Environmental and Social Impacts Assessment Study Report for Oil Exploratory Drilling in Block 2B Wajir

NEMA/5/2/12177

Prepared by:

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Acronyms

CBOs	Community Based Organizations
CPP	Consultative Public Participation
DEO	District Environment Officer
DPHO	District Public Health Officer
DWO	District Water Officer
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GoK	Republic of Kenya
HQS	Headquarters
IEC	Information Education and Communication
LAP	Land Acquisition Plan
MDGs	Millennium Development Goals
NEC	National Environmental Council
NEMA	National Environmental Management Authority
NET	National Environmental Tribunal
NGOs	Non-governmental Organizations
PCC	Public Complaints Committee

License to operate in Block 2B

Block 2B was licensed to Lion Petroleum in September 2008 under the terms of a Production Sharing Contract (PSC). An initial exploration period expired in June 2013 after Lion were granted an extension by the Government. The license is currently in the First Additional Exploration Period, which expires in June 2015.

DECLARATION

This EIA Study report was prepared in accordance with Environmental Management and Coordination Act, 1999 and the Environmental Impact Assessment and Audit Regulations, 2003, for submission to National Environmental Management Authority (NEMA).

The undersigned, submit the following Environmental Impact Assessment Study report for the proposed Exploratory well drilling Project in Laghbogoll North and Korich Locations of Wajir County. All information contained in this report is accurate and truthful representation of all findings as relating to the project.

NAME.....

SIGNATURE.....

NEMA REGISTRATION No: 2815

DATE.....

PROPONENT

I, …….....on behalf of Lion Petroleum Corp. submit this Environmental Impact Assessment Study Report for the Proposed exploratory drilling for oil and gas in Laghbogol north and Korich locations in Wajir County. To my knowledge all information contained in this report is accurate and truthful representation of all findings as relating to the project.

Designation: ……

Signature: ……

Date: ……..

Disclaimer:

This Environmental Impact Assessment Study Report is strictly confidential to the Lion Petroleum Corp (the proponent) and any use of the materials thereof should be strictly in accordance with the agreement between the proponent and Dr. Joseph M. Maitima (the EIA Expert). It is, however, subject to conditions in the Environmental (Impact Assessment and Audit) Regulations, 2003 under the Kenya Gazette Supplement No. 56 of 13th June 2003.

Identification of Proponent

The proponent for the project described in this EIA study report is Lion Petroleum Corp. Lion Petroleum is company registered as an oil exploration company in Kenya and dully licensed by the government of Kenya to prospect for oil and gas in Block 2B, Wajir Kenya.

The physical location of Lion Petroleum Corp is 1st Floor Express Plaza, Corner of Ring Road and Jalaram Road, Westlands, Nairobi.

Lon Petroleum was licensed by NEMA to prospect for oil and gas in block 2B using seismic profiling under NEMA license Number 0009521 of Sept. 15th 2011. Consequently following a year in operation and completion of surface seismic profiling an environmental audit was conducted in fulfillment of EMCA 1999 requirements and EIA/AU regulations of 2003.

The proponents operations in Block 2B has been in full participation of NEMA County office in Wajir

Executive Summary

Overview of Environmental and Social Impact Assessment (ESIA)

With diminishing fossil fuel resources worldwide, efforts have been increased to search for the valuable resource in all areas. Advancement in exploration technology has also meant revisiting such areas to acquire new set of data. Oil exploration is a multimillion-dollar venture which involves high costs and equally, high risks. Due to this, few governments are willing to commit funds in such projects hence the involvement of private firms in initial searches and subsequent explorations.

Industry players have segmented and staggered the exploration process to minimize costs and spread risks. The multi-stage approach also helps in decision making based on results from one to another. The current stages involved in oil exploration can be broadly divided into four namely – photo geological reconnaissance and remote sensing; regional and detailed geological; geophysics and exploratory drilling.

The current stage of exploration is that of exploratory drilling which is basically boring through the earth crust to the depth where an oil reservoir may be existing. The prime purpose is to test for the presence of oil and establish the both the quality and quantity of the deposits. The process will drill only a relatively small hole on the ground and extend it downwards through the geological layers of the earth and will have no impacts on the environment. The environmental implications at this stage are limited to removal of the geological materials from underneath the earth surface mainly in the form of clay and sandstone cuttings. The cuttings material removed from underneath the earth surface will be used for study purposes and the excess will be mixed with surface soil and disposed in a pit where they will be out of contact with people, animals and wildlife including soil organisms.

The expected output of the ESIA process is a report presenting a review of the baseline conditions, analysis of the impacts associated with the proposed project, a summary of related policies and legal framework with appropriate compliance indicators, institutional framework for the implementation of the project and presentation of views from stakeholders. Environmental Management Plan (ESMP) has also been developed to provide the key environmental issues, mitigation actions with matching responsibilities, timeframe and cost estimates. The EMP will be integrated into the construction and drilling contract documents for implementation during site construction and well construction works.

Importance and Justification of the ESIA

Projects of this nature will during construction and implementation have positive and negative impacts and while the positive impacts of the proposed exploratory drilling on project are very significant the negative impacts could also be serious unless well managed. The objectives of the proposed Environmental and Social Impact Assessment (ESIA) are to identify the potential impacts on the physical, biological, social and economic and environment and subsequently propose appropriate mitigation measures for any negative impacts and enhancement measures for the positive impacts resulting from the proposed seismic exploration project.

The Environmental and Social Assessment has been carried out in line with the prescribed environmental management legislations requirements under the EIA Regulation as stipulated in the Kenya Gazette Supplement no. 56 (Legislative Supplement No. 31) that contained the Legal Notice No.101 on the Environmental Impact Assessment and Audit Regulations 2003. It is expected that the

proposed project should comply with the regulations and other environmental oriented legislative sections.

The Process of ESIA

The ESIA process involved intensive desk studies for the review of the design and other project documentation. For purposes of verification, the process also involved detailed field assessments and observations and discussions with the other experts in the project including the geophysicists, Government officials, and the local community living along the project area. The geophysicists provided the proposed project concepts and physical extent for purposes of determining the implications on the social and economic aspects along the corridor. In addition to the physical assessment and documentary review, interaction and involvement of the stakeholders was important. Rapid interviews with Government officers and random members from the local community living in the study area sought to explanation of the proposed project. This was followed by structured public consultation forums through the local residents to solicit their views on environmental and social aspects and areas of public interest that need to be considered during the design and implementation of the project.

Expected Output

The output is ESIA Report that constitutes part of the design submissions and includes,

A review of the impact of the proposed project on existing environmental and social setting,

Provision of appropriate mitigation measures,

Analysis of the views from stakeholders and local community

A compliance schedule with the environmental laws and regulations,

A comprehensive environmental management plan (EMP).

The report is to be submitted to NEMA for review and necessary approval.

Physical Environment Status

The topography of the project area lacks any significantly conspicuous features. The project area is therefore in the low-lying flat land area within the Nyika plains of the country. The large part of the project area is covered by reddish coarse sandy soils which grades to light grey sandy-clay in the few river valleys locally known as ‘laggas’. The Geology of the area is generally viewed to be of the sedimentary rock sediments of Quaternary Geological Age associated with the Coastal plains of the country.

Climate

The area falls under the ASALs of Kenya, experiencing high temperatures and low, unreliable rainfall. Rainfall is generally low and unreliable in the area but when it comes, it falls in sudden heavy storms often causing unpredictable flash foods.

Flora and Fauna

The area vegetation is generally thin in density and poor in diversity. Animal species identified include Giraffes, Somali ostriches, and a few cheetahs along the dry savannah; rodents (mice), birds

mainly along the river valleys, dik-dik antelopes, and domestic livestock including zebu cattle, goats, sheep and camels.

Drainage

The district depends upon the seasonal Ewaso Nyiro River, pans, dams, bore holes, and to small extent roof catchments for sources of water. Many other streams such as lagh Mura, Libahili, and Dera are all small and seasonal streams emptying into the swamps.

Water

The area's main permanent sources of fresh water are boreholes sunk along the Ewaso Nyiro River flood plain and swamp grounds. The nearest source of fresh water for drinking is Habaswein where boreholes can produce fresh, courtesy of the presence of an acquifer with fresh water.

Roads

The project site is situated within the reaches of the Garissa-Wajir-Mandera road; an earth infrastructure that is in relatively good condition during all weather seasons. Other neighbourhood feeder roads are sandy graveled to all weather status.

Communication

Telecommunication and postal services network are generally poor in this region. These facilities are only available in the major urban areas of North Eastern region. There are no fixed telephone lines close to the project area. Mobile phone signal for the major companies are however available around a few small Townships with telecommunication masts along the Garissa-Wajir Road.

Environmental and Social Management Plan (ESMP)

While appreciating the benefits on the social and economic front, it will be necessary to recognize the potential negative implications on the biological diversity and habitats of the proposed project with specific focus on the sensitive ecosystems. The forth coming chapters of this report shows that the proposed project poses issues of concern related to social and economic development as well as environmental conservation and for this reason, a comprehensive management plan outline would be necessary on the project implementation. The plan would provide the key environmental and social concerns, appropriate preventive actions and responsibilities, targets to be achieved and where possible estimate of the respective costs. The plan will also provide basic success indicators for monitoring purposes.

The environmental and social management plan is the most important component of the ESIA report. While the short concept summary is presented in the design report, the entire plan will be integrated in the construction report upon approval by NEMA. To ensure that this exploration drilling campaign project is sustainable, Environmental and Social Management Plan (ESMP) has been prepared under the ESIA report so as to include;

- Listing of the anticipated environmental and social concerns,
- Environmental management actions to be undertaken by the Contractor and or proponent,
- Apportioned the responsibility and costs for mitigation action measures recommended
- Monitoring indicators and how the monitoring is to be carried out

- Presented activities mitigation measures during preparation, operation and decommissioning phases.

This management plan presents the key management principles that then defines a scope of the plan implementation. Broad indications of the responsibilities have also been discussed along with the possible implementation constraints anticipated while detailed actions are tabulated in a matrix for ease of reference and review. It should also be noted that the matrix is not complete in itself and continuous reviews would be necessary throughout the project implementation period.

EMP Principles

The broad factors that need to be considered in the project implementation and its post evaluations initiatives could include the following;

- Preservation of the physical land forms (slopes, valleys, hills, etc.) and natural beauty (vegetation, aerial appearance, etc.) of the countryside.

- Protection of steep slopes, control of soil erosion and siltation of public sources of water (springs and streams),

- Enhancing integration of environmental, social and economic functions (hydrology, climatic conditions, topography, geology, population trends, settlement patterns, land use systems, etc.) in the project design and implementation,

- Protection and conservation of biological diversity throughout the project route,

- Clear demarcation of the project activities that will ensure reduced encroachment by the adjoining landowners,

EMP Scope

The scope of this environmental management plan (EMP) is to give guidelines to all parties involved during execution of seismic exploration in fulfillment of environmental and social requirements. The management plan has a long-term objective to ensure that:

- Environmental management conditions and requirements are implemented from the beginning of the project, during the survey and post-survey period,

- The social interests of the community and other stakeholders are considered throughout the entire period.

- Maximum economic benefits to the immediate communities and the whole country,

- Precautions against damages to environment, biological diversity and sensitive habitats, and Unnecessary delay of the completion date of the contract.

EMP Responsibilities

In view of the above objectives and scope, the project management system is expected to commit itself on the following aspects;

- The proponent will engage an environmentalist/social expert to monitor the implementation of the management plan on a pre-agreed schedule,

- The project implementation shall uphold national policies and legal requirements on environment at all times during the project implementation,

- Ensure the proposed environmental protection measures stipulated in the impact – mitigation matrix are integrated in the project implementation plan to the extent possible,

- Resolve problems and complaints arising from damages and property losses within reasonable timeframes to ensure a smooth flow of construction operations and reduce social conflicts,

- Implement and continuously review this Environment and Social Management Plan for the benefit of acceptability of the project to all stakeholders.

Conclusion and Recommendations

The information herein describes the salient biophysical and socio-economic features of the project area, the impacts of the proposed development and mitigation measures to be put in place as a responsibility of the proponent.

From the investigation results, it is evident that the benefits of the project will mainly be of economic in nature, with potential minor adverse impacts on the social and biophysical environments. However, the mitigation measures when implemented will not only ensure that the positive effects and potential of the proposed development are enhanced, but also that the anticipated negative impacts and possible social conflicts are greatly minimized.

It is recommended that the Management and Directors should be supportive in terms of leadership and resource allocation to the development and improvement of relevant policies and practices such as internal environmental monitoring, annual audits, good housekeeping and reporting of incidences to the relevant authorities.

In addition, the proponent is advised to ensure that consultations and linkages are developed and maintained with relevant Lead Agencies in the oil exploration sector as well as the National Environment Management Authority.

Introduction

Exploration of oil and gas is truly global, with operations conducted across the globe and in every habitat from arctic to the tropics, from deserts to the tropical rainforest to the coastal mangroves and to offshore habitats.

Here in Kenya oil deposits have been discovered in Turkana opening up interests for other places to explore the presence of this valuable commodity. The Turkana oil deposits have been found to be commercially viable, and the higher the amount available the better is the commercial feasibility in exploiting the resource. Exploring the presence of the resource however, cannot be done without some ecological implications associated with both the movement of people and equipment and the processes used in different stages of exploration.

The proposed activities are associated with test drilling to determine if there is oil or not and if there is, the amounts in the deposit so as to know the commercial viability for exploiting the resource in the prescribed area. The broad environmental impacts associated with oil and gas exploration are both local and global. They include habitat destruction, air pollution, and ground water contamination. Operations in the exploration site bring in changes in the socio-economic status of the people around the exploration site by influencing trade and providing essential services to the people in the region.

Over the years of existence, the industry has responded to all the challenges. All needed is to make sure that operations conform to the set down procedures for impact avoidance and mitigation. However, the continual evolution of the environmental agenda must be taken into account. The industry has placed much emphasis on establishing effective management systems and has gone a long way to make sure that environmental issues are a key corporate culture, with issues related to health, safety and environment are often discussed together because they have much in common.

Through the Oil Industry International Exploration and Production forum (E&P Forum), a common industry –wide Health, Safety and Environmental Management System (HSE-MS) was made available in 1994 as a guideline, the fundamentals of which are taken into account in this report.

This report presents a study of the proposed project and presents a comprehensive account of the possible environmental and social impacts and the mechanisms through which the negative impacts can be avoided or mitigated and the mechanisms through which the positive impacts can be enhanced to benefit both the surrounding environment and the social status of the people in the area. This study report also presents an elaborate public participation analysis to show the feelings of the local residents about the proposed project. However, the broad objective of the project is not new to the people of the area as operations of surface seismic oil exploration has been going on in the same area and in the presence of the same people under an EIA and a subsequent EA all of which were formerly acquired as required by EMCA 1999 and the EIA and EA regulations of 2003.

Discovery and potential development of onshore oil and gas reserves follows a distinct "life cycle" which is generally common to all areas of operation

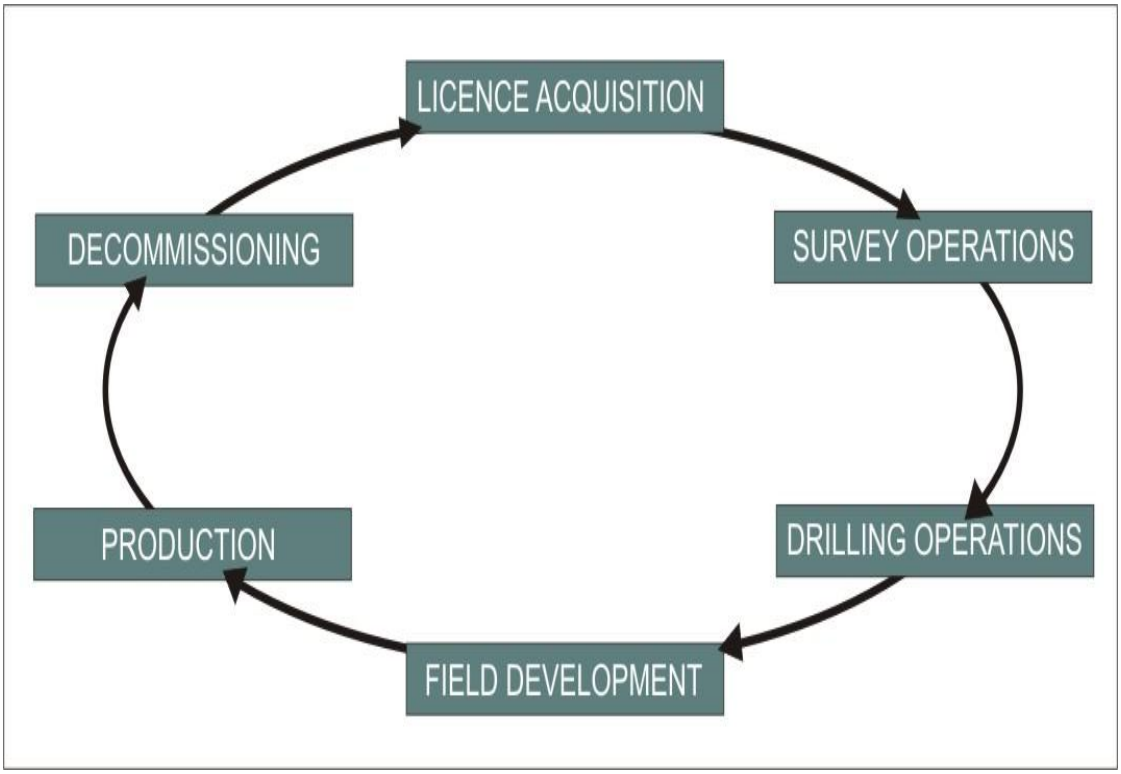

Figure 1: Oil and Gas exploration to production life cycle

After acquiring a license to prospect for oil the first operation is to conduct ground surface surveys usually comprising of seismic profiling to study the geological stratigraphy of the rock formations underneath the earth surface. The types of these formations can indicate the possibility of finding oil or not. After the surface operations if positive indicators have been achieved, the next step is conducting an exploratory drilling in an effort to reach out to the oil deposit to test for the presence, quality and amounts. This is last stage of prospecting which if sufficient deposits are found is followed by production. If oil is not found or it is in insufficient amounts the exploratory well will be abandoned and the exploration team moves the camp to another site. The work described in this report is for the drilling operations in Block 2B of Wajir county.

1.1. Approvals sort through this study report

This report seeks approval from NEMA for environmental compliance in;

- Construction of a campsite in the oil exploratory drilling area. The campsite is being transferred from the area previously located to the area of oil exploratory drilling.
- Construction of an oil drilling rig within the campsite
- Drilling of an oil exploratory well

1.2. History of petroleum exploration in Kenya

Despite the fact that no single oil well has so far proceeded to the production stage, a number of test exploratory wells have yielded substantial amounts of oil. Since the 1970s prospecting for oil has been done on an off and on basis without much success, but during the last decade exploration has

intensified with a lot more exploratory wells drilled than previously and this effort has born fruits as now Kenya is known to have commercially viable oil deposits in Turkana.

The petroleum find announced by Tullow Oil in 2012 offers great potential for Kenya. Managed properly, petroleum can produce large government revenues, which can be used to finance rapid, broad-based and sustained development.

At the request of the Ministry of State for Development of Northern Kenya and Other Arid Lands and the National Oil Corporation of Kenya (NOCK), and in close cooperation with the Ministry of Finance, the Ministry of Energy and the Ministry of Environment and Natural Resources, SI Sustainable Integrity, (a globally oriented research and consulting social enterprise), has initiated a project to support the strengthening of a coherent policy framework for the development of the petroleum industry in Kenya.

