers of the land and any other interested and affected party, which is the subject of the application".

**PROPOSER: Msix (Pty) Ltd**

**PROJECT: Msix Gas Exploration Rights**

**REGISTRATION DIVISION: Queenstown, Woodhouse**

**AFFECTED FARMS:**

Andries Berg 194, Andries Berg 194 pt 1, Andries Bergen 195, Annan Water 197, Brandewyn Hoegte 28, Craigie Burn 200, Dell 44, Doornboom 32, Dwaal Fontein 43, Farm 184, Farm 185, Farm 186, Farm 260, Groot Vley 191, Hughtenden Annex 192, Kaalhoek 193, Kalkoenkranz 266, Kettlers Hoek 41, Klein Vlei 190, Koppers Fontein 27, Le Grange Estate 24, Lusernhoek, Naudes Fontein 38, Piet Kull 26, Ouaggas Fontein 198, Riet Fontein 201, Styvoetpad 40, Thomas Fontein 183, Uyl Hoek 198, Vaalkrantz 42, Waltevrede Annex 196, Waltevrede 45 and Wen fontein 39

Land owners, lawful occupiers and interested and/or affected parties are given the opportunity to access more information on the proposed activities and to give comments. Please submit your name, contact information and comments and/or requirements in writing before 8 January 2010 to:

**Msix (Pty) Ltd**  
PO Box 13509  
Sinoville, 0129  
Ms Francis de la Rosa  
Tel: (012) 543-9083  
Fax: (012) 543-9610  
E-mail: [francis@naledidev.co.za](mailto:francis@naledidev.co.za)  
Background Information Documents available on request.

Ref: EC4M6

THE HERALD  
WEEKEND POST

  
FOR AVUSA

**ANNEXURE D:  
BACKGROUND  
INFORMATION DOCUMENT**



December 2009

Exploration Right Application

## INTRODUCTION

Msix Mining Development has applied for an Exploration Right in terms of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) on various farms in the Eastern Cape area. As required by the Mineral and Petroleum Resources Development Act an Environmental Management Plan has to be compiled and submitted to the Petroleum Agency SA (the Agency) as part of an application for an Exploration Right.

## WHO IS MSIX MINING DEVELOPMENT (PTY) LTD

MSIX is a mining development consultancy providing a uniquely diverse, fully integrated range of construction and management expertise to clients in every sphere of public and private sector activity.

The guiding principle behind this mining development company and the service we offer is simple: We add value to your company's profile. We aim to provide the expertise, creative innovation, commitment, resources and support to enable our clients to progress as swiftly and effectively as possible from where they are today, to where they want to be tomorrow by offering professional BEE partnership in mining development.

## WHERE IS THE PROPOSED EXPLORATION AREA?

The exploration right application that has been launched in terms of the Mineral and Petroleum Resources Development Act is located within the registration divisions of Wodehouse and Queenstown, Eastern Cape Province on the following farms: Andries Berg 194, Andries Berg 194 of 1, Andries Berg 195, Annan Water 197, Brandswyn Heegte 28, Craiggie Burn 200, Dail 44, Doornboom 32, Dwaal Fontein 43, Farm 184, Farm 185, Farm 186, Farm 260, Groot Vlei 191, Hughenden Annex 192, Kaalhoek 193, Kalkoenderand 265, Katters Hoek 41, Klain Vlei 190, Kloppers Fontein 27, La Grange Estate 24, Lusenhoek, Naudies Fontein 38, Piet Klai 26, Quaggas Fontein 198, Riet Fontein 201, Stylvoetpad 40, Thomas Fontein 183, Uyl Hoek 199, Vaalkrantz 42, Waterwade Annex 196, Waterwade 45 and Wier fontein 39.



## WHAT IS A EXPLORATION RIGHT APPLICATION

In terms of the Mineral and Petroleum Resources Development Act, Section 22 of the Act 2002, (ACT 28 OF 2002): to explore for gas. The exploration right application was set there to assist applicants to comply with the act. The area of application is specified in the Environmental Management Programme Report and will be managed accordingly.

## ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

The EMPR will govern how mining will take place to minimize the impact on the environment. To inform this plan specialist studies will be conducted if requested by the Petroleum Agency. It is believed that the mining activity, if managed according to the EMPR recommendations, will have a limited, short term impact on the environment.

## INTERESTED AND AFFECTED PARTIES

You are an interested and affected party to this development. Msix want to ensure that all parties have an opportunity to submit written comments on the proposed development. Please find attached a form, please complete and submit back to Francis de la Rosa by fax (012) 543 9093 or email: francis@msix.co.za.

## REGISTRATION & COMMENTS FORM — EC 4

This response sheet has been designed to assist you with your comments. The information provided will be used to guide the environmental studies and will contribute to ensuring that an informed decision is taken about the proposed activity. Please complete this form and return it to:

**Msix (Pty) Ltd**

Fransis de la Rosa Cell: 082 407 5639 (Email: [fransis@maledidev.co.za](mailto:fransis@maledidev.co.za))

Tel/Fax: 012 543 9093 / 012 543 9610

Title: \_\_\_\_\_ Initials: \_\_\_\_\_ Surname: \_\_\_\_\_

Organisation/ Firm (if applicable): \_\_\_\_\_

Affected portion number / Address: \_\_\_\_\_

Position/ Nature of involvement (e.g. property owner): \_\_\_\_\_

Street address: \_\_\_\_\_

Postal address: \_\_\_\_\_

Tel and area code: \_\_\_\_\_

(Work) \_\_\_\_\_ (Home) \_\_\_\_\_

(Cell) \_\_\_\_\_ (Fax) \_\_\_\_\_

(E-mail) \_\_\_\_\_

### COMMENTS / QUESTIONS:

1. What potential impacts do you foresee?

\_\_\_\_\_

\_\_\_\_\_

2. What issues and concerns would you like to raise with regard to these anticipated impacts?

\_\_\_\_\_

\_\_\_\_\_

3. How do you perceive this activity in the study area?

\_\_\_\_\_

\_\_\_\_\_

4. Are there any role-players that you feel we should consult with (please state their names and

contact details)?