The first phase of exploration over the area now covered by Block 2B, took place during the seventies, when a large number of regional seismic lines were acquired by a number of operators. A total of some 1,850 km 2D data were acquired over the present area of Block 2B, along with gravity and magnetic data. Further seismic data were acquired by Amoco in the mid-eighties and two wells, Elgal-1 & 2, were subsequently drilled in 1987 immediately to the east of the Laghbol fault which bisects the block. Both were dry holes. In 1989, Amoco drilled the Hothori-1 well on an inverted feature in the centre of the Anza Basin. This encountered oil & gas shows, but was plugged and abandoned as a dry hole.

Lion Petroleum acquired Block 2B in September 2008 and in 2013, 440 km 2D seismic data were acquired, chiefly in the central part of the block. Also in 2013, 7,300 square kilometers of Full Tensor Gradiometry, high-resolution gravity data were acquired across the entire block. In early 2014, 176 km additional 2D data were acquired over the Badada Prospect, to aid in determining a drilling location

1.3. Location of the proposed drilling site

The proposed site for exploratory drilling occupies parts of two locations namely: Korich and Laghbol North locations in Wajir County. The Oil and Gas exploratory Block 2B area is situated at about 600Km NE of Nairobi and at about 200km to the Northern direction of the Garissa Town.

This site has been arrived at after several months of ground surface prospecting using seismic profiling in a much wider area of the two locations. The area where the proponent is seeking NEMA approval for exploratory drilling had already been licensed for ground surface exploration and establishment of a mobile campsite for use by exploration personnel and the storage of equipment. What is required now is a license to drill test exploratory well (s) in the designated area. Before drilling the well, the proponent will establish a base camp measuring approximately 300m by 300m from where the well will be drilled and also serve as the base where the personnel will be housed and all the equipment will be stored. Establishment of the campsite however, was licensed the previous EIA license in the sense that the NEMA permit allowed for a movable campsite within the area.

Apart from establishing an access road to the camp, almost all environmental impacts will be limited to the area within the base camp. The proponent is known for taking very good care of environment within the camp based on the observations made during the fieldwork for this report and the experiences during the environmental audit report that the consultant made last year. In addition to observations made by the consultants, the proponent has maintained a close relationship with the local NEMA officials based in Wajir about environmental management. The proponent will take the same care for the base camp to be set up in the same way they took care for the one used during surface exploration.

The project site falls under the jurisdiction of Wajir County located in north eastern part of Kenya. The reasons for choosing this area to explore for oil and gas in this Block includes but not limited to the following.

- The high possibility of striking oil and gas in the area as a result of -
- The highly positive results of seismic surveys in the area already completed.
- The availability of favourable geological environments for oil and gas fields.
- The very low population presence and hence adequate land and space for prospecting and exploration activities.

Figure 2: Map of Kenya showing the location of the proposed project.

Coordinates for Block 2B

Point M5 400 59’ 46.74” E and 01o 21’ 04.22” N
Point M6 390 20’ 52.49” E and 01o 20’ 48.37” N
Point M8 390 00’ 00.00” E and 01o 00’ 00.00” N
Point M9 400 59’ 46.74” E and 01o 00’ 16.94” N

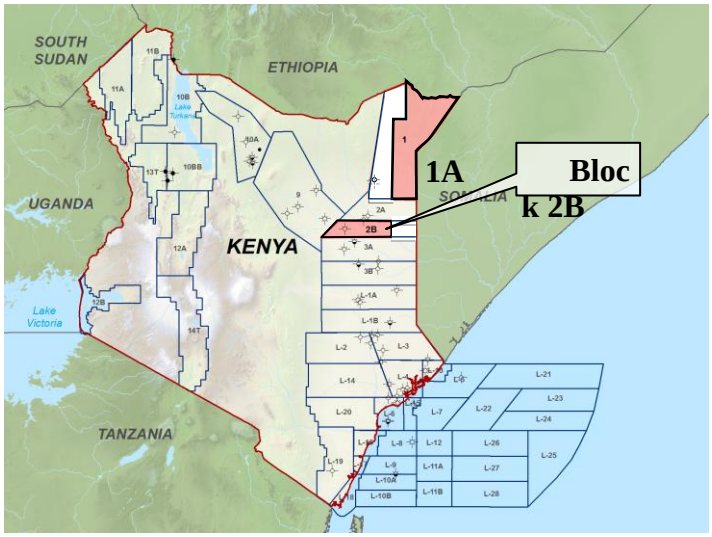

Figure 3: Location of Block 2B in relation to other exploration blocks

1. Project Description

As described before in this report, the proposed project is for drilling oil and gas exploratory well. Drilling is undertaken to establish the presence of hydrocarbons indicated by seismic survey and interpretation of data. Exploratory drilling is temporary (usually 60 – 90 days) and characterized by short duration activities like establishing a base camp, site preparation, setting up well foundation, rig building, drilling and restoration of the well site. These activities take only a few months under normal conditions.

A drilling rig is used for drilling the well and the process involves rotation of drill bit attached to a long string of a drill pipe down the well. Drilling mud is pumped through the drill string, through the drill bit, and which then returns up the annulus between the drill string and bore. The drilling mud is used to cool the drill bit while drilling, remove cuttings from the well, control formation pressures, suspend and release cuttings, seal permeable formations, maintain well-bore stability, minimize reservoir damage, cool and lubricate the bit etc. The drill cuttings are separated from the drilling mud at shale shakers and the fluid is re-circulated. If the presence of hydrocarbons is detected during drilling, production testing is normally conducted. The production testing is carried out to ascertain the reserves and economic viability.

1.1. Overview of the exploration drilling programme

1.1.1. Scoping

This project falls within the category of projects that should undergo environmental impact assessment as demanded by the EMCA 1999 and the legal Notice 101 of 2003. The key issues identified revealed that there are potential impacts. Upon using a checklist, scoping done to identify the broad areas, which would generate potential negative impacts on the environment identified the follows as areas for possible impacts: -

Air quality and noise
Soil erosion
Road traffic and safety
Changed land use
Loss of vegetation
Loss of biodiversity
Public health
Community issues

1.1.2. Components, Activities and Materials

The following are the main stages of the project development: - Campsite design and construction, drilling a test well, data collection on drilling results and the decommissioning phases of both the camp and test drill operations. The test drilling is expected to produce oil for testing for quality and amounts present. This chapter describes the components activities and materials/resources involved in each of these stages.

1.1.3. Design and Construction of the Campsite

It is expected that the proposed site will undergo alternation during the construction phase to development it into a field operational base campsite as well as the drilling site. New features will be introduced as part of the constructed environment. These will include:

- Storage fabricated containers and tents Air conditioned containers to be used as administration Block and offices.
- Air conditioned tents to use for the staff accommodation.
- Specially fabricated air conditioned containers to be used as toilet, washing room and laundry
- Tented workshops for use as garage, cable and mechanic repairs.
- Air conditioned containers to be used as a mobile clinic for field crew.
- Fuel storage facilities will be erected at the camp as guided by the petroleum act.
- A bore hole will be drilled to supply water to the Campsite.
- Leveled parking for the motor vehicles, equipment and machinery.
- A drilling rig will be constructed within the camp site boundaries.
- An oil exploration well will be drilled within the camp site boundaries

The established Health and Safety and Environmental Protection Regulation/Standards shall guide the contractor in relation to the campsite erection project. This will include safety wear at all times and the contractor will appoint a Certified Safety officer on site during all construction activities. The

contractor shall also provide first aid and fire extinguishing equipments at the site during the construction and well drilling operations. During the construction phase of the campsite, close supervision will be carried out to ensure:

- Workers put on safety gear at all time such as nose masks, hand gloves, helmets, and safety shoes with metal tipped toes, earmuffs, overalls, dust coats, safety harnesses and use of scaffolding.
- Emergency response procedures will be put in place and all workers will be sensitized and trained in effecting them.
- First aid kits and firefighting equipment (portable cylinders and sand buckets) will be provided and placed at strategic positions that can be accessed.
- Workers who will operate vibrating equipments (such as compressors) shall wear earmuffs and protective gloves.
- All equipments will be checked and certified to ensure that they are suitable, in good working condition and safe to use.
- All works at a height of more than 1.5 meters will be done with scaffolding and safety harness.
- The screening machine will be grounded firmly as to ensure that it is secure and maximizes efficiency.
- An operational manual containing effective maintenance procedures will be provided at the site.

2. Activities

2.1. Location of the test drilling

The Kenyan Government through previous exploration works that were undertaken in the 70s and 80s by various companies has identified a number of ‘blocks’ with potential for oil and gas. These blocks are found in the coast, eastern, north eastern and rift valley provinces and Kenya’s territorial water and exclusive economic zones in the Indian Ocean. The proponent has been granted the exploration license for Block 2B, in Wajir County. For this reason, the concept of ‘alternative site’ does not apply, as each block within the country is agreed upon by the Government of Kenya and the interested party and subsequently licensed. Other blocks have been licensed to other companies. The proposed project has to be implemented in the designated location because:

- The area is geologically suitable for hydrocarbon deposition and has been delineated and gazetted by the government for oil and gas exploration.
- There is likelihood of striking rich deposits of the intended oil and gas in the area. The project is supported by ready market for the end-products in the energy and petro-chemical industry.

- The Petroleum Exploration Block is sparsely populated and relatively well accessed by all weather earth roads and other infrastructural facilities.

- The proponent has just concluded seismic surveys in the proposed area and has decided to proceed to the next phase of test drilling.

Site preparation

The proponent will establish a site measuring approximately 300 x 300 meters in the area around the border of Laghbogol and Korich locations. Vegetation within the site will be cleared to give way for the construction of camping facilities for the workers, storage area for materials and the drilling site. The area will be surrounded by a soil fence to the height of 2 to 3 meters and inside the soil fence there will be a chain-link fence, with security topping such as razor wire.

The intended project will not involve any relocation of displaced people and the following activities will be carried during this phase:

- Acquisition of the construction and installation materials for campsite. Transportation of installation materials and machinery. Ground vegetation clearance.

- Leveling and compaction of the surface to provide a stable foundation for the construction of the drilling rig and its cellar.

It is expected that the proposed site will undergo alternation during the construction phase to develop it into a field operational base campsite. New features will be introduced as part of the constructed environment and these will include:-

Storage containers and tents

Air conditioned containers to be used as administration Block and offices. Air conditioned containers and tents to be used for the staff accommodation. Specially fabricated air conditioned containers to be used as toilet, washing room and laundry. Tented workshops for use as garage, cable storage and mechanic repairs. Air conditioned container to be used as a mobile clinic for field crew. Fuel storage facilities will be installed at the camp and drill location as guided by the petroleum act. One or two bore holes will be drilled to supply water for drilling and to the campsite. Leveled parking for the motor vehicles, equipment and machinery. Communications from the drilling engineer, suggest that if a source of fresh water can be found to supply not only water for use in the camp but also water for use in the drilling, it will be good and in this case drilling of a water borehole in the proposed area during the exploratory well drilling.

2.2. Excavations

While removing the overburden materials a number of environmental aspects will have to be considered. Any work that will involve deep excavations, lifting heavy loads, working in restricted areas poses severe risk issues. The contractor shall develop a safety plan before commencement of each stage of the installation. This will ensure that all the personnel are equipped with the correct protective clothing and equipment and are aware of the risks associated with the work they are doing. The contractor will ensure that work is minimized at the excavation work side so as to reduce cave-in.

• The proponent shall organize for regular performance checks and fault tests.

Figure 4: Base camp established during the BGP seismic campaign, which will be similar to the one that will be established for the well drilling operations.

2.1 Regional Geological Setting

The principle tectonic elements within Block 2B comprise the Anza Basin, the Mandera-Lugh Basin and Lagh-Bogal Fault. The Lagh-Bogal Fault trends northwest-southeast across the block and separates the Anza Basin in the west from the Mandera-Lugh Basin in the east.

The Lagh-Bogal Fault almost certainly originated as a Pre-Cambrian fracture zone and has undergone several periods of re-activation. Movement on the fault is predominantly down to the west, but it also contains a significant strike slip element. Surface expression of the fault is muted, with only a slight rise in topography marking its position. West of the fault lies the Anza Basin, which has the aspect of a half-graben and contains possibly as much as 4,000 metres Tertiary section downthrown against the fault. This thick Tertiary section is underlain by a Cretaceous and Jurassic section. The Tertiary section is expected to comprise interbedded sandstones and shales, the latter being potentially of lacustrine origin.

Immediately east of the fault, the section comprise sediments of Karoo age (Permian- Jurassic) which are overlain in the west of the block by the Cretaceous sediments of the Mandera-Lugh Basin.

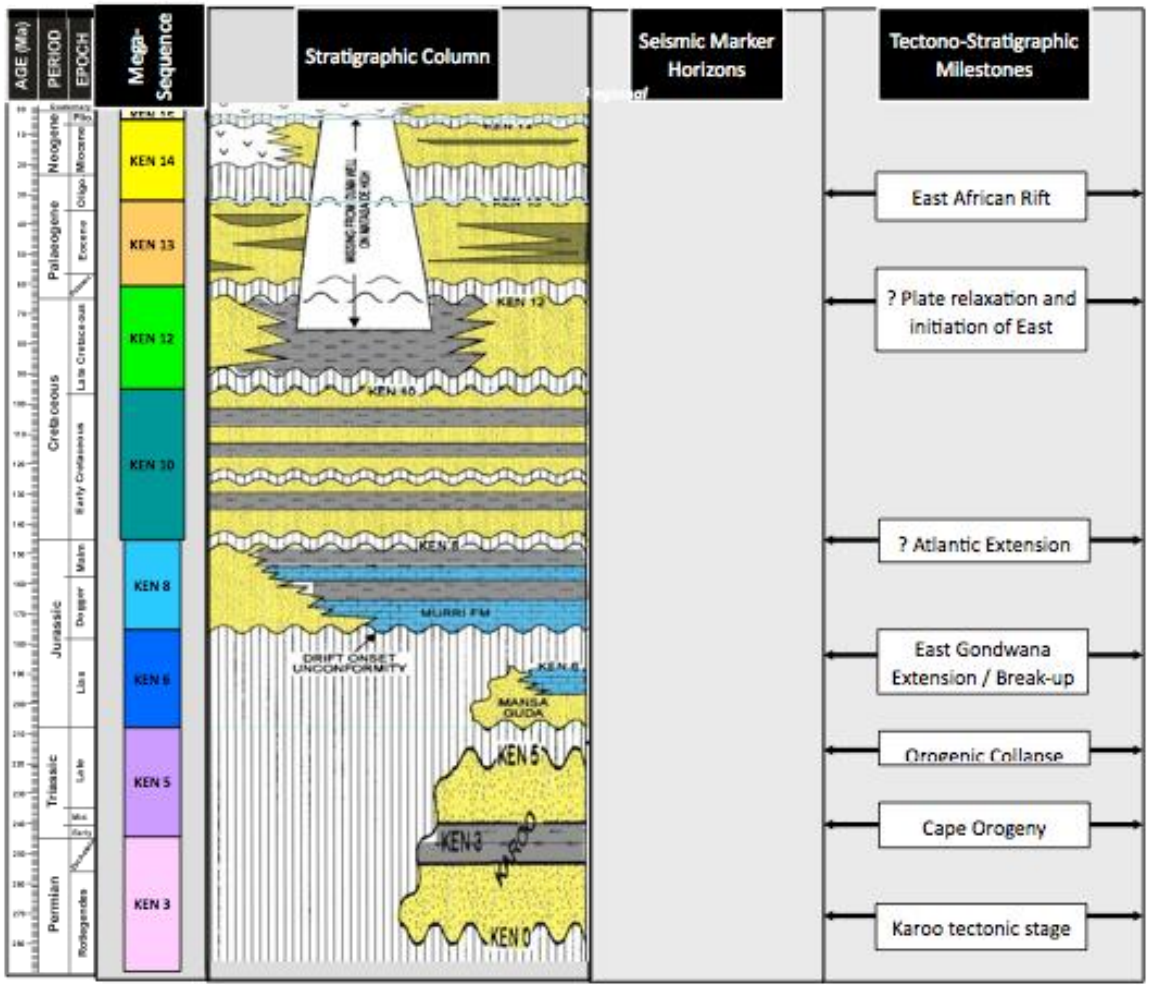

Figure 5: Regional Stratigraphy diagram of the Block

2.2 Hydrocarbon Play Elements

The Badada Prospect lies within the Anza Basin, west of the Lagh-Bogal Fault and comprises a three-way dip closure against the fault, mapped at mid-Miocene (Base Orange) and base Miocene (Base Yellow) levels. The principle target lies with sediments of expected Miocene age with interbedded sandstones and shales expected to provide reservoirs and intra-formational seals. It is anticipated that the Tertiary section will also contain shales of lacustrine origin, which will provide a hydrocarbon source rock. Organic-rich shales in the underlying Cretaceous section are also expected to provide an additional potential source rock.

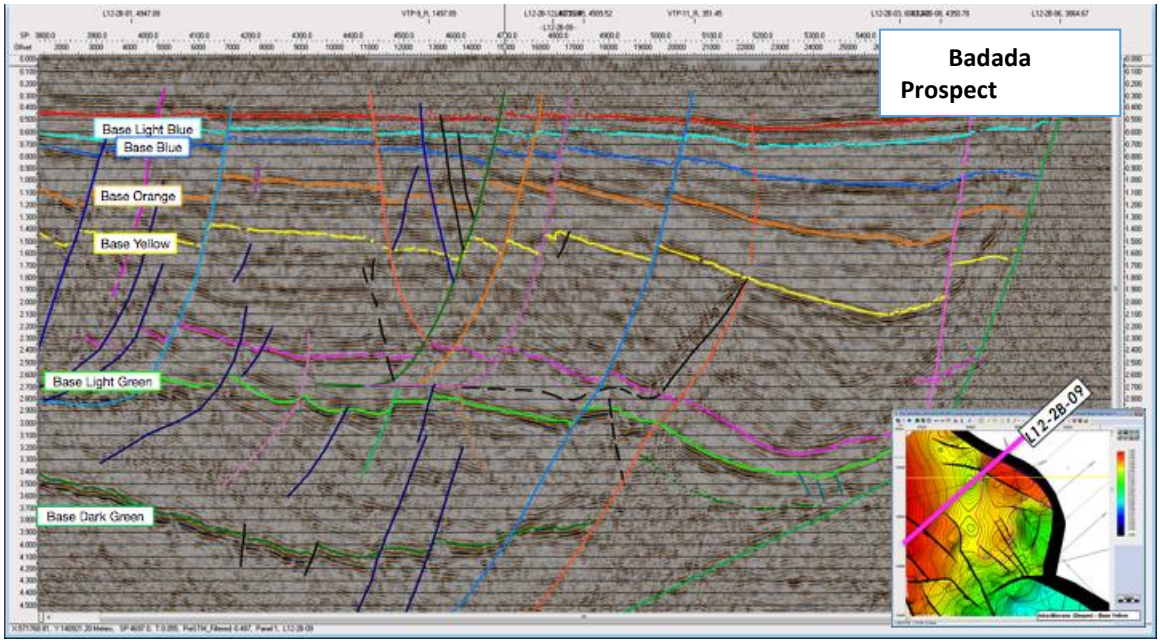

Figure 6: Seismic cross-section over the Badada Prospect

2.3. Assembling the drilling Rig

The drilling rig will be transported in parts to the site by road and will be assembled on site. Working areas and office and mini-camp accommodation facilities will be positioned adjacent to the rig to facilitate operations at the rig site, whilst accommodation for the majority of the personnel will be at the designated camp site area. The process of rigging up will involve assembling and erecting the drill tower and the associated equipment as indicated in the general schematic below.

2.4. Drilling Rig Specification

While Lion Petroleum Corp might not have tendered for the rig that they will use to accomplish this mission, given normal practice it is probable that the type of the drilling rig to be used will be rotary drilling equipment with mud method will be used.

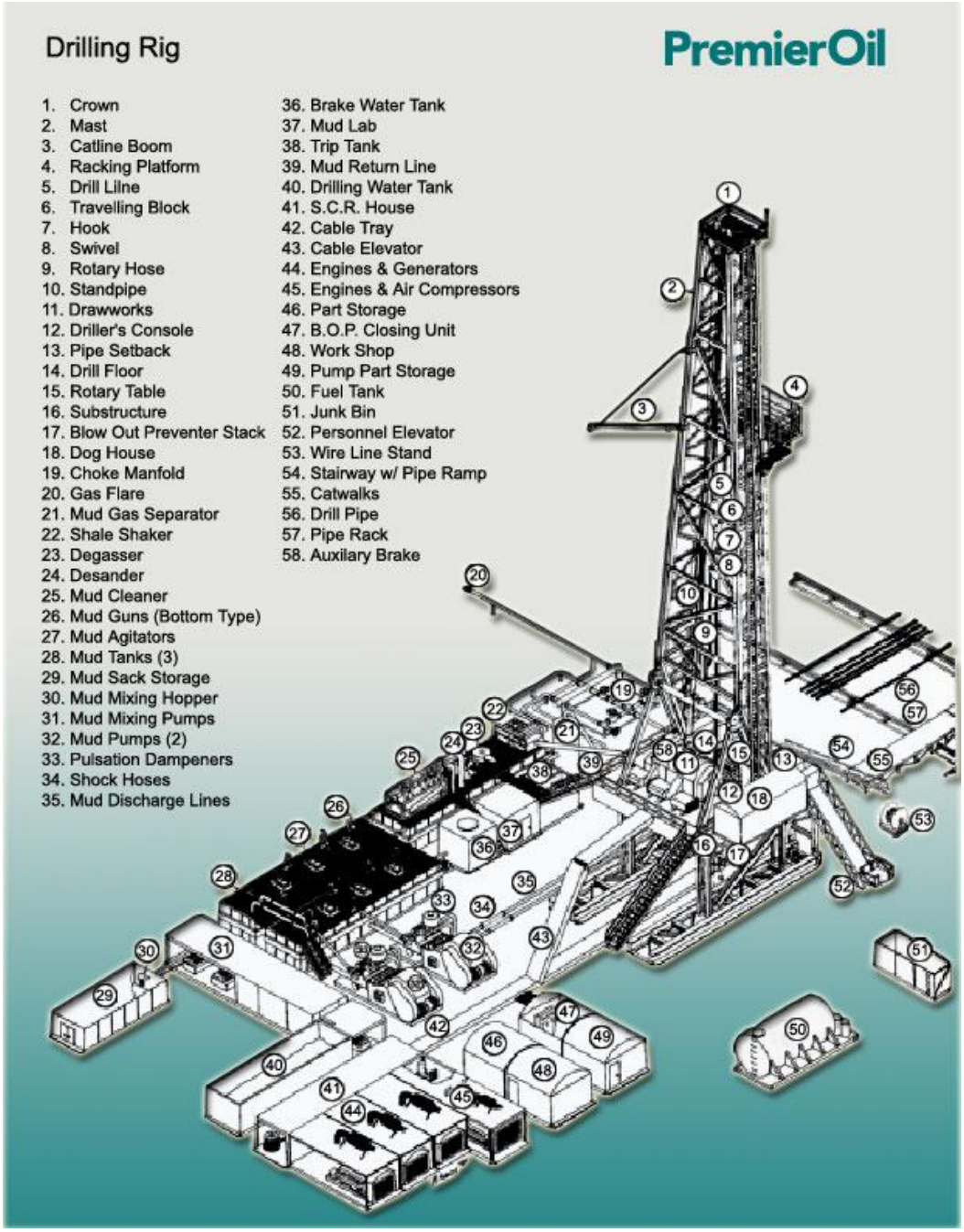

Figure 7: Typical Land Drilling Rig Components

Figure 7 shows the diagrammatically the components of a typical oil drilling rig similar to the one to be used in the proposed project. Premier Oil is a company associated with Lion Petroleum Corp.

2.5. Design and Construction of Drilling Rig

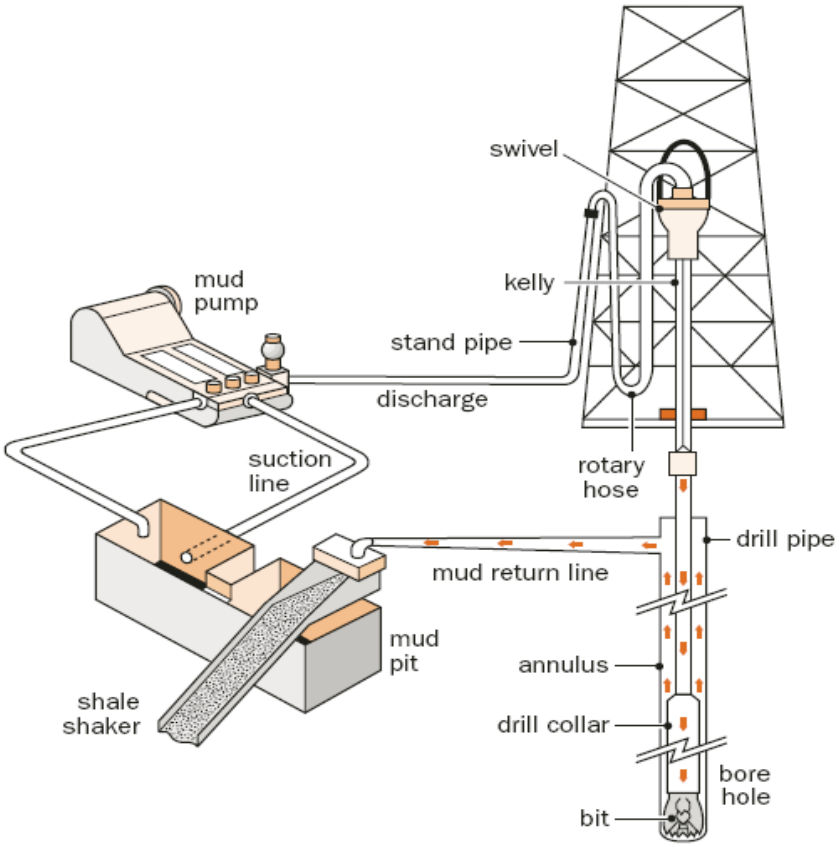

Figure 8: A simplified representation of oil drilling rig

Figure 8, shows a diagrammatic representation of major components of on-shore oil drilling rig comprising shale shaker, mud pump, the mast and the drill pipe that drives the drill head down the hole. All the components work simultaneously, one feeding into the other systematically.

2.6. Drilling Technique to be used

For land-based operations a pad is constructed at the chosen site to accommodate drilling equipment and support services. A drilling pad for a single exploration well occupies between 10,000–15,000 m2; including the main campsite and equipment storage area, this will increase to circa 90,000-100,000 m2. The type of pad construction depends on terrain, soil conditions and seasonal constraints.

Land-based drilling rigs and support equipment are normally split into modules to make them easier to move. Drilling rigs may be moved by land, air or water depending on access, site location and module size and weight. Once on site, the rig and a self-contained support camp are then assembled. Typical drilling rig modules include a derrick, drilling mud handling equipment, power generators, cementing equipment and tanks for fuel and water as demonstrated in the figure above. The support camp is self-contained and generally provides workforce accommodation, canteen facilities, communications, vehicle maintenance and parking areas, fuel handling and storage areas, and provision for the collection, treatment and disposal of general wastes.

Once drilling commences, drilling fluid or mud is continuously circulated down the drill pipe and back to the surface equipment, (see schematic below). Its purpose is to balance underground hydrostatic pressure, cool the bit and flush out rock cuttings. The risk of an uncontrolled flow from the reservoir to the surface is greatly reduced by using blowout preventers—a series of hydraulically actuated steel rams that can close quickly around the drill string or casing to seal off a well located below the rig floor. Steel casing is run into completed sections of the borehole and cemented into place. The casing provides structural support to maintain the integrity of the borehole and isolates underground formations.

Drilling operations are generally conducted around-the clock. The time taken to drill a bore hole depends on the depth of the hydrocarbon bearing formation and the geological conditions, but it is commonly of the order of one or three months, dependent upon the depth below ground level drilled. Where a hydrocarbon formation is found, initial well tests—possibly lasting another month—re conducted to establish flow rates and formation pressure. These tests may generate oil, gas and formation water back to surface—each of which needs to be disposed of.

After drilling and initial testing, the rig is usually dismantled and moved to the next site. If the exploratory drilling has discovered commercial quantities of hydrocarbons, a wellhead valve assembly, (a “Christmas Tree”), may be installed. If the well does not contain commercial quantities of hydrocarbon, the site will be decommissioned to a safe and stable condition and restored to its original state or an agreed after-use. Open rock formations are sealed with cement plugs to prevent upward migration of any wellbore fluids. The casing wellhead and the top joint of the casings are cut below the ground level and capped with a further cement plug.

When exploratory drilling is successful, more wells are drilled to determine the size and the extent of the field. Wells drilled to quantify the hydrocarbon reserves found are called ‘outstep’ or ‘appraisal’ wells. The appraisal stage aims to evaluate the size and nature of the reservoir, and to ultimately determine the number of confirming or production wells required, and whether any further seismic work is necessary. The technical procedures in appraisal drilling are the same as those employed for exploration wells, and the description provided above applies equally to appraisal operations. A number of wells may be drilled from a single site, which increases the time during which the site is occupied.

2.7. Casing operations

Typically, a well contains multiple intervals of casing successively placed within the previous casing run. The following casings are normally used in an oil or gas exploration:

- Conductor casing
- Surface casing
- Intermediate casing
- Production casing or liner, (in the event that testing or subsequent production is an option)

The conductor casing serves as a support during drilling operations, to prevent flow back returns during drilling and cementing of the surface casing, and to the collapse of the loose soil near the surface. It can normally vary from sizes such as 18" to 30".

The purpose of surface casing is to isolate water zones so that they are not contaminated during drilling and completion. Surface casing is the most strictly regulated due to these environmental concerns, which can include regulation of casing depth and cement quality. A typical size of surface casing is 13⅜ inches.

Intermediate casing will be set at deeper depths to similarly secure an exposed borehole interval, and may be of more than one string and several sizes ranging from 7" to 13⅜".

Production casing or liner is only set in the event of a discovery or subsequent appraisal and production wells, and is generally set at or close to the bottom of the last section of the well, to permit production of the wellbore fluids into the casing in a controlled manner and thence to surface via a smaller specialist pipe known as tubing; this would be connected to the Christmas, (or Xmas), Tree valve system.

Table 1: the variable sizes of casing and depths

Hole Size (in)	Casing Size (in)	Depth of Shoe (metres BGL)	Section Length (metres)	Proposed Mud System
	30"(762mm)	+/- 20	+/- 20	Pre-Installed
26" (660mm)	20"(508mm)	+/-300	+/-300	Spud
17.5" (445mm)	13 $^{3}/_{8}$"(337mm)	2000	1700	WBM
12.25"(311mm)	9 $^{5}/_{8}$"(244mm)	3520	1520	WBM
8.5"(216mm)	7"(178mm)	TD	1480	WBM

2.8. Drilling Mud System

Drilling fluid is used to aid the drilling of boreholes into the earth. Often used while drilling oil and natural gas wells and on exploration drilling rigs; drilling fluids are also used for much simpler boreholes, such as water wells. The three main categories of drilling fluids are water-based muds, non-aqueous muds, usually called oil-based mud, and gaseous drilling fluid, in which a wide range of gases, (including simply, air), can be used.

The main functions of drilling fluids include providing hydrostatic pressure to prevent formation fluids from entering into the well bore, keeping the drill bit cool and clean during drilling, carrying out drill cuttings, and suspending the drill cuttings while drilling is paused and when the drilling assembly is brought in and out of the hole. The drilling fluid used for a particular job is selected to avoid or minimize formation damage and to prevent corrosion.

The proposed exploratory drilling will use water in a system referred to as Water – Based Mud (WBM). Most basic water-based mud systems begin with water, then clays and other chemicals are incorporated into the water to create a homogeneous blend resembling something between chocolate milk and a malt (depending on viscosity). The clay (called "shale" in its rock form) is usually a combination of native clays that are suspended in the fluid while drilling, or specific types of clay that are processed and sold as additives for the WBM system. The most common of these is bentonite, frequently referred to in the oilfield as "gel". Gel likely makes reference to the fact that while the fluid is being pumped, it can be very thin and free-flowing (like chocolate milk), though when pumping is stopped, the static fluid builds a "gel" structure that resists flow. When an adequate pumping force is applied to "break the gel", flow resumes and the fluid returns to its previously free-flowing state.

Many other chemicals (e.g. potassium formate) may be added to a WBM system to achieve various effects, including: viscosity control, shale stability, enhance drilling rate of penetration, cooling and lubricating of equipment.

On a drilling rig, mud is pumped from the mud pits through the drill string where it sprays out of nozzles on the drill bit, cleaning and cooling the drill bit in the process. The mud then carries the crushed or cut rock ("cuttings") up the annular space ("annulus") between the drill string and the sides of the hole being drilled, up through the surface casing, where it emerges back at the surface. Cuttings are then filtered out with either a shale shaker, or the newer shale conveyor technology, and the mud returns to the mud pits. Some mud pits let the drilled "fines" settle; whilst the other pits are agitated and are where the fluid is treated by adding chemicals and other substances. Following sampling and analysis, the separated rock material will be discharged to the surface, where its disposal will be managed according to defined environmental impact mitigation procedures. A typical solids control system for drilling fluid, which is illustrated I nthe figure schematically in below, consists of the following main components:

- *Shale shakers* (remove large-sized cuttings);
- *Degasser* (removes entrained gas);
- *Desander unit* (removes sand-sized cuttings);
- *Desilter unit* (removes silt-sized cuttings);
- Mud cleaner unit; and
- *Centrifuge* (removes fine solids and drilling fluid weighting materials such as barites).

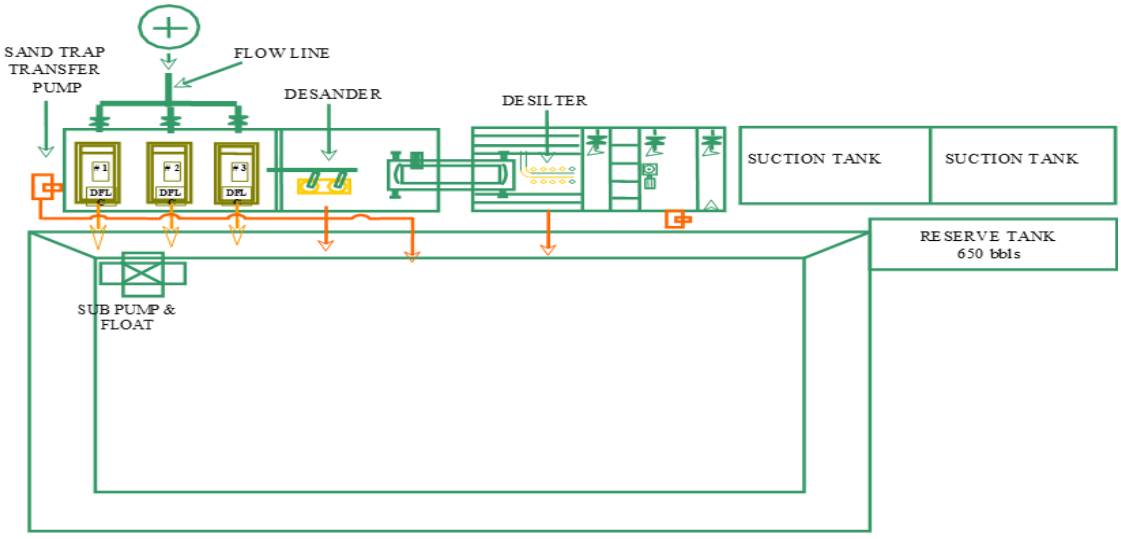

Figure 9: Schematic depiction of a typical solids control system used to separate cuttings from drilling fluid

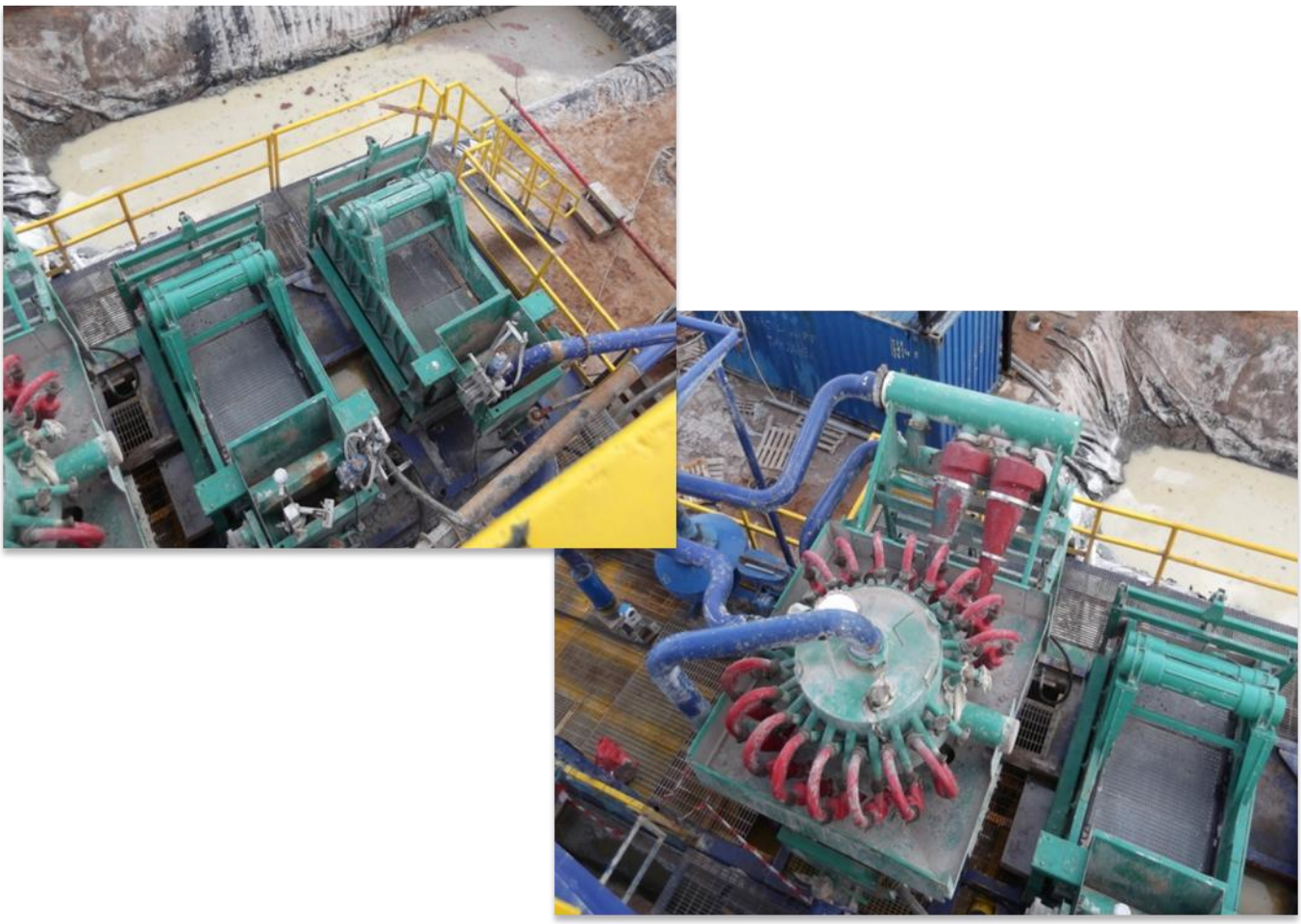

Figure 10: Solids control equipment (derrick shakers on the left, hydro-cyclone mud cleaner on the right)

The returning mud can contain natural gases or other flammable materials which will collect in and around the shale shaker / conveyor area or in other work areas. Because of the risk of a fire or an explosion if they ignite, special monitoring sensors and explosion-proof certified equipment is commonly installed, and workers are trained and instructed to take safety precautions.