\_\_\_\_\_

# ANNEXURE E: I&AP LIST



I&AP Serial	Organisation	Contact person	I&AP category
1	Department of Land Affairs	Regional Manager	Affected Party
2	Private Person	MZ Jack	Affected Party
3	Private Person	ID Hansen	Affected Party
4	Private Person	SM Creese	Affected Party
5	Private Person	HFV Kruger	Affected Party
6	Private Person	D Wentzel	Affected Party
7	Private Person	MJS Jordaan	Affected Party
8	Private Person	AC Creese	Affected Party
9	Transnet Ltd	Property Manager	Affected Party
10	Groot Vley Trust	The Trustee	Affected Party
11	Private Person	CR Callaghan	Affected Party
12	Stephanne Trust	The Trustee	Affected Party
13	Private Person	J du Plessis	Affected Party
14	Private Person	SP Oelofse	Affected Party
15	Van Vuuren Familietrust	The Trustee	Affected Party
16	Private Person	NJ Corbett	Affected Party
17	Merino Walk Trust	The Trustee	Affected Party
18	Private Person	PF Ernest	Affected Party
19	Private Person	A de Beer	Affected Party
20	Oelofse Petrus Johannes-Trust	The Trustee	Affected Party
21	Private Person	H Wentzel	Affected Party
22	Quaggasfontein Trust	The Trustee	Affected Party
23	Smaldeel Trust	The Trustee	Affected Party
24	Hebron Trust	The Trustee	Affected Party
25	Bloukrans Trust	The Trustee	Affected Party
26	Selborne Trust	The Trustee	Affected Party
27	Private Person	MG Corbett	Affected Party
28	Private Person	IJ van Heerden	Affected Party
29	Schilderkrantz Trust	The Trustee	Affected Party
30	Private Person	Redvers Dixon Peverett	Affected Party
31	Private Person	WJ King	Affected Party
32	Private Person	H Geyer	Affected Party

I&AP Serial	Organisation	Contact person	I&AP category
33	Private Person	SJ Corbett	Affected Party
34	Private Person	CM Malepola	Affected Party
35	Inkwanca Local Municipality	Municipal Manager: A Ncube	Interested Party

# ANNEXURE F: ISSUES AND RESPONSE TABLE

Issue	Response
What does exploration mean? Is this a mining development?	Exploration is not mining and actually totally different. Exploration is an activity defined in terms of the MPRDA and is a right to explore for natural gas on specific properties. In this case it would mean research, data analysis, 1- 5 test boreholes on the whole application area.
What happens when you find gas?	Once the test boreholes are complete, we will start with a pre-feasibility study to determine if the project would be financially viable. Only once that has been determined, we will apply for a production right which will entail extensive public participation.
How will you disrupt my land use activities? Will I be able to continue farming? What happens if fences, roads and other farming infrastructure is damaged? Will you replace or compensate for it?	The majority of the exploration will not disrupt any land use activity as it would be research, data-gathering and analysis, feasibility studies. We do however envisage to drill 1 - 5 test boreholes within zoom of each other. The position of these boreholes has not been determined and will only be determined at the end of the first phase. Once we have an idea where the boreholes need to be, we will further engage with that specific land owner to gain access to the property. If any damages occur that is the fault of the applicant or its contractor's replacement or compensation will be agreed with the land owner.
If you drill the boreholes do you pump the groundwater out. What effect will this have on my groundwater levels and the irrigation I do out of these sources?	When we do the test boreholes, we need to pump the water out to release the pressure that keeps the gas trapped. This water can be pumped into a dam that you can utilise for irrigation or livestock watering.
Once exploration is complete, would the land owners be able to utilise the boreholes drilled?	If exploration is unsuccessful, discussions will be held with the land owner prior to sealing the boreholes. If land owners utilise these boreholes it would be on their own risk.
When will this activities start? Will we be informed before you start with the	Once the exploration right is approved, there will be research done for approximately 6 months;

Issue	Response
exploration?	thereafter the test boreholes will be drilled. You will be notified when the exploration right is approved. We will further engage directly with the land-owner where the test boreholes will be drilled.
Does Msix aim to purchase properties if the exploration deems the project productive? Can the owner sell just the mineral rights?	Msix does not intend to purchase any of the properties on which they have made an application for exploration rights. In terms of the MPRDA the mineral rights are not owned by the land owner, but by the state.
Will the company rehabilitate the cleared area after exploration? How much bush clearing will take place? What about sensitive areas, especially where koppies occur?	A rehabilitation fund is made available prior to commencement of the exploration. The exploration footprint is relatively small and major bushclearing would not be required. Sensitive areas will be avoided.
How many jobs will be filled and will workers be brought into the area. What about the influence this will have on our farm labour?	The exploration process does not require many workers, but some skilled people will be brought in with the exploration team, other labour will be sourced locally. If the exploration team set-up camp on the property, their movement patterns will be restricted as not to have an impact on the local farm labour.