The mud is then pumped back down the hole and further re-circulated. After analysis by a specialist technician know as a "mud engineer" or "mud man", the mud is treated periodically in the mud pits to ensure properties which optimize and improve drilling efficiency, borehole stability, and other requirements listed below.

Table 1: Estimated quantities for drilling fluid and well clean-up chemicals and water that will be used for drilling the Babada-1 exploration well.

CHEMICAL PRODUCT NAME	**PRODUCT FUNCTION**	**TONNES**
I) Drilling Products		
BARITE	Weighting agent	330.000
CAUSTIC SODA	pH Control	1.000
SODA ASH	Reduce Calcium level	1.000
SODIUM BICARBONATE	To treat cement contamination	2.000
DEXTRID	Filtration agent/shale stabilizer	9.000
PAC UL	Filtration agent - low viscosity	6.000
PAC R	Filtration agent - high viscosity	1.000
BARAZAN D+	Viscosifier - Shear thinning	4.000
EZ-MUD RDP	Shale stabilizer/ lubricant	4.000
BARACARB (mixed grades)	Bridging agent/ LCM	48.000
STARCIDE	Biocide	1.000
OXYGON	Oxygen Scavenger	0.500
BARACOR 95	CO2 Scavenger/Thermal Extend.	0.600
BARADEFOAM W 300	Defoamer	0.500
CITRIC ACID	pH reducer	4.000
THERMA-THIN	Polymeric Defloculent	4.000
Option for FW/Amine based system		
CLAYSEAL +	Shale Inhibitor (Amine)	37.000
BOREVIS II	Viscosifier /Extender	11.000

BOREPLUS	Viscosifier /Fluid Loss Control	4.000
CLAY GRABBER	Shale stabilizer/lubricant (liquid)	4.000
Option for Potassium Acetate/Polymer/Glycol Inhibitive system		
POTASSIUM ACETATE (KAc)	Clay Inhibitor (Chloride free salt)	140.000
GEM CP	Shale Inhibitor (PEG)	40.000
II) Clean-Up/ Completion		
BARAKLEAN GOLD	Well Clean-Up (Flocculant)	1.600
FLO-CLEAN Z	Well Clean-Up (Surfactant)	1.600
OXYGON	Oxygen Scavenger	0.800
STARCIDE	Biocide	0.600
BARACOR 95	Corrosion Inhibitor	1.600
SODIUM FORMATE	Completion Brine @10.5 ppg	120.000
III) Contingency Products		
BARITE	Weighting agent	420.000
Bentonite API	Viscosifier (cmt mixwater)	10.000
CAUSTIC SODA	pH Control	3.000
SODA ASH	Reduce Calcium level	2.000
Sodium Bicarbonate	To treat cement contamination	3.000
DEXTRID	Filtration agent/shale stabilizer	9.000
PAC UL	Filtration agent - low viscosity	6.000
PAC R	Filtration agent - high viscosity	1.000
BARAZAN D+	Viscosifier - Shear thinning	4.000
EZ-MUD RDP	Shale stabilizer/ lubricant	4.000
BARACARB 50 (big bags)	Bridging agent / density	48.000
DRISTEMP	HT Fluid Loss Polymer	6.000
SAPP	Reduce Calcium level	4.000
QUIK FREE NS	Stuck Pipe additive	8.000

CF DESCO	Thinner - top hole sections	3.000
QUIK FREE NS	Stuck Pipe additive	3.328
HYDROPLUG	LCM (cross-linking plug)	4.000
BARACARB (mixed grades)	LCM	10.000
Kwikseal F/M/C	LCM-Blended product	5.000
BAROFIBRE	LCM - Fine/Ground cellulose	6.000
NutPlug/ Nutshell	LCM - Wallnut shells F/M/C	6.000
STEELSEAL	LCM - Resilient Dual Carbon	8.000
SOURSCAV	Iron Glutanate (H2S)	4.000
IV) Waste Management and Dewatering Products		
Acetic Acid	pH reducer	2.000
Citric Acid	pH reducer	6.000
Aluminium Sulphate	Flocculant	12.000
Calcium Hypochloride	pH reducer	2.000
Lime	alkalinity / pH	6.000
PHPA type flocculant (TBA)	Flocculant	3.000
	Total (Tonnes)	1,387.128

It is important to note that use of these chemicals will depend on circumstances as found during the drilling operations. Each of the chemical will be used when needed and the amounts needed.

2.9. Well logging

Well logging, is the practice of making a detailed record (a well log) of the geologic formations penetrated during drilling. The log may be based either on visual inspection of samples brought to the surface (geological logs) or on physical measurements made by instruments lowered into the hole (geophysical logs). Some types of geophysical well logs can be performed during any phase of a well's history: drilling, completing, producing, or abandoning.

The oil and gas industry uses wireline logging to obtain a continuous record of a formation's rock properties. Wireline logging can be defined as being "The acquisition and analysis of geophysical data performed as a function of well bore depth, together with the provision of related services. The measurements are made referenced to "TAH" - True Along Hole depth: these and the associated

analysis can then be used to infer further properties, such as hydrocarbon saturation and formation pressure, and to make further drilling and production decisions.

Wireline logging is performed by lowering a 'logging tool' - or a string of one or more instruments - on the end of an electrical wireline into an oil well (or borehole) and recording geophysical properties using a variety of sensors. Logging tools developed over the years measure the natural gamma ray, electrical, acoustic, stimulated radioactive responses, electromagnetic, nuclear magnetic resonance, pressure and other properties of the rocks and their contained fluids. For this article, they are broadly broken down by the main property that they respond to.

The data itself is recorded either at surface (real-time mode), or in the hole (memory mode) to an electronic data format and then either a printed record or electronic presentation called a "well log" is provided to the client, along with an electronic copy of the raw data. Well logging operations can either be performed during the drilling process, to provide real-time information about the formations being penetrated by the borehole, or once the well has reached Total Depth and the whole depth of the borehole can be logged

2.10. Well testing

In the petroleum industry, a well test is the execution of a set of planned data acquisition activities to broaden the knowledge and understanding of hydrocarbons properties and characteristics of the underground reservoir where hydrocarbons are trapped. The test will also provide information about the state of the particular well used to collect data. The overall objective is identifying the reservoir's capacity to produce hydrocarbons, such as oil, natural gas and condensate.

Data gathered during the test period includes volumetric flow rate and pressure observed in the selected well. Outcomes of a well test, for instance flow rate data and gas oil ratio data, may support the well allocation process for an ongoing production phase, while other data about the reservoir capabilities will support reservoir management.

Fluids brought to surface are normally processed through a “test package”, (a series of separator tanks, and monitoring systems), before being “flared off” through a specialist environmentally sensitive burner to reduce the pollutant effects of the emissions : any mildly contaminated formation waters will be separately captured and disposed of in accordance with the approved EMP.

2.11. Well completion and well suspension or Abandonment

On completion of activities, the well will be either plugged and suspended (if the well evaluations indicate commercial quantities of hydrocarbons) or will be permanently plugged and abandoned. In the event of a decision to suspend the well, it will be filled with a brine solution containing very small quantities of inhibitors to protect the well. The well will be sealed with cement plugs and some of the wellhead equipment (Blind Flange) will be left on the surface (Cellar).

If the well is abandoned it will be sealed with a series of cement plugs, all the wellhead equipment will be removed, leaving the surface clear of any debris and the site will be restored to its natural state to the extent possible.

2.12. Flaring

Flaring is the burning of natural gas and hydrocarbons that cannot be processed or sold. Flaring disposes of the formation fluids while releasing emissions into the atmosphere. Most flaring performed involves natural gas containing little or no Hydrogen Sulphide (H2S). Flaring is also used to dispose of waste gas containing contaminants such as Carbon Dioxide (CO2). It is a very important safety measure at natural gas facilities as it safely disposes of gas during emergencies, power failures, equipment failures or other "upsets" in the processing. Regulators have established guidelines for flaring reduction. Flare reduction increases the amount of marketable product being recovered and sold while also reducing emissions to the atmosphere.

Well test flaring occurs during drilling and testing of all oil and gas wells. This is a standard practice used to determine the types of fluids the well can produce, the pressure and flow rates of fluids and other characteristics of the underground reservoir.

Additional flaring during "under-balanced drilling" operations is performed to dispose of the gas that comes to the surface. This process speeds up drilling and reduces the damage to producing formations by the drilling fluids. Some well test flaring may be necessary after certain well servicing operations. The average flaring duration is 2.5 days.

What is emitted from the flares?

It has been assumed that flares burn at 99% efficiency. However, 1% of incomplete combustion can produce Carbon Monoxide (CO), unburned hydrocarbons, particulate matter (soot and ash), volatile organic compounds (Benzene, Toluene, Xylene), other organic compounds known as Polycyclic aromatic hydrocarbons and small quantities of Sulphur compounds such as Carbon Disulphide (CS2) and Carbonyl Sulphide (COS). Benzene is known as a cancer causing compound and Carbon Disulphide is also classified as a poison affecting the central nervous system. The effects of these depend on the magnitude, duration and frequency of exposure. Many of these compounds are not unique to flaring and are common products of incomplete combustion in emissions from automobiles, forest fires, stubble burning, barbecues and cigarettes.

2.13. Water Supply for drilling

Two boreholes will be made for each campsite used for test drilling to provide water will be needed for test drilling purposes. Water will be used for making Water Based Mud (WBM) solution for use in drilling. Ground water in the area is known to be saline and therefore the water borehole water will not be used by the workers or the residents of the camp because it is too salty. Fresh water for domestic use within the camp will have to be sourced from Habaswein the nearest place with fresh water aquifers and supplied by tankers to the campsite.

2.14. Drilling Operations and Generated Waste Streams

Drill site construction and rigging up are conducted in preparation for drilling activities. Wastes generated include debris, small quantities of lubricating oil contaminated soil from heavy equipment (e.g., bulldozers), and contaminated rainwater.

Drilling activities include the operation of the rig, a drilling mud system, and drill string and drill bit to “make” hole.

The drilling rig is used to handle the drill pipe and bit and to set casing to complete the well. Rig operation and maintenance uses numerous systems and various types of machinery.

Waste products include in small quantities: excess and spent drill-pipe connection grease, (pipe dope), hydraulic fluids, used oils and oil filters, rigwash, , , drums and containers, spent and unused solvents, paint and paint wastes, , scrap metal, solid waste, and garbage from the accommodation camps.

Drilling Waste consists of rock chips, (cuttings), generated at the drill bit during drilling and excess and waste drilling fluid.

Drilling fluid ("mud") is used to maintain hydrostatic pressure for well control, carry drill cuttings to the surface, and cool and lubricate the drill bit. Drilling fluids may be fresh or mildly brackish, (dependent upon the local make-up source), water-based, Potassium or other ionic compound solution water-based, oil-based, or synthetic-based depending upon the conditions encountered. Water used to make up the drilling fluid may require treatment to remove naturally occurring dissolved calcium and/or magnesium. Soda ash may be added to form a precipitate of calcium carbonate. Caustic soda (NaOH) is added to form magnesium hydroxide. In this case additional solid wastes may include:, calcium carbonate and magnesium hydroxide.

Solid additives are usually introduced into the mud system in a mixing (jet or "shotgun") hopper. In this case wastes may include: drilling fluid additives (used and unused) and empty containers. Other chemical additives for control of mud viscosity and gel strength are mixed in tanks connected to the mud stream.

Waste pits receive drill cuttings and solids, used drilling fluids, rigwash, and separately, surface runoff from the drilling location. Drilling wastes comprise of drill cuttings and solids, used drilling fluids, rigwash. Several devices are used to remove solids from the drilling fluid as it circulates. These include shale shakers, centrifuges, and cone-type desanders/ desilters.

2.15. Emission and Waste Management

Fugitive emissions include emissions from all non-combustion sources as well as from waste gas disposal activities.

In general, fugitive emissions from oil and gas activities may be attributed to the following primary types of sources:

- Equipment leaks;
- Evaporation losses;
- Disposal of waste gas streams (e.g., by venting or flaring), and
- Accidents and equipment failures.

Accidents and equipment failures may include well blowouts, gas migration to the surface around the outside of wells, and surface-casing vent blows. Gas migration to the surface may be caused by a leak at some point below the surface casing, or by the migration of material from one or more of the hydrocarbon-bearing zones which are penetrated (e.g., a coal seam).

The following additional sources of fugitive emissions may be encountered at oil and gas facilities, but are only minor contributors to greenhouse gas emissions by the oil and gas industry:

- methane emissions from wastewater handling,
- nitrous oxide from human sewage.

While methane (CH 4) is the predominant type of greenhouse gas emitted as a fugitive emission in the oil and gas sector, noteworthy fugitive emissions of carbon dioxide (CO2) and, to a much lesser extent, nitrous oxide (N2O), may also occur. CO2 is present as a natural constituent of most untreated hydrocarbon streams. Both CO2 and N2O may also be produced from oxidation of the organic constituents of waste gas streams. Combustion products are only classified as fugitive emissions when they are produced by waste-gas flaring or incineration activities.

2.16. Oil Spill Contingency Planning

In exploratory oil drilling spills from oil discovered in the area is unlikely because the operation is not for oil production. The moment the exploration hits the oil deposits only a little bit may be extracted for test purposes. If the well will be turned into a production well, the oil producers will work out an oil spill contingency plan which will include spills during production and transportation as well.

Any oil spill that may occur during the proposed operations may arise from the machineries and vehicles in use on site and the machinery maintenance workshop in the camp. The drilling engineer will ensure that all machineries used on site are in good condition and that technicians working in the maintenance workshop are instructed on how to avoid oil spills.

If oil spills do occur, the soil contaminated by the spill will be collected mixed with clean soil from the surface to reduce toxicity and buried in a pit where it will have no contact with people, animals or any other organism on the ground, or will be collected into a storage container and removed by an authorized contractor to a licensed waste disposal site..

3. Equipment, Materials and Resources to be used

3.1. Equipment

At all times during the construction phase, the contractor will ensure that high quality construction and installation of materials and equipment is done. During this phase, a number of equipments to be used will include but not limited to the following: concrete mixers, vibrators, welding machines, simple hand equipments, electrical equipments, lorries and excavators.

3.2. Materials

The materials that will be used shall be as per the Kenya Bureau of Standards and care will be taken to ensure that only sufficient materials and equipments are purchased to avoid wastage.

Materials will be sourced locally from local manufacturers, stockiest and wholesalers. Sand and ballast shall be sourced from recommended dealers or local “borrow pits”. Materials will include plastics, cement, water, paints and hardcore stones, sand, ballast, reinforcement steel, wood and timber products, steel sections, water supply and drainage pipes, electrical wiring and PVC conduit pipes, concrete paving and slabs, electrical fitting, plumbing and drainage fittings, roofing, paints and varnish.

3.3. Project Resource Inputs

A large amount of capital and recurrent resources will be used throughout the project cycle.

These will comprise:

- Land – will be needed for the project
- Water – for mixing the cement, drilling operations, dust control, for landscaping and domestic uses.
- Plant and equipment – these will be required during the construction of the building and associated works.
- Energy resources including electricity, petroleum fuels (diesel, heavy industrial oil, petrol) and engine oils for vehicles.
- Labour (skilled and unskilled) – causal workers will be employed as well as qualified personnel such as engineers and geologists.
- Funds – the proponent will require finances to implement the project.
- Construction materials and equipments are necessary.
- Policy and Legal documentation and enforcement instruments that are needed in terms of approvals and the relevant legislations on the project.

Waste that may be generated at construction and installation

There are likely to be a number of wastes in the construction process.

These would include:

- Soil and pebbles from excavation and construction debris.

- Dust emissions arising from excavations activities on site and the transport to site of construction materials.
- Polythene sheeting and nails from installation activities.
- Worn-out construction equipment parts, and
- Domestic solid and sewage waste from the workers

4. Project Benefits

Though the exploratory drilling activity is temporary and of short duration it has many beneficial impacts. Some of the benefits include:

- Generating indirect employment in the region during site preparation and drilling activities, supply of raw materials and auxiliary works.

- The commissioning of project would lead to improvement in transport facilities as loose or soft surface rural roads will be upgraded to facilitate movement of the drilling rig and supply vehicles.

- In case hydrocarbon reserves are found it will lead to all round prosperity of the region and the Kenya nation.

- A boost in business for the local area as the exploratory personnel increase demand for commodities.

5. Terms of Reference

To facilitate compliance with EMCA 1999, and the Kenya government regulations on environmental impacts assessment and the issuance of a license by NEMA, the proponent has contracted Dr. Joseph Mworia Maitima a lead EIA expert to conduct a full study for the exploratory drilling part of the project. This will involve establishment of a base camp in the area where the test drilling will be done. It is to be noted that the proponent already had a NEMA approval for establishment of a camp within block 2B and that the camp was to be moved from site to site within the block. This time the camp is being moved to a site where test drilling will be done.

The consultant has the following terms of reference:

- To meet the legislative requirement of the National Environmental Management Authority by carrying out an environmental impact assessment exercise for the proposed exploratory
- Compile an action plan for the prevention and management of foreseeable accidents and other works related to health and safety hazards during the operation of the project.
- To collect and collate views from the local neighborhood and stakeholders interested and affected by the presence and operations of the proposed facility.
- To obtain sufficient baseline information on the bio-physical and Socio-economic environment.
- To obtain data on significant environmental impacts, including health and safety of the workers, visitors to the project and surrounding environment.
- To prepare project alternatives as provided in the act and the guidelines for environmental impacts assessment.
- To collate and analyze findings of the specialist investigations and information gathered during the assessment, and thereof highlight the following:
- Mitigation measures to avoid negative environmental impacts and if possible alternative activities that could be considered.
- Measure to maximize positive impacts
- Possible monitoring indicators for future use/reference.
- Determine gaps in knowledge that were encountered during the course of the study.
- Make recommendations.

In accordance with the National Environmental Management Authority (NEMA), Section 58 of the Environmental Management and Co-ordination Act (1999), and the Environmental (Impact Assessment and Audit) Regulations (2003). It is on this basis that, the proponent commissioned a

NEMA lead expert as a consultant to prepare this Environmental Impact and Social Impact Project Study Report.

5.1. Responsibilities

The responsibilities are as follows:

The Proponent is to provide the following;

- Site maps for the developments showing service roads, background information on previous studies including records on public participation during the previous surface exploratory activities in the area.
- Proposed measures intended for handling solid and liquid wastes, soil erosion and vegetation degradation
- To provide permits and corporate principles that govern the proposed activities

The consultant is to provide or accomplish the following:

- A project brief describing the proposed activities for NEMA approval to undertake the full study
- An Environmental Impacts Assessment Study draft report to the Client
- An Environmental and social Management Plan (ESMP) to the client
- Final Environmental Impact Assessment Study report to the proponent that will be submitted to NEMA for approval

5.2. Scope of EIA Study

The scope of study includes detailed characterization of existing status of environment around the proposed exploratory drilling site in Block 2B in Laghbol North and Korich locations of Wajir County for various environmental components viz. air, noise, water, land, biological and socio-economic. Under the scope of EIA it is envisaged:

- To assess existing status of air, noise, water, land, biological and socioeconomic components of environment
- To identify and quantify significant impacts of the campsite and the proposed drilling operations on various environmental components
- To evaluate proposed pollution prevention and control measures
- To prepare a pragmatic environmental and social management plan (ESMP) outlining control technologies and or practices to be adopted for avoiding and mitigating adverse impacts
- To delineate post-project environmental quality monitoring programme to be implemented.

6. Methodology for EIA

Keeping in view the nature of activities envisaged and environmental impacts assessment guidelines and regulations of 2003, the area around proposed exploration well site was studied for the purpose of environmental impact assessment studies. The work to be carried out for each of the environmental components is briefly reported below and described in details for the purpose of showing the extent the study report will cover.

Air Environment

- Collection of surface meteorological data like wind speed, wind direction, relative humidity, rainfall, ambient temperature etc.
- Design of ambient air quality monitoring network

Noise Environment

- Establishing existing status of noise levels in residential, commercial, industrial areas and silence zones within the block area.

Land Environment

- Collection and assessment of representative soil samples within the study Area
- Assessment of productivity and fertility of soil found within the study area.

Water Environment

- Collection of surface and ground water resources for determining quality of water in the study area

Biological Environment

- Collection of data on flora and fauna including rare and endangered species within the block area
- Collation of information on wildlife sanctuaries / reserve forest if any in the vicinity of the project area
- Assessment of species diversity, density, abundance etc., in the study region.

Socio-economic Environment

- Collection of baseline data including demographic details, such as households, population, literacy, employment pattern, general health, tribal, transport, communication & welfare facilities such as hospitals, educational institutions, project awareness amongst the public, infrastructure facilities, economic resources, cultural and aesthetic attributes etc. as per the requirements under

Anticipated Environmental Impacts

- Identification of Environmental Impacts associated with exploratory drilling

- Prediction of adverse impacts due to activities related to proposed exploratory drilling

- Assessment of adverse impacts due to the proposed activity on air, land, water, biological and on human interests.

Mitigation Measures

- It is recommended that all equipment are operated within specified design parameters during the preparation, construction, drilling and decommissioning phases both for the camp and the drilling activities.

Environmental and Social Management Plan

Environmental and Social Management Plan (ESMP) will be drawn after identifying, predicting and evaluating the significant impacts on each component of the environment with a view to maximizing the benefits from proposed project. The following measures will also be included in ESMP:

- Recommend mitigation measures required to address environmental and social concerns such as wildlife and habitat protection, cultural and archaeological sites protection, terrain stabilization, maintaining water resource, debris disposal and conservation of natural resources, drainage and water flow patterns

- Provide a comprehensive and detailed plan covering environmental and social variables to be monitored, the location and timing of sampling and the use to be made of monitoring data to ensure compliance with the applicable environmental rules/regulations throughout the life of the project

- Delineate post-closure plan coexisting with natural surroundings for abandonment of wells, rig dismantling and site completion and reclamation for abandonment.

7. Existing Environmental Conditions

7.1. Climate

The project area lies within the Sahelian Climatic region, characterized by dry spells and short rainy seasons and is classified as 100% Arid and Semi Arid Land (ASAL). The area experiences high temperatures and low unreliable rainfall throughout the year. The hottest season falls between November and April with temperatures soaring up to 38°C. Cooler months of July and August have mean temperatures of between 25 – 30°C. Rainfall is generally low and unreliable in the area but when it rains, it falls in sudden heavy storms often causing unpredictable sheet wash and flash floods.

Table 3: Climate data for Wajir

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average high ˚C (˚F)	35(95)	36(96)	36(96)	34(94)	33(92)	32(90)	31(88)	32(89)	33(91)	33(92)	33(91)	33(92)	33.4(92.2)
Average low ˚C (˚F)	21(70)	22(72)	23(74)	24 (75)	23 (73)	21 (70)	21 (69)	21 (69)	21 (70)	22 (71)	22 (71)	23 (73)	21.9 (71)
Precipitation mm (inches)	5(0.2)	13 (0.5)	20 (0.8)	69 (2.7)	36 (1.4)	0 (0)	5 (0.2)	3 (0.1)	5 (0.2)	25 (1)	41 (1.6)	23 (0.9)	244 (9.6)

Source: Weatherbase

Rainfall in Wajir is generally low with some months with no rain at all or with very low rainfall. The area has a bi-modal pattern of rainfall with the long rains falling from Feb. to May and the short rains falling in the months of October and November.

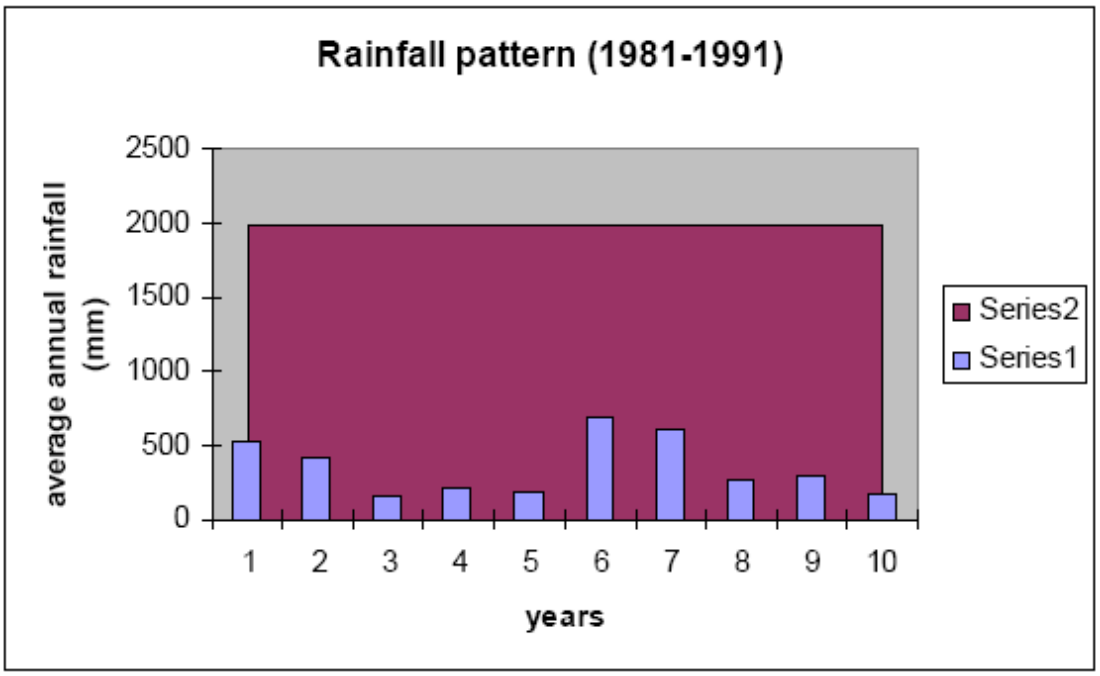

Figure 11: Rainfall patterns in the proposed site

7.2. Topography

The drilling site is located in the western side of block 2B – east of the country, within the County of Wajir in the former North Eastern Province of Kenya. The topography around the proposed site lacks any significantly conspicuous features. The area is generally flat with some point rising to the 600m.asl to as low as 400m.asl. along the Uwaso Nyiro-Lorian swamp plains. The project site is therefore in the low-lying flat land area within the dry Nyika plains of the country.

7.3. Geology

The Geology of the area is generally viewed to be of the sedimentary rock sediments of Quaternary Geological Age associated with the Coastal plains of the country. There were very few solid rock exposures encountered within the exploration concession during this field work survey. The few poor exposures encountered during the field survey consisted of poorly unconsolidated marine *kunkar* limestone. See the geological map below.

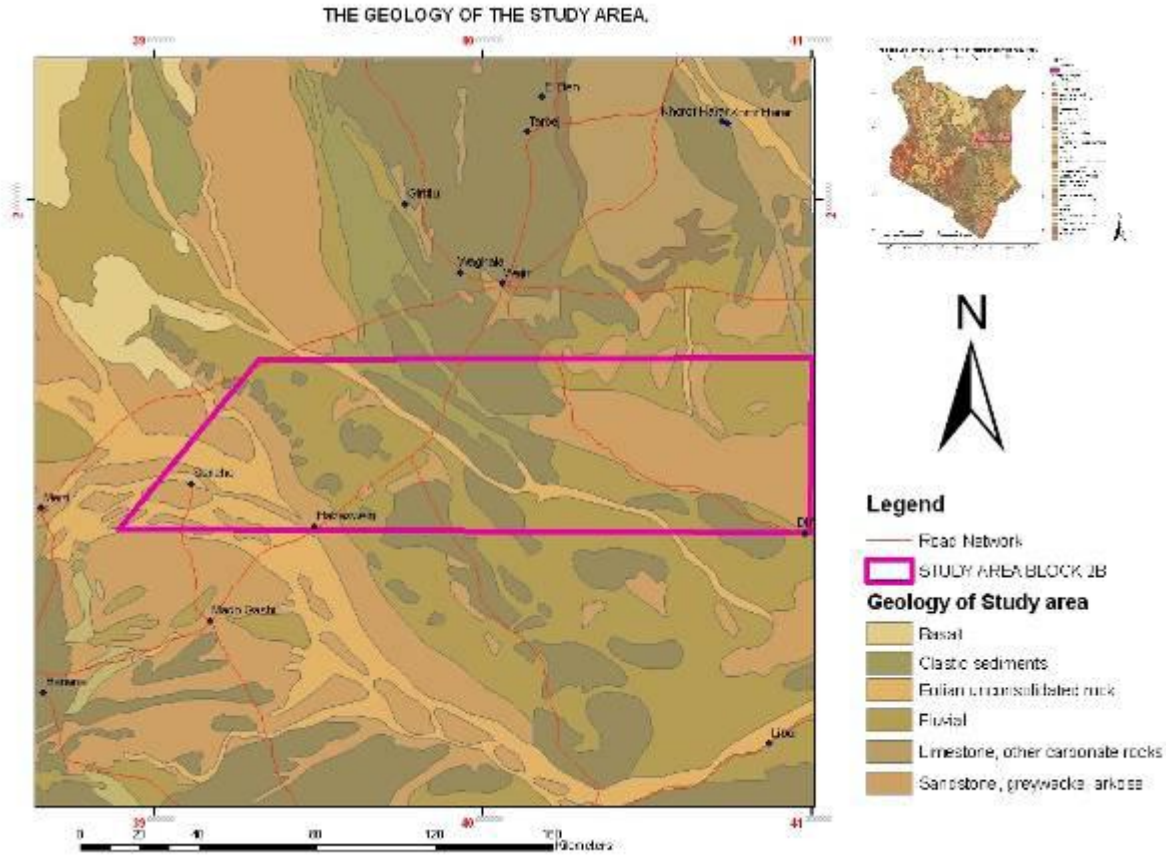

Figure 12: The geological map of the study area. (Modified from the geological of map Kenya by Schlueter, 1997).

7.4. Soils

The soils are mainly sandy cal-silicate with some alluvium deposits along the Ewaso Nyiro-Lorian swamp plains. The large part of the project area is covered by reddish coarse sandy soils which grades to light grey sandy-clay in the few river valleys locally known as ‘laggas’.

7.5. Hydrology

Wajir is part of the expansive ASAL of Kenya, the area characterized by dry riverbeds usually that collects water only during the rainy days as a result of surface runoff. Ground water is the main source of water for domestic purposes. The water table in Wajir is very high where in some places shallow wells dung for only 5 meters below the ground level gives water. For most part of the county the ground water is saline except in Habaswein where boreholes dung to a depth of about 150 meters yields fresh water.

7.6. Archaeology

Desk analysis at the National Museums of Kenya has established that there are no archaeological sites in the area proposed for this exploratory drilling. However, the proponent and the contractor will be observant of any exposure of prehistoric cultural or palaeontological materials and if found relevant authorities at the National Museums of Kenya will be contacted for advice on how to handle them.

Figure 13: Pit excavated to study the soil profile on the proposed site

7.7. Flora and Fauna

The vegetation in the area is generally thin in density and poor in diversity. These are dominated by tall elephant grass that grows mainly during rainy season and dries up during the long dry spells. Scattered thorny trees and bushes are found on the plains while the dry river beds (laggas) are covered by green umbrella shaped acacia trees and other thorny shrubs.

Animal species identified include Giraffes, Somali ostriches, and a few cheetahs along the dry savannah; rodents (mice), birds mainly along the river valleys, dikdik antelopes, mongrels and domestic livestock including zebu cattle, goats sheep and camels The area is generally flat terrain with sandy soils and is colonized by scattered thorny trees. See the desert wind erosion features; hummocks.

Figure 14: Photograph of vegetation in the proposed site

7.8. Drainage

The district depends upon the seasonal Uwaso Nyiro River, pans, dams, bore holes, and to small extent roof catchments for sources of water. The area's main permanent sources of fresh water are boreholes sunk along the Uwaso Nyiro River flood plain and swamp grounds. Many other streams such as lagh Mura, Libahili, and Dera are all small and seasonal streams emptying into the swamps.

7.9. Water

The project area is considered to be under arid and semi-arid, ASAL climatic condition. The area experiences dry climatic condition with little rainfall. The area is generally a water scarce region. The natural water sources are seasonal rivers and streams, seasonal water pans, and riverbed sand wells. These are the primary sources of water for both domestic and livestock uses. See map below.

7.10. Communication

The project site is situated within the reaches of the Garissa-Wajir-Mandera road with an infrastructure that is in relatively good all weather condition. Other neighbourhood feeder roads are sandy graveled to all weather status. The new and previous exploration cutline roads are also in good conditions and are providing new communication inter connection infra structure routes to the local pastoralist movements. Telecommunication and postal services network are generally poor in this region. These facilities are only available in Habaswein Township. There are no fixed telephone lines close to the project area. Mobile phone signal for the major companies are however available around a few small Townships with telecommunication masts along the Garissa-Wajir Road.

7.11. Aesthetics

The unusually flat and open panorama covered by scattered trees forms great scenic beauty. This scenery is enhanced by the hot weather and the attractive wildlife and the unusually big and clean domestic animals including the camel which make a great tourist attraction.

8. Baseline social and economic conditions

8.1. Project sites Administrative Units

The proposed test drilling site for Block 2B is in the western half of the block covering parts of two locations of Wajir County namely Laghbogol and Korich locations. There are reports of past oil and gas exploration in the area. However, this chapter discusses the baseline social and economic conditions of the local people before the commencement of the proposed test drilling project area.

8.2. Baseline Social Conditions

The team of Consultants surveyed through site visit and reviewed related literature on the social conditions of the proposed projects environment before the commencement of the proposed project. The study findings are discussed in the session below:

8.3. Settlement Patterns

Water availability and security influence the districts population distribution and density.

The two locations have no developed infrastructure and lack organized commercial centers.

People tend to settle in the small set up market centers where they can have security arrangements. The clustered types of settlements within the district provide a good opportunity for basic services like water, health care and education.

8.4. Population Distribution in the project area

The two affected locations have a population growth rate of about 3.7%. The neighbouring Habaswein Division is projected to have the highest population density of 8 persons per square kilometer, due to higher concentration of business majorly, SMEs, informal sector income generating activities and employment activities. This is partly because of good telecommunication coverage. The two locations in the area proposed for oil exploratory drilling have low population densities for being in the interior where the main activities is livestock keeping. The dominant ethnic group in the two locations is Somali.

8.5. Land- use

Land in the 2 locations is commonly owned except in urban area where plots are allocated to individuals by the former County Council and now Wajir County. The entire Wajir South district is categorized as trust land with only a small percentage of the total area which is occupied by townships. The proposed project area land is mostly rangelands suitable for nomadic pastoralism. Environmental degradation is a common feature along animal movement routes and the settlement areas like Laghbogol where unmanaged wastes like plastic bags are found everywhere in the market center.

8.6. Religion and Culture

The dominant religion in the proposed project site is Islam. The religion determines the local people's way of life including culture which among others include – worship, dressing and food. The local people are also very wary of outsiders intruding in their way of life.

8.7. Gender and Children Affairs

Gender issues are deeply rooted in culture and tradition. Education disparities have a ration of 1:2 girls to boys in both primary and secondary education. Literacy levels are therefore lower for women and stand at 8.1% for women against 21% for men. Access to economic resources is also low for women owing to the traditional division of labour which places women at the household level for domestic chores. Female Genital Mutilation (FGM) rates are high in the area under study with over 97% of the women having gone through it.

Girl child is seen as an investment for which the father expects to receive some dowry and often girls are married off at the tender age of 14 years, which forces them to drop out of school. This practice has also contributed to low enrolment of girls to school. Inadequate education infrastructure in the area under study also accounts for the low literacy levels. According to the District Development Plan most of the missing structures include classrooms, toilets and desks.

8.8. Youth Employment

Youth comprise the largest part of population in the two (2) locations. The highest number of the youth remains unemployed. The ages of 1-24 comprises of a 60% of the population (DDP, 2008-2012). This is economically active age group whose increase will require economic empowerment. Over 75% of those youth are currently involved in livestock subsector.

8.9. Levels of Poverty

Poverty levels are high in the two locations and the general area under study. According to the DDP and Vision 2030 (2008-2011), the majority of the people are not able to supply themselves with the basic needs of food, clothing and shelter. Causes of poverty include, unreliable rainfall, high levels of illiteracy, poor infrastructure, and natural disasters like floods, droughts and poor market systems. Environmental degradation associated with climate change- severe and more frequent droughts have aggravated poverty levels.

8.10. Housing

Majority of the local people live in semi-permanent grass thatched 'manyattas' made of grass stall walls and grass thatch. The type of housing is suitable for the hot and dry climate of the area. They however are quite inconvenient to live in, during the rainy seasons. The semi-permanent housing materials are ferried from place to place during the pastoralist's migration. The houses made up of tree twigs are semi permanent and when families migrate to other areas for pasture, they leave behind the twigs and cut others where they eventually settle. This cutting of the already stressed tree resources contributes to environmental degradation.

Figure 15: typical human settlement

Figure 16: A typical homestead

8.11. Health

The area under study suffers from critical water scarcity. People depend on surface water pans and untreated water increases risk of water borne diseases. Nomadic lifestyles and long distances to

the nearest health facilities reduce the utilization and access to health facilities hence leading to high infant and maternal morbidity and mortality.

8.12. HIV/AIDS

Prevalence rate has been increasing over the years from 0.1 in 1999 to about 2% in 2008

(NDP, 2008-2012). Equally, the rate of new infection is increasing at a rate of 4% per annum (NDP, 2008-2012). Most victims are women. The major challenges of fighting HIV/AIDS are due to high levels of stigmatization.

9. Baseline Economic Conditions

Livestock production is the major economic activity in the area under study. An estimated 90% of the local people are engaged in this activity, making it the major source of employment. The sector has also faced challenges that include erratic rainfall, insecurity and poor infrastructure. The main livestock in the area include cattle, sheep, goats, camels, donkeys and poultry keeping at small scale.

Figure 17: Camels fetching water

Figure 18: Camels, cows and donkeys and small ruminants

9.1. Trade, Tourism and Industry

Trade

Trade in livestock and their products make up the key commodities for trade and dominate the economy. Hundreds of traders trek to the project areas to buy animals for slaughter. Meat products from the region supply most major towns in Kenya and also find their markets outside the country and particularly the Middle East.

Tourism

The area is heavily endowed with wildlife and there species of various types such as ostrich, gazelles, giraffes, warthog, lions, Cheetahs, monkeys and birds.' There no national parks in the 2 locations but the animals and people co-exist together with minimum conflict.

Figure 19: Giraffes, roads and bushes in Block 2B

9.2. Physical Infrastructure

This sector comprises of telecommunications, roads and transport, energy and piped water.

Telecommunications

Poor communication in the area makes communication difficult. The main towns like Habaswein, Laghbogol land other pockets of the two locations have telephone networks but other area the network is either lacking or very week. This makes communications very difficult and retards development.

Road transport

Most of the roads in the area are unclassified. They are loose surface roads which are impassable during the rainy seasons. The poor conditions of the roads cause relatively high wear and tear of vehicles. It also limits the type of vehicles used to trucks and 4 wheel drive vehicles. The poor conditions of the roads are a major hindrance to the development in the vast area of North Eastern Province.

Energy

The main source of energy for cooking is wood. However, the area is endowed with intense heat and most parts have winds that can be tapped as alternative sources of energy.

9.3. Piped water

Piped water in the project area is only found in the urban areas. The people in the rural areas use shallow water pans but where the Government and NGOs have assisted, the people use boreholes. During the time of drought, people in the project area supplied with food and water by the government and NGOs.

10. Public consultations and socio economics

10.1. Introduction

Consultative Public Participation (CPP) as an EIA procedure is an aid to project management. It is a useful tool for gathering local environmental information by understanding anticipated impacts from local people who have lived and understand their environment better. The consultation also gives a chance to the local community to participate in the determination of project alternatives regarding designing and citing viable and sustainable mitigation and compensation plans. The consultation is best carried out during the project design so that the stakeholders' views are incorporated in the plan as this is the requirement stated in EMCA 1999 and EIA/EA Regulations of 2003.

The objectives of public consultations were to:

- Inform representatives of the local people about the details of the proposed campsite development and oil exploratory drilling activities
- Ask local residents about the environmental and social problems they anticipate with the commencement of the proposed project and seek proposals on how these can be avoided, or mitigated.
- Promote social acceptance of the project to the local community so as to avoid costly modifications or abandonment of the project at a later stage.
- The consultation helped in obtaining additional information to the local community and in giving them a chance to contribute to the management of their environment

10.2. Consultation Method

The method of consultation used included:

- Public meetings where representatives of the local community aired their views for and against the proposed project. The general consensus was that the project should take off but ensure that all the negative environmental impacts are addressed.
- Focused groups discussions with the chiefs and sub- chiefs from the area
- One to one interviews
- Information gathering through questionnaires.
- The report of the analyzed questionnaire is included in session.

10.3. The Process

Public consultations process for Block 2B exploration drilling was held at Lagbogol North and Korich locations in Wajir between 24th – 28th February 2014. The local consultation at the oil explorations sites were preceded by the EIA experts holding 2 consultative meetings with key stakeholders one in Lagbogol North location and one on Korich location. Both of them were attended by the local administration including chiefs and assistant chiefs who were requested to invite all the leaders in their respective locations to the full consultation barazas.

Figure 20: Sensitization meeting Lagbogol North Location

Figure 21:Water pan made for residents of Korich

10.4. Public Consultation Forums

These public forums were organized to help exchange of views between various members of the community who included:

- Technical Officers from among others Environment and Natural Resources,, Livestock, Water
- Provincial Administration (District Officers, Chiefs and Assistant Chiefs)
- Opinion Leaders – political leaders,
- Local NGOS and CBOs
- Community Representatives – Religious leaders, Farmers, businessmen, retired public servants,
- Gender groups – women, men and youth

Detailed Consultations

The EIA Experts briefed the participants on the proposed activities on moving the campsite to the new location and the planned activities of drilling oil exploratory well (s). The experts then asked the participants to respond by mentioning the issues likely to be affected by the activities of the proposed

project. The issues raised by the participants will be considered during project design and in the whole project cycle. The EIA experts briefed the local community on the proposed project activities in detail including the establishment of the campsite, drilling of water boreholes, and the drilling of oil exploratory well. Attendance list for each CPP is attached as an annex to this document.

In total three (2) CPPs were held one in Lagbogol North location and the other in Korich location. The meetings were chaired by the respective chiefs representing the District Officer. During each of these meetings, the Environmental and Social Impact Assessment experts briefed participants on the proposed project, its design and clarified the objectives of the meeting, anticipated impacts

The community consultative meetings were held in order to gauge the attitudes of the communities towards the proposed oil exploratory drilling and moving of the camp to the new location that was identified on the ground at the border of the two locations. Detailed outcomes of each of these meetings are discussed here below.

Community Contribution to the Proposed Project

Following this presentation, the floor was opened for participants to raise their concerns, fears and propose mitigation measures or other recommendations. The participants were very cautious of past experiences of oil exploration where outsiders would move in without consultation with the locals, start drilling in secrecy and sometimes leave hurriedly without rehabilitating drilled explorations sites.

a) *Encroachment on human settlements*

The Local community was concerned that the truck roads will encroach on their settlements. They emphasized that they have a lot of attachment to their land which is their home and the community representatives proposed that should their settlements be affected, compensation should be made. They were assured that every effort will be made to avoid destruction of settlements but they be affected, the victims will be compensated.

b) *Communicable diseases and Cancers*

The local people felt that communicable diseases like HIV/AIDS and also cancers were not common before foreigners started moving in. The local people claimed that since exploration started in the area, things have been buried on the ground and they suspect those things are nuclear waste and as result incidences of diseases such as cancer have increased.

c) *Employment*

They local residents emphasized that they should be considered for jobs and especially unskilled employment. There is also need to sub-contract locals who have skills or companies to undertake some activities instead of bringing outside sub-contractors for minor works. Even skilled jobs should be advertised locally to give community members with such skills an opportunity to apply. The community should also take advantage of indirect employment during the planned oil exploration activities.

d) *Grave Yards and Cultural rites*

The local community advised that the proponents should keep off cultural rites including graveyards and mosques.

e) *Drainage and Erosion Control*

Drainage should not be directed towards homesteads. Drainage should also not be directed to natural springs where they get water for domestic use and for animals as this will cause pollution.

f) *Other Concerns*

The local communities were concerned about:

- Nuisance from polythene paper bags and other solid wastes
- NEMA to assist with the planting of tree especially in school compounds and to money to buy tree seedlings for planting.
- Campsite should be left for community use for example as social centres after the road construction.
- Boreholes constructed and used for watering be left for community use.

10.5. Summary of Perceived Negative Impacts

In summary negative impacts of the project are summarizes in the table below:

Table 4: Perceived Impacts and Proposed Prevention Measures

Potential Negative Impacts	**Proposed Mitigation Measures**
Physical Environment	
Displacement of residents	There are no human settlements in the project area. If any unforeseen activity by a resident will be displaced compensation will be made the displaced activity
Interference with animal watering points (or wetlands)	The project staff will be instructed to avoid interference with animal watering points
Interference with shared grazing areas	The project staff will be instructed to avoid interference with animal grazing areas
Forested trees	Trees will be protected and a replacement of any tree uprooted or destroyed will be made during the decommissioning of the project
Encroachment on wildlife habitats	Protect wildlife and their habitats
Social Environment	

Increased communicable diseases including HIV/AIDS	Respect local culture and traditions
Increased human and livestock accidents	Utmost care to be taken to avoid vehicle accidents with livestock
Conflicting culture and religion.	The contractor and the project employees will be requested to respect local cultures and religion
Employment of local people for casual labour	The contractor will be encouraged to seek unskilled labour from the local communities as a direct benefit.
Removal and relocation of grave sites	Utmost care should be taken to ensure non- interference with Cultural rites and grave sites
Noise pollution	Contractor to be advised to undertake work during the day to avoid being a nuisance to communities with noise pollution and to follow NEMA Regulations on Noise Pollution.
Dust can be a nuisance during construction.	The contractor to sprinkle water during construction to reduce dust pollution. In any case the Contractor will be encouraged to work away from human settlements

The stakeholders consulted cited many benefits of the proposed project as:

- Enhanced access to markets: creating of access road will benefit the local people in gaining access to markets
- Poverty reduction: Improvement of local socio-economy as access roads will improve business and boost the economy of the Region
- Employment for casuals
- Reduced travel time and transport costs and prices of goods

- Improved access to social services including local and national hospitals, schools and businesses in the government and NGO offices.

- Promotion of national integration and trade in the Region

Key recommendations and mitigation measures made by the local people is included in the EMP so that responsibilities and budget for mitigation can be allocated.

10.6. 11.4.1 Analysis of data collected through Questionnaires

A total of 27 responses were received from the two meetings held in the two locations. The participants were given questionnaires to fill. English was used as the medium of communication. This was mainly done at the places where meetings were held. Due to the domestic responsibilities for women, only very few were able to attend the meetings.

Statistical analysis responses

This has been done by analyzing the responses from those who filled the questionnaires.

There was a question as to whether the residents were aware of the proposed activities,

Response	Number	Percentage
Yes I was aware of their activities	25	92.59%
No I am not aware	2	7.41%

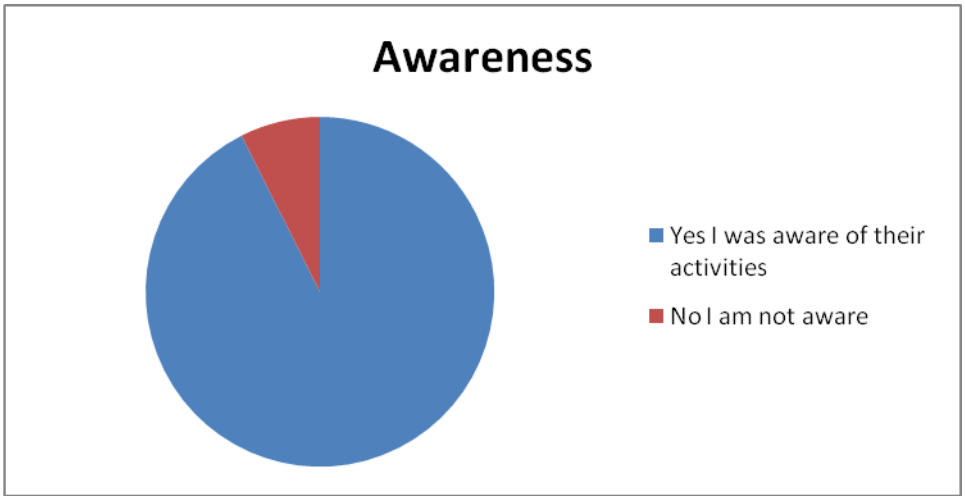

Figure 22: showing that most people were aware of the project

Do you support the project?

Response	Number	Percentage
Yes I was aware of their activities	24	88.89%
No I am not aware	3	11.11%

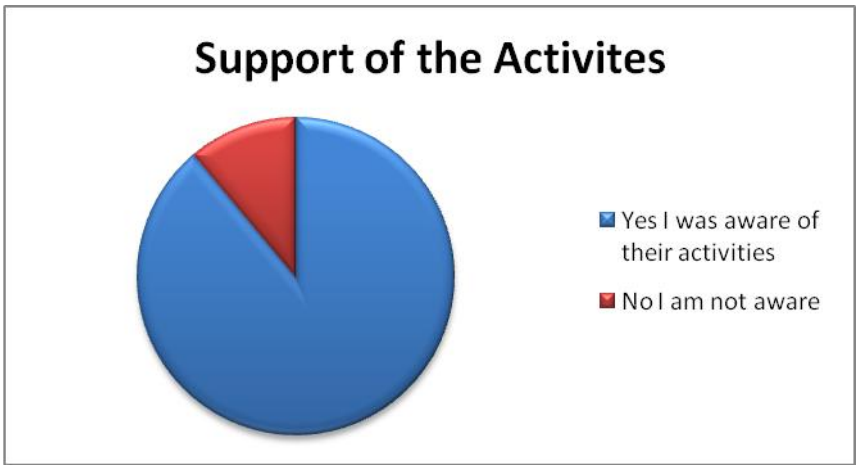

Figure 23 showing that most people are in support of the project

Table 5: Statistics of potential negative effects

Negative effects	Frequency	Percentage of respondents
Environmental Degradation	14	11.11%
Health effects	20	15.87%
Exposure to poisonous substances/ Dumping of waste	15	11.90%
Conflicts	10	7.94%
Danger to wildlife	8	6.35%
Socio-cultural effects	12	9.52%
Displacement	18	14.29%
Insecurity	20	15.87%
Loss of livestock	9	7.14%
Other effects		

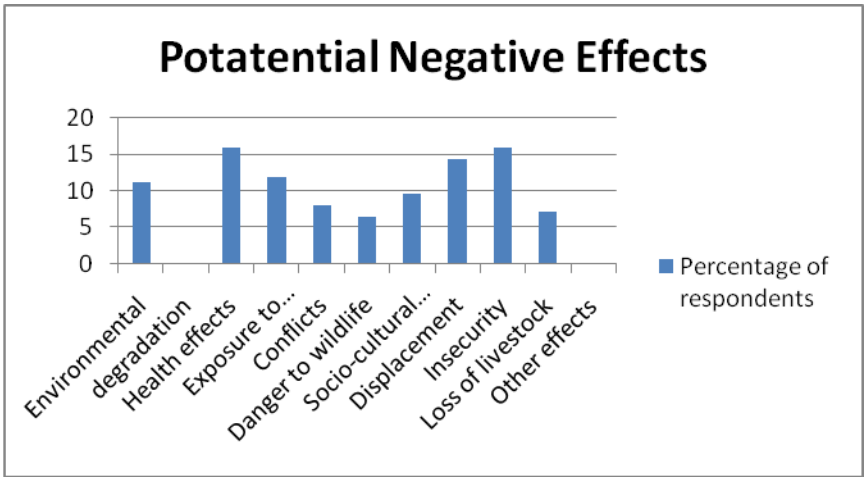

Figure 24: Histogram of responses on potential negative effects.

Table 6: The Statistics of positive effects as taken from the community

Positive effects	Frequency	Percentage of respondents
Job creation	22	14.57%
Improvement of Infrastructure/ Communication	24	15.89%
Drilling of boreholes, building of schools and other amenities	22	14.57%
Trade	20	13.25%
Social interactions	12	7.95%
Security	21	13.91%
Improved environmental Conservation	12	7.95%
Technological/ Skills transfer	18	11.92%

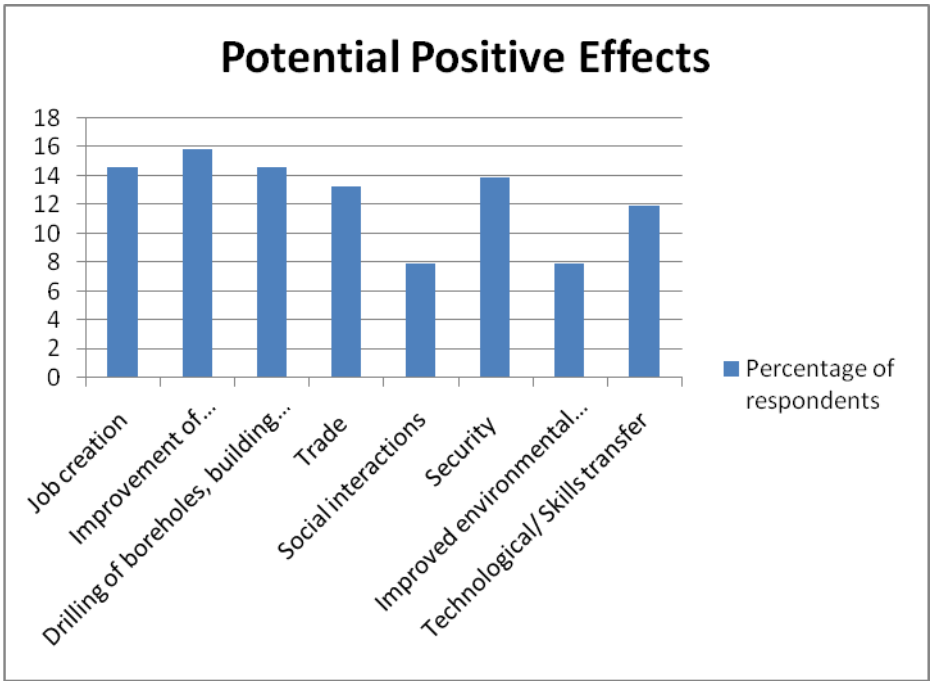

Figure 25: Graphic presentation of potential positive effects taken for the community

11. Project Alternatives

The main reason for establishing the air strip is to enable the proponent who is engaged in Oil and Gas exploration the main natural raw materials from which energy and its related petrochemical industrial development products depend upon. With diminishing fossil fuel resources worldwide, focus has now been turned to areas that were unlikely targets in the last century. Advancement in exploration technology has also meant revisiting such areas to acquire new set of data. Oil exploration activities impact on the environment either negatively or positively depending on the location, design and the nature of activities. This section of the ESIA report reviews the various alternatives of the project with a view to minimizing or enhancing the impact of the seismic exploration project, on the environment.

12. Alternative means of communication to the project site

Alternative means of communication leads to either travel by road or by air to Wajir and then by road from Wajir to the project site. There is no all weather road connecting Nairobi and Wajir. Tarmac road end in Garissa which is more than 300km away from Wajir. The road between Garissa and Wajir is dusty during dry seasons and muddy during the wet seasons. Public transport is not reliable due to the conditions of the road and not acceptable for business executives who are busy and can afford better means of communication

12.1. Travel by Road

Travel by road is undesirable because the vehicles are not comfortable and do take either a whole night on the road or a whole day to get to Wajir from Nairrobi. This is not convenient to business executives who are busy and can afford better means of communication.

12.2. Travel by air to Wajir town and by road to the project site

Travel by air to Wajir from Nairobi is not desirable as there are no scheduled flights by any airline. Flights are scheduled when there is a good number of a traveler to fill the seats of an aircraft. Business executives cannot delay their businesses until the aircraft has enough passengers.

With this alternative, the project staff will have to travel from Wajir town to the project site by road. The road from Wajir to Laghbogol the project site cannot be relied on during any season.

12.3. No Project "Scenario"

The no project Scenario in this case will mean no oil ang gas exploration is conducted in Block 2B of Wajir County, and that will lead into loss of a much needed opportunity of finding gas and oil. In view of the diminishing resources this commodity is needed to drive the national and global economies. Not exploring this opportunities will mean:

The country socio- economic developments will lag behind for lacking oil and gas that drives them. This country's industrial sector will keep paying heavily for these commodities that are currently controlled by the global market which slows development in a third world country like Kenya.

If the project started very many local people would get jobs and this will improve the social welfare of this Region that remains heavily under-developed.

If oil is found in this area, the responsible company would pump bank some of the money to improving the infrastructure like roads, water and transport and communication.

Poverty begets more poverty. With alternatives sources of livelihoods, the local people will continue relying on natural resources which is not sustainable development

13. Potential Environmental and Social Impacts

Oil and gas exploration and production operations have the potential for a variety of impacts on the environment. These 'impacts' depend upon the stage of the process, the size and complexity of the project, the nature and sensitivity of the surrounding environment and the effectiveness of planning, pollution prevention, mitigation and control techniques.

The impacts described in this section are potential impacts for the proposed exploratory well drilling in block 2B. With proper care and attention, these potential impacts may be avoided, minimized or mitigated. The oil exploration industry has been proactive in the development of management systems, operational practices and engineering technology targeted at minimizing environmental impact, and this has significantly reduced the number of environmental incidents worldwide. Various initiatives are described in the UNEP/IPIECA publication Technology Cooperation and Capacity Building, and preparation of this report has made reference to these

initiatives as much as they can apply to the environmental conditions in the area of operation (Block 2B).

Several types of potential impacts are discussed here. They include human, socio-economic and cultural impacts; and atmospheric, aquatic, terrestrial and biosphere impacts. Table 3 provides a summary of potential impacts in relation to the environmental component affected and the source and operational activity under consideration.

Drilling typically lasts a few months although the period may be longer in certain situations. It is only when a significant discovery of oil is made that the nature of the process changes into a longer term project to appraise, develop and produce the hydrocarbon reserves. Proper planning, design and control of operations in each phase will avoid, minimize or mitigate the impacts.

13.1. Human, socio-economic and cultural impacts

Exploration operations are likely to induce economic, social and cultural changes. The extent of these changes is especially important to local groups, who may have their traditional lifestyle affected. The key impacts may include changes in:

- land-use patterns, such as agriculture, and grazing as a direct consequence or as a secondary consequence by providing new access routes, leading to unplanned settlement and exploitation of natural resources;
- local population levels, as a result of immigration (labour force) and in-migration of a remote population due to increased access and opportunities;
- socio-economic systems due to new employment opportunities, income differentials, inflation, differences in per capita income, when different members of local groups benefit unevenly from induced changes;
- socio-cultural systems such as social structure, organization and cultural heritage, practices and beliefs, and secondary impacts such as effects on natural resources, rights of access, and change in value systems influenced by foreigners;
- Availability of, and access to, goods and services such as education, healthcare, water, transport, and consumer goods brought into the region;
- Aesthetics, because of increase in the number of people or noisy facilities; and
- Transportation systems, due to increased road infrastructure and associated effects (e.g. noise, accident risk, increased maintenance requirements of change in existing services).

Some positive changes will probably also result, particularly where proper consultation and partnerships have developed. For example, improved infrastructure, water supply, trade, health care and education are likely to follow. However, the uneven distribution of benefits and impacts and the inability, especially of local leaders, to predict the consequences of un equitable distribution employment opportunities for example, may lead to unpredictable outcomes.

13.2. Atmospheric impacts

Atmospheric issues are attracting increasing interest from both industry and government authorities worldwide. This has prompted the oil and gas exploration industry to focus on procedures and technologies to minimize emissions.

In order to examine the potential impacts arising from exploration operations it is important to understand the sources and nature of the emissions and their relative contribution to atmospheric impacts, both local and those related to global issues such as stratospheric ozone depletion and climate change.

The volumes of atmospheric emissions and their potential impact depend upon the nature of the process under consideration. The potential for emissions from exploration activities to cause atmospheric impacts is generally considered to be low.

13.3. Aquatic impacts

The principal aqueous waste streams resulting from oil exploration operations are:

- produced water;
- drilling fluids, cuttings and well treatment chemicals;
- process, wash and drainage water;
- sewerage, sanitary and domestic wastes;
- spills and leakage; and
- cooling water.

Again, the volumes of waste produced depend on the stage and method of the exploration process. In exploratory drilling the main aqueous effluents are drilling fluids and cuttings, whilst in production operations—after the development wells are completed—the primary effluent is produced water. Other aqueous waste streams such as leakage and discharge of drainage waters may result in pollution of ground and surface waters. Impacts may result particularly where ground and surface waters are utilized for household purposes or ecologically important areas are affected.

Indirect or secondary effects on local drainage patterns and surface hydrology may result from poor construction practice in the development of roads, drilling and process sites.

13.4. Terrestrial impacts

Potential impacts to soil arise from three basic sources:

- physical disturbance as a result of construction;
- contamination resulting from spillage and leakage or solid waste disposal; and
- Indirect impact arising from opening access and social change.

Potential impacts that may result from poor design and construction include soil erosion due to soil structure, slope or rainfall. Left undisturbed and vegetated, soils will maintain their integrity, but, once vegetation is removed and soil is exposed, soil erosion may result. Alterations to soil conditions may result in widespread secondary impacts such as changes in surface hydrology and drainage

patterns, increased siltation and habitat damage, reducing the capacity of the environment to support vegetation and wildlife.

In addition to causing soil erosion and altered hydrology, the removal of vegetation may also lead to secondary ecological problems, particularly in situations where many of the nutrients in an area is held in vegetation (such as tropical rainforests); or where the few trees present are vital for wildlife browsing (e.g. tree savannah); or in areas where natural recovery is very slow (e.g. Arctic and desert ecosystems). Clearing by operators may stimulate further removal of vegetation by the local population surrounding a development.

Due to its simplicity, burial or land-filling of wastes in pits at drilling sites has been a popular means of waste disposal in the past. Historically, pits have been used for burial of inert, non-recyclable materials and drilling solids; evaporation and storage of produced water, work over/completion fluids; emergency containment of produced fluids; and the disposal of stabilized wastes. However, the risks associated with pollutant migration pathways can damage soils and usable water resources (both surface and groundwater), if seepage and leaching are not contained.

Soil contamination may arise from spills and leakage of chemicals and oil, causing possible impact to both flora and fauna. Simple preventative techniques such as segregated and contained drainage systems for process areas incorporating sumps and oil traps, leak minimization and drip pans, should be incorporated into facility design and maintenance procedures. Such techniques will effectively remove any potential impact arising from small spills and leakage on site. Larger incidents or spills offsite should be subject to assessment as potential emergency events and, as such, are discussed under ‘Potential emergencies’ (below) and also under ‘Oil spill contingency planning’ on page 50.

13.5. Ecosystem impacts

Plant and animal communities may also be directly affected by changes in their environment through variations in water, air and soil/sediment quality and through disturbance by noise, extraneous light and changes in vegetation cover. Such changes may directly affect the ecology: for example, habitat, food and nutrient supplies, breeding areas, migration routes, vulnerability to predators or changes in herbivore grazing patterns, which may then have a secondary effect on predators. Soil disturbance and removal of vegetation and secondary effects such as erosion and siltation may have an impact on ecological integrity, and may lead to indirect effects by upsetting nutrient balances and microbial activity in the soil. If not properly controlled, a potential long-term effect is loss of habitat which affects both fauna and flora, and may induce changes in species composition and primary production cycles.

If controls are not managed effectively, ecological impacts may also arise from other direct anthropogenic influence such as fires, increased hunting and possibly poaching. In addition to changing animal habitat, it is important to consider how changes in the biological environment also affect local people and indigenous populations.

13.6. Potential emergencies

Plans for all drilling operations should incorporate measures to deal with potential emergencies that threaten people, the environment or property. However, even with proper planning, design and the implementation of correct procedures and personnel training, incidents can occur such as:

- spillage of fuel, oil, gas, chemicals and hazardous materials;
- oil or gas well blowout;
- explosions;
- fires (facility and surrounds);
- unplanned plant upset and shutdown events;
- natural disasters and their implications on operations, for example flood, earthquake, lightning.

Planning for emergency events should properly examine risk, size, nature and potential consequences of a variety of scenarios, including combination incidents.

13.7. Environmental impacts in the context of policies & requirements

This Section provides a broad overview of potential impacts related to exploration activities. The potential for oil and gas drilling operations to cause impact must be assessed on a case-by-case basis, since different operations, in different environments, in different circumstances may produce variable magnitudes of a potential impact. With the proper application of management techniques and best environmental practice, many, if not all, potential impacts will be eliminated or mitigated.

The potential impact of exploration activities must also be considered in the context of national and global protection policies and legislation. Frequently, such policy objectives will provide clear guidance on the relative importance of a given issue or potential impact. For example, an assessment may identify an apparently small level of impact, which, when seen in the context of national objectives, may acquire an increased significance and importance and require especially careful management.

13.8. Environmental management in the oil and gas industry

Oil and gas development activities are expected to grow to meet the need of rapidly industrializing countries, and can be carried out safely with minimum adverse environmental impact, only through a strong company commitment to environmental protection. The host government also needs to have a solid understanding of exploration and production operations and how they may affect the environment. The activities on both sides should ideally be complementary to achieve the most cost-effective and environmentally sound approach. It is now generally acknowledged that this approach:

- systematically integrates environmental issues into business decisions through use of formal management systems;
- integrates health, safety and environmental management into a single programme;
- considers all environmental components (air, water, soil, etc.) in decision making at strategic and operational levels;

- prevents waste at its source through pollution prevention techniques and making maximum re-use of waste components, rather than installing expensive treatment for discharges;
- evaluates alternatives on a cost/benefit/risk basis that includes environmental values;
- aims at minimizing resource inputs; and
- innovates and strives for continual improvement.

Exploration and production operations involve a variety of relationships, from company and contractor partnerships, and joint ventures, to dealing with other stakeholders such as government and the public. This, together with the fact that environmental issues are now so numerous, complex, interconnected and continuously evolving, means that an *ad hoc* approach to problem solving is no longer considered effective.

13.9. Management systems

Policy and commitment alone cannot provide assurance that environmental performance will meet legislative and corporate requirements or best industry practice. To be effective, they need to be integrated with the formal management activity and address all aspects of desired environmental performance including the principles referred to above. The model Health, Safety and Environmental Management System (HSE-MS) outlined by the E&P Forum23 includes seven key elements as illustrated here.

The E&P Forum HSE-MS model is compatible with the requirements of the ISO 14000 series. In fact ISO 14001 acknowledges that many companies will have such an integrated HSE-MS. The ISO 14001 standard, however, is not intended to address, and does not include, requirement for aspects of occupational health and safety management, neither does it seek to prevent an organization from incorporating such issues into it's environmental management system.

Effective implementation of a management system requires the following: clear analysis of current practice, total

14. Potential Environmental and Social Impacts and Mitigation Measures

The proposed project is likely to alter both the biophysical and socio-economic salient environmental features of the area as outlined below.

14.1. Positive impacts

Employment and Income

Job opportunities will be created for the local communities and the rest of Kenyans at large. This embraces both permanent and temporary staffing as per contract duration. Indirect services during construction and operation phases are likely to generate more income/job opportunities. This would raise the standards of living to the people of Laghbogol and Korich locations. A number of workers from the local community will be employed by this project either directly or indirectly. This will provide income and thus improve the living standards of the local people. The government will also

gain in revenue collection through taxes and the local county council will benefits from increased property rates and levies.

14.1.1. Trade

Due to increased demand for household goods during the exploratory drilling operations, there will be increased trade of agricultural goods and consumables by those working at the project area. A number of materials, input and products will be purchased for use during the construction phase. The demand for construction materials will provide trade in the sourced supplies and thus creating and generating employment and income for suppliers, stockiest and transporters within the project area.

Growth of the Informal Sector

All new projects tend to attract informal sector activities by providing food and other essential goods to the project employee and casual workers.

14.2. Potential Negative Impacts

Negative impacts are likely to occur from activities associated with all the main phases of the project, all of which cumulatively have potential negative impacts on the biophysical and social environment. The potential negative environmental and social impacts will include the following; noise and dust pollution, loss of biodiversity, landscape interference and possible effects on soil geo chemistry.

There will also be increased consumption of energy and water, natural water systems contamination, higher risks to HIV/AIDS, occupational fire and accidents from the machinery, disruption of land use pattern, solid and sewerage generation in addition to occupational health and safety risk. The proposed project will also generate increased traffic flow of motorized machinery and equipments. These impacts are categorized and then grouped under the various project phases.

14.3. Impact categorization

The possible negative impacts and mitigation measures are listed below. Their significance is categorized according to the Legend shown.

Table 8: Legend of negative impact categorization

Nature of impact	**Symbol**	**Significance Categories scale** **1 = Low significance;** **5 = High significance**

Temporary	t	S=1-5
Permanent	T	S=1-5
Short term	St	S=1-5
Long term	Lt	S=1-5
Specific or localized	w	S=1-5
Widespread	W	S=1-5
Negligible or Zero	O	S=1-5
Reversible	R	S=1-5
Irreversible	IR	S=1-5

14.4. Impacts at Construction Phase

The main activities in this phase will involve the construction of the campsite, which will include the makeshift iron structures (for sentry offices, kitchen and dining mess) during the day, and moving in of heavy equipment.

14.4.1. Biophysical Impacts

Vegetation loss and Soil erosion (t, St, w, R S=2)

Some site clearance and opening up of roadways will lead to loss of vegetation and displacement of associated fauna. Localized erosion of the cleared site and the compaction by trampling of the ground by the heavy equipment thereby reducing percolation capacity of soil. Iron roof and paving will increase the risk of runoff.

Mitigation:

Following the completion of site preparation and construction activities, the Company will undertake grass planting as the construction progresses to avoid the soil being washed or carried by wind. Places of least vegetation cover will be identified for the campsite and only construction points

will be completely cleared to ensure minimum vegetative disturbance. Proper roof catchments and gutters will be put in place to control the possible increased runoff. Temporary storage tanks will be supplied to trap this water for irrigating planted vegetation.

14.5. Impacts during the Operation Phase

14.5.1. Biophysical Impacts

Soil and bedrock disturbance and Landscape interference

Excavation could lead to the risk of land slide due to bedrock disturbance and possible over saturation of the overburden soil. Scattered trenches and mounds of top soil and tailings from screening could be a common feature, not in keeping with the natural Nyika plains and the seasonal streams that cross this project site.

Mitigation:

The stripped topsoil and tailings from the screening process will be used to progressively backfill the dugout trenches immediately behind the abandoned pit. This combination of and backfilling leaves only minimal sized pit opening at any given time. Care will be taken not to interfere with the course of the seasonal steams, by leaving clearance of at least 30m from the operations points. This is in keeping with the Legal Notice 120 – Water Quality Regulations 2006.

Ponding Risk from construction (t, St, w, R, S=3)

Excavation leaves open pits which could trap water and from stagnant ponds. Loose soil could block free flow of surface water leading to pools of water at excavation points.

Mitigation:

The Proponent will do landscaping, and fill the depressions including borrow pits and disused quarries. Sporadic torrential rains may fill up pits still in use with water. In such cases supplemental pumping into suitably designed drainage outlets into the seasonal stream will be ensured. The quality of the discharged water will be monitored in keeping with the Legal Notice 120, of 2006.

Loss of Plant Life and associated bio-communities (T, Lt, w, S=3)

The seismic activity will clear off much of the thorny shrubs and acacia vegetation within operation areas. Direct impact will result from a disturbance that causes changes in root stability, temperature, light, soil structure, and moisture and nutrient levels. These interfere with the natural soils and fauna. The clearing of vegetation will lead to loss of plant life, associated birds, rodents, earthworms, microbes as well as larger animals spotted on the Nyika Plains of the site such as dik-diks. It will also lead to increased soil erosion as a result of unstable soil structure and uncovered ground.

Mitigation:

Although plant diversity is low at the proposed site, the proponent will incorporate greater species diversity in their rehabilitation and landscaping programmes. Close collaboration and assistance will be sought and built with the Kenya Forest Service at their nearest station and the Kenya Forestry

Research Institute, for supply of appropriate seeds and establishing tree nurseries in the rehabilitation programme.

Increased surface runoff and soil erosion (T, Lt, w, S=2)

The built up area and bare ground such as road tracts will lead to increased volume and velocity of storm water run-off across some points of the area covered by the proposed area. This will lead to increased amounts of runoff entering drainage systems that could result in over flow and clogging in lower laying flat parts and neighbouring plots. Loose soils and debris could be carried and deposited in the process at places where they could create siltation.

Mitigation:

Since the areas is arid and semi-arid the amount of continual runoff will be minimal and therefore of little impact. However, the proponent will construct surface rainwater trap pits and cut-off drains to check occasional runoff. Roof catchment's gutters connected to tanks will harvest excess rainwater. The water would also be used for irrigating planted vegetation and for outdoor cleaning such as of vehicles and toilet cleaning, thereby reducing demand on water supply.

Air pollution from Dust and Engine exhaust gases (t, St, W, R, S=2)

Excavation during construction and demolition activities will generate dust particles that are potential hazard to the workers, neighbor hoods and passers-by. During windy days, dust may emanate from the cleared spots. This may also cover the photosynthetic tissues of nearby plants.

Mitigation:

Prompt compaction of loose soils and aggressive grass replanting will be implemented. The distance to the neared population concentration is about 1km. The impact of the dust on the surrounding people is therefore unlikely. Water will be sprinkled on to the disturbed off-pit soil to reduce flying dust. However, the drilling operation will produce no dust since most of the operations will be down the hole below the ground surface.

Employees/construction workers will be provided with personal protective equipment (PPE), to reduce possible dust and noxious gas inhalation.

Obstruction by disposed Excavated Soil (t, Lt, w, R, S=2)

The soil and tailing mounds will cause both visual and movement obstruction.

Mitigation:

Public movement through this SPL area will generally be of a limited nature. However, emergency responses, which might be hindered by the obstruction, will be provided for by clear operating procedures. Most of the excavated materials will be used for backfilling and some will be applied in landscaping.

Alteration of soil geochemistry

The cuttings brought up during drilling may bring to the surface a mixture of clay and sandstone by-products, which are rich in chemicals. These are bound to alter the soil geochemistry of the surrounding are location. Besides, prolonged human activity, the intensive transport system around the exploration site may lead to break up of soil texture that may lead to changes in the soil's physical chemistry.

Mitigation:

Beneficial use will be made of these chemical dynamics by investing on plant species that can utmost benefit from the availed chemicals through efficient absorption. Assistance will be sought from Kenya Forestry Service and other soil and botanical experts. Otherwise, backfilling will recognize the depth origin of the overburden and tailings, where the latter will go in first.

Waste into the Environment (T, St, w, IR, S=2)

The operations will generate both solid and liquid waste namely:

- Lavatory waste, and used oil.
- The solid waste will encompass office and packaging refuse, oil plastic conatinerss, small amounts of vehicle parts and kitchen refuse.

Mitigation:

The staff or workers who will be residing on site will be using appropriate sized potable septic tanks that will be installed at their dwelling places and places of work to keep with the movement of operations. Quality standards will be adhered to through initial testing and periodic monitoring in line with the requirements of NEMA contained in the Legal Notice 120, of 2006. The proponent will ensure that it enlists a licensed private company specialized in the handling oil and solid waste. Biodegradable kitchen waste will be composted on site for tree planting manure. A Good Housekeeping as part of the company policy will be implemented at the facility.

Surface and Ground Water Contamination (T, Lt, W, iR, S=3),

Oil spill, discharges from cleaning and washes could be a source of pollution to water bodies during very wet conditions. Flowing leachate and run-off washings could proceed to pollute the swampy areas within the operation area and seasonal streams such as Lagbogol.

Mitigation:

The project area does not have permanent surface running river or streams. The seasonal streams on site are dry beds only holding water occasionally during the wet rainy season. The project will have an adequate drainage on site containment to minimize uncontrolled storm water. Well-documented procedures for maintenance of the drainage system will be implemented and staff will be trained accordingly. Oil waste will never be allowed into the environment; proper containment and accidental spill absorption regime will be implemented at all time. Vegetative pollutant traps and continual monitoring of the waters on site and surrounding areas will form part of the pollution control efforts by the company.

14.5.2. Socio-economic Impacts

Disease transmission through social interaction (t, Lt, W, R, S=2)

The activities related to prospecting and mining will attract the informal sector business and unemployed people, and this will lead to increased interactions of people which might lead to spread of diseases such as HIV/AIDs.

Mitigation:

Special trainings will be conducted for employees on HIV, and related social health risks. The company, through its social responsibility, will extend community education into the surrounding areas.

Noise pollution nuisance (t, Lt, w, R, S=2)

The use of machinery, vehicles and screening activities will generate noise.

Mitigation

The contractor will ensure that the operations of most of the machinery such as excavator, loader shovel and graders are concentrated within 100m-radius and that all workers are provided with and using PPE such as earmuffs. Although the there are no residential dwellings in the SPL area noise surveillance instruments will be availed periodically to check on any excesses.

Traffic congestion and accidents (t, St, w, R, S=1)

During operations, there will be a lot of movement of lorries transporting excavated materials to and from the site thus increasing vehicular flow, and congestion especially along the main road in the district and outside.

Mitigation;

The highway is not a busy one. Logistical procedures will ensure ease of movement. Materials will be packed properly in specialized carriers trucks to reduce chances of fallout on the road. Assistance will be sought from Traffic Department where and when necessary.

14.5.3. Health and safety impacts

Increased Occupational and safety hazards (t, Ltd, w, R, S=3)

The oil exploration is not associated with occupational health. However the proponent should ensure health and safety of the people and outside the project area.

Mitigation:

Safety rules and warning signs including emergency procedures, evacuation mechanism in case of fire will be displayed at strategic open places within the premises. Relevant trainings and drills on fire and first aid will be conducted for employees. Relevant fire fighting and safety systems, including reliable written operating procedures will be in place. A standby ambulance will be availed on site to respond to emergencies, besides keeping close touch with other health and emergency institutions such as the Police, St. Johns Ambulance and health facilities. A specially trained manager will be in charge of environment, health and safety matter of the project.

Health deterioration of facility workers (t, Lt, w, R, S=2)

Prolonged exposure to dust contaminants and welding fumes (during maintenance) may lead to poor health incidences of those permanently stationed at specific high-risk workstations.

Mitigation

Dust containment and suction systems will be installed. Use of PPEs will be strictly enforced. Welders will be provided with respirators, eye protections and dustcoats to minimize inhalations. Regular medical checks will be done and records maintained of the employees. Staff working at the plant will have medical cover. Sanitation related education and practice would form part of the facility's regular routine, to avoid incidences of infections such as cholera, bilharzias and malaria. Swapping of work stations for staff will reduce level exposure.

14.6. Impacts at Decommissioning Phase

14.6.1. Biophysical Impacts

Un-aesthetic derelict land (t, St, w, R, S=3)

Mitigation

Proper site restoration or reconstruction measurers will be carried out in the event of complete phase-out of the project. Landscaping and plant enrichment will be done at phase-out. Environmental, health and safety legal requirements will be followed.

14.6.2. Socio-economic Impacts

Loss of jobs and livelihoods (T, Lt, w, R, S=2)

There may be some layoffs due to redundancy

Mitigation:

If the oil is found, the workers who will have performed well will be recommended for employment by the company that takes up production in the area.

Noise pollution (t, St, w, R, S=2)

Noise may interfere with neighbours and rouse their objections

Mitigation:

The contractor will ensure that the required noise levels are observed during the decommissioning phase. Noise surveillance instruments will be availed periodically to check on any excesses.

14.6.3. Health and Safety Impacts

Loss of hearing (T, Lt, w, IR, S=1)

There may be elevated noise levels at demolition works that may interfere with workers' hearing in addition to related disturbance.

Mitigation:

Use of PPE like earmuffs will be enforced.

Bodily injuries and accidents (T, Lt, w, IR, S=2)

These may be due to increased equipment mishandling, faulty workmanship, inappropriate equipment and protective gear, poor visibility, flying debris and falls.

Mitigation

The contractor will ensure supervision of work and handling of equipment is restricted to only skilled and experienced personnel to prevent accidents. Debriefing on safety procedure for site workers will precede any such works. Both the contractor and proponent will observe work ethics and worker's compensation in case of injury or loss. PPE like helmets, overall, nose and eyes protection hand gloves and boots, all of suitable and reliable quality will be used.

Table 9: Impact Valuation Matrix

Impact	Categorization	Valuation S= value
Vegetation loss and Soil erosion	t, St, w, R	2
Ponding Risk from construction	t, St, w, R,	3
Loss of Plant Life and associated bio-communities	T, Lt, w,	3
Increased surface runoff and soil erosion	T, Lt, w,	2
Air pollution from Dust and Engine exhaust gases	t, St, W, R,	2
Obstruction by disposed Excavated Soil	t, Lt, w, R,	2
Waste into the Environment	T, St, w, IR,	2
Surface and Ground Water Contamination	T, Lt, W, IR, ,	3
Disease transmission through social interaction	t, Lt, W, R,	2
Noise pollution nuisance	t, Lt, w, R,	2
Traffic congestion and accidents	t, St, w, R,	1
Increased Occupational and safety hazards	t, Ltd, w, R,	3
Health deterioration of facility workers	t, Lt, w, R,	2
Un-aesthetic derelict land	t, St, w, R,	3
Loss of jobs and livelihoods	T, Lt, w, R,	2
Noise pollution	t, St, w, R,	2
Loss of hearing	T, Lt, w, IR,	1
Bodily injuries and accidents	T, Lt, w, IR,	2
Average Valuation		39/18 = 2.17
Overall score is 2.17 implying low impacts		

Comment:

With an impact valuation of 2.17 the overall impacts of the project are within the acceptable ranges

15. Potential Impacts and Proposed Environmental Mitigation Measures

Table 10: Anticipated impacts at different phases of the development

Phase	Environmental Parameters									
	Biophysical							Social Economic & Cultural		
Planning		Soil	Water	Flora	Fauna	Noise	Dust	ECONOMY	HEALTH	EDUCATION
	Stake holders Consultants	+III	+III	+III	+III	+III	+III	+III	+III	+III
	EIA Report Preparation		+III	+III	+III	+III	+III	+III	+III	+III
Construction	Vegetation Clearing		-II	-II	-II	-II	-II		+III	
	Excavation	-I	-II	-II	-III		-I	-I	+III	
	Fencing the campsite		-II	-II	-I	-I	-I	-I	-I	
	Structure Setting		-III			-II	-II	-II	-II	
	Soil Movement	-II	-II	-II	-II	-II	-III		-II	
	Drilling the well	-I	-II	-I		-II				
Decommissioning	Decamping		-II	-I	-I	-I	-II	-II	-II	
	Waste Generation		-II	-III	-II	-I			-I	
	Traffic		-I I		+I		-I		+I	
			+II	-III	+III	+II		+II		
Operation & Maintenance	occupation		+III	+II	+III	+II		+II		
	Waste Generation		-II	-I						
	Traffic		-II	-III						
	Campsite Area Maintenance		-I I							

Key: Categorization of impacts (+) Positive (-) Negative: I low; II medium; III High

A) Levels of potential negative impacts

Table 11: Analysis of environmental issues and their potential impacts

ENVIRONMENTAL ISSUES	**POTENTIAL EFFECTS**	**DURATION**	**REMARKS**
Land terrain alteration	Medium	Medium term	As roads are made and vehicle move to and from the camp there will be some soil disturbance.
Soil erosion	Low	Short term	At start of construction, but as we move to operation stage there will be no exposing soil
Soil quality	none	-	Insignificant effect
Surface water	Low	Medium term	Contamination from liquid waste if not well managed, during the operation phase .
Underground water	Low	Medium term	The project will drill an oil well and two or so water boreholes from which much of the water for drilling will come from. Contamination from liquid waste if not well managed is a potential risk.
Storm water drainage	Medium	Medium term	Run off drainage management needs to be put in place
Vegetation cover	Low	Medium term	The current Low vegetation cover and scattered trees likely to be impacted upon within the campsite The project will not interfere with vegetation outside the camp
Bio-diversity	Low	Long term	Wildlife will be protected and the area affected is very small
Micro climate	High	Medium term	The micro-climate around the camp area will be altered but for a very temporary period of time
Air soil particles	Low	Short term	To happen especially during construction of the campsite
Noise	Med. /high	Short term/long term	During construction and some during the operation due to movement of vehicles. The contractor should use vehicles in good mechanical condition
Water demand	High	Long term	Boreholes will provide water for the drilling but the fresh water for use in the camp will be supplied from elsewhere.

Activity	Environmental Aspect	Potential	Mitigating Measures	Time Frame &	Indicators to be

Table 12: Impacts on Geological Resources

		Environmental Impact		**Responsibility**	**monitored**
Site excavation, grading; and offloading of construction materials at the site	Dust	Adverse human health impaired visibility Legal non-compliance Nuisance to neighbours causing dirt and rewashing of clothes	Water the ground before excavation Provide dust nets at high levels Avoid exaction during windy times	Before excavation Main contractor for civil works	Complaints from neighbours and workers Visual observation
Site excavation, grading; and offloading of drilling material at the site. This includes use of jack hammers	Noise	Adverse Human health Legal non-compliance Nuisance to neighbours	Use of ear protectors by workers Recondition engine exhaust systems Engine tune-up Establish inspection program for equipment	Main contractor to provide protective gear to the workers and ensure the machines are in good working condition Before excavation Main contractor for civil works	Complaints from neighbours and workers Records of machine reconditioning and inspection Visual observation
Site excavation, grading; and offloading of construction materials at the	Emissions from construction equipment such as bulldozers, graders, concrete mixers and compactors	Legal non-compliance Adverse Human health Contribution to	Use of respirators by workers Recondition engine	Main contractor to provide protective gear to the workers and ensure the machines are in good	Complaints from neighbours and Workers Records of machine

site. This includes use of jack hammers	including: Particulates Carbon dioxide Carbon monoxide	Greenhouse effect (global warming) Contribution to Acid rain Contribution to smog	exhaust systems Engine tune-up Establish inspection program for equipment	working condition Before excavation Main contractor for civil works	reconditioning and inspection Visual observation

Table 13: Impact on Water Resource

Activity	Environmental Aspect	Potential Environmental Impact	Mitigating Measures	Time Frame & Responsibility	Indicators to be monitored
Site evacuation grading; and offloading of construction materials at the site	Oil, chemical and material spills	Soil contamination	Establish site spill control procedures Training of workers on spill control procedures/ preparedness Off-site maintenance operations Spill control kit be availed at the site	Main contractor Prior to construction	Spillage incident records/ complaints from workers/ neighbours Training records Visual observation
Occupancy of the residential houses	Sewage disposal Waste water disposal	Contamination of soil	Sewage &waste water to be discharged into the septic tanks	Proponent during occupancy phase	Complaints from neighbours/ occupiers Visual inspections Contract documents

Table 14: Impacts on biodiversity

Activity	Environmental Aspect	Potential Environmental Impact	Mitigating Measures	Time Frame& Responsibility	Indicators to be monitored
Clearing in building camp site, roads and soil fence	Changes in plant and animal biodiversity	Loss of above and below ground biodiversity	Preserve indigenous plants as much as possible	During site preparation and operation Responsibility: The contractor	Changes in the number of indigenous plants, birds and insects
Site excavation, grading; and offloading of construction materials at the site.	Changes in biodiversity and landscape	Loss of above and below ground biodiversity	Preserve indigenous plants as much as possible	During site preparation and construction Responsibility: The contractor and proponent	Changes in biodiversity
Noise	Noise to wildlife in the surrounding areas	Disturbance to wildlife in the neighbouring bushes	Maintain low noise (to the recommended levels of decibels)	During and construction and operation Responsibility: The proponent and contractor	Complaints from people in the neighbourhood or visitors
Solid Waste Management	Dumping of construction or household materials	Contamination	All solid wastes must be disposed to designated sites and handled by licensed individuals or firms	During construction and operation. Responsibility: The proponent and contractor	Visual observation or complaints from people in the neighbourhood or visitors
Liquid Waste management	Disposal of hazardous liquid wastes in undeveloped areas	Contamination	All solid wastes must be disposed to designated sites and handled by licensed individuals or firms	During construction and occupancy. Responsibility: The proponent and contractor	Visual observation or complaints from people in the neighbourhood or visitors

Use of fire during construction and occupancy	Ignition of wild or unmanaged fires within and outside the site	Destruction of habitats for wildlife and property	Installation of fire warning signs and fire fighting equipments	During construction and occupancy. Responsibility: The proponent and contractor	Presence of dry matter and litter

Table 15: Impacts on humans and socio-economics

Activity	Environmental Aspect	Potential Environmental Impact	Mitigating Measures	Time Frame& Responsibility	Indicators to be monitored
Noise	Noise pollution	People or wildlife affected negatively	Observe recommended noise levels	During construction, occupation and decommissioning Responsibility: contractor	Noise levels
Air Quality	Pollution by particulate matter	Contamination by dust and other aerosols	Wet the ground if excavating during dry seasons	During construction, occupation and deco Responsibility: contractor	Particles in the atmosphere
Water quantity and quality	Effects on water quality and quantity	Poor and scarcity of water for domestic uses	Rational use of water resources, and avoid contamination. Maintain 6 m riparian vegetation around dams	During construction, occupation Responsibility: contractor	Water flow, quality (chemical and solutes composition)
Security	Dangers to people and property	Impacts on land use, property ownership, and freedom of association	Enhance security	During construction, operation and decommissioning Responsibility: Proponent and contractor	Incidences of insecurity
Access to markets	Blockage of movements for people and livestock	Impacts on prices on farm produce	Provide access across the developed site,	During construction, operation	Complaints of people on changes in

			while maintaining security	Responsibility: Proponent and contractor	movements
Cultural and social activities	Interference with local social and cultural events	Impacts on freedom of association and movement	Rights of people observed	During construction, operation and de-commissioning Responsibility: Proponent and contractor	Complaints of people on the effects on their social and cultural events

16. Policy, Legal and Administrative/Institutional Framework

16.1. Overview

The economic recovery action plan takes cognizance of the need to achieve macro and micro sectoral objectives and targets without compromising the health of the environment. Kenya faces an environmental challenge due to degradation of the country's natural resources that form the Country's economic base. The Government has attempted to address these problems through the enactment if the Environmental Management and Coordination Act (EMCA) 1999 which provides for Environmental Impact Assessment (EIA) of proposed projects and environmental audit (EA) of existing enterprises.

EIA is a tool for environmental management and has been identified as key component for proposed projects, to ensure sustainable development with respect to environmental resources and co-existence with socio-economic activities in the neighbourhood. At the national level, Kenya has put in place necessary legislation that requires EIA to be carried out on some specified projects, activity or programmes, and a report submitted to the National Environmental Management Authority (NEMA) for approval and issuance of relevant certificates.

To facilitate this process, regulations on EIA and Environmental Audits have been established under the Kenya Gazette Supplement No.56 of 13th June 2003. Besides, a number of other national policies and legal statutes have been reviewed to enhance environmental sustainability in national development projects across all sectors, which the proposed project must adhere to. This section discusses the environmental policies, legislation and institutional requirements impacted on by the proposed development. The proposed project impacts on several Government institutions mandates, policies and legal framework are explained here below:

16.2. Selected National Policies

National Environmental Action Plan (NEAP)

The NEAP for Kenya was prepared in mid 1990s. It was a deliberate policy effort aimed at integrating environmental considerations into the country's economic and social development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and conservation of natural resources are integral part of societal decision-making. The NEAP also established the process of identifying environmental problems and issues, raising awareness, building national consensus, defining policies, legislation and institutional needs, and planning environmental projects. An Environmental Action Plan for Arid and Semi-arid Lands (ASAL) and District-specific Environmental Action Plans for 24 ASAL districts were also formulated and formed part of the building block to the NEAP.

The 2nd NEAP (2009) recognizes that a network of transport services including roads, airports, railways and waterways facilitate economic and social development. It has however cautioned that continued use of these modes of transport often cause negative impacts on the environment such as air, noise, clearance of vegetation, water pollution, solid and liquid waste disposal resulting from operations and maintenance. The NEAP (2009) recommends control of air and noise pollution, and compliance to EMCA (1999) and its subsidiary legislations. The Report cautions that abandoned

quarries pose threat to human and wildlife and must therefore be rehabilitated. These recommendations have been taken into consideration in the design of this seismic exploration project.

Environment and Development (Sessional Paper No. 6 of 1999)

The paper, is now a full policy on environment, presents broad categories of development issues that require sustainable approach. The paper harmonizes environmental and developmental objectives so as to ensure sustainability. The paper provides comprehensive guidelines and strategies for government action regarding environment and development. With regard to wildlife, the policy reemphasizes the aims of the Wildlife Policy of 1976 and especially the government's commitment towards involving local communities and other stakeholders in wildlife conservation and management, as well as developing mechanisms that allow them to benefit from the resource. The paper also advocates for the establishment of zones that allow for the multiple use and management of wildlife.

The Wildlife Policy (Sessional Paper No. 3 of 1975)

This is the policy that governs wildlife management in Kenya. Its goal is "to optimize returns from this resource, taking into account returns from other land uses". The policy not only recognizes economic benefits from tourism and consumptive uses but also the intangible benefits that include aesthetic, cultural, and scientific gains that accrue from conservation of ecosystems and biodiversity.

The National Biodiversity Strategy

The overall objective of the National Biodiversity Strategy and Action Plan (NBSAP) is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity (CBD). It is a national framework of action to ensure that the present rate of biodiversity loss is reversed and the present levels of biological resources are maintained at sustainable levels for posterity. The general objectives of the strategy are to conserve Kenya's biodiversity to sustainably use its components; to fairly and equitably share the benefits arising from the utilization of biological resources among the stakeholders; and to enhance technical and scientific cooperation nationally and internationally, including the exchange of information in support of biological conservation.

The National Poverty Eradication Plan (NPEP) and the Poverty Reduction Strategies Paper (PRSP)

The objective of the NPEP is to reduce the incidence of poverty in both urban and rural areas by 50% by the year 2015 as well as strengthening the capabilities of the poor and the vulnerable groups to earn income. Also it aims to narrow gender and geographical disparities and create a healthy, better educated and more productive population. The plan has been prepared in line with the goals and commitment of The World Summit for Social Development (WSSD) of 1995 and focuses on the four WSSD themes of poverty eradication, reduction of unemployment, social integration of the disadvantaged people and creation of enabling economic, political, and cultural environment. This plan is to be implemented by the Poverty Eradication Commission (PEC) formed in collaboration with government ministries; community based organizations, the private sector, non-governmental organizations, and bilateral and multilateral donors.

The NPEP emphasizes the empowerment of poor people and their communities to better manage their resources for collective advancement. The PRSP has the twin objectives of poverty reduction and economic growth. The paper articulates Kenya's commitment and approach to fighting poverty, with the basic rationale that the war against poverty cannot be won without participation of the poor themselves.

Vision 2030

Vision 2030 the country's new development blueprint aims to transform Kenya into a newly industrializing, middle-income country to all its citizens by the 2030. The Vision is based on three pillars, economic, social and political. Infrastructure is one of the foundations to anchor the three (3) pillars of Vision 2030. Vision 2030 aspires for a country firmly interconnected through a network of roads, railways, port, airports, waterways, and telecommunications are available to all. The Vision states that by 2030, it will become impossible to refer to any region of our country as remote. To ensure that the main projects under the economic pillar are implemented, investment in the nation's infrastructure will be given the highest priority. The objectives of the proposed project are in line with Vision 2030. Any development project that incorporates these strategies in its plans is most welcome in Kenya.

Relevant International Agreements

Kenya's commitment to implement global and regional environmental agreements that influence land use can be ascertained by her acceptance, accessions and ratifications. The Multilateral Environmental Agreements (MEAs) are legal instruments that are utilized to enhance the global responsibility in the management of the environment and natural resources.

Other relevant International Agreements include Conventions on Biological Biodiversity, Climate Change, Desertification, Trade in Endangered Species of Wild Fauna and Flora, Wetlands and Vienna Convention for the Protection of the Ozone Layer. Kenya is also party to the major international human rights treaties specifically, the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights.

Convention of Biological Diversity (CBD)

The purpose of this Convention is to ensure the conservation and sustainable use of biodiversity. The implementation of CBD impacts on land in many ways. For example, the designation of reserves or protected areas for preservation of flora and fauna restricts use of such land. EMCA, 1999 provides for conservation of biodiversity. The provisions of CBD are domesticated in the Wildlife Conservation and Management and Forest Acts.

The seed and Plant Varieties Act (Cap 326) regulates seed development, transfer, importation and use. The Acts scope includes seed testing, certification, cross-pollination and importation. The use of specific plants and seed varieties on land is regulated by the Act. The Plant Protection (Cap 324) aims to preserve plant varieties, by preventing and controlling pests and diseases that are likely to damage the faunal diversity.

16.3. Legal and Institutional Framework

Economic development is always accompanied by potential environmental degradation. There is the risk of utilization of natural resources in a manner that is not sustainable. The Government had to come up with legal framework to protect against these negative impacts of natural resources utilization. A sound legal and institutional framework for environmental protection and human health was necessary. The Table below shows how the proposed project will impact on and compliance to the relevant laws and regulations.

Table 16: Legal Provisions and Compliance Aspects

The Legal Statute	Legal Provisions	Compliance Aspects
The Environmental Management and Coordination Act, 1999	Part II of the Environment Management & Coordination Act, 1999 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. In order to ensure that this is achieved, part VII section 68 of the same Act directs that any operator of any undertaking should carry out an environmental audit and prepare an appropriate report for *submission* to the National. Environmental Management Authority (NEMA), who in turn may issue a license as appropriate. The second schedule of the same Act lists proposed recreation facilities development activities (lodges and hotels) as among the facilities that must undergo annual environmental audits. Part V section 42, subsection 1 directs that no person shall among others deposit any substance in a lake, river or wetland or under its bed if the substance will have adverse environmental effect on the river, lake or wetland. Section 44 requires that NEMA develop, issue and implement regulations, guidelines and measures for sustainable use of hill sides, hill tops and mountain area to control harvesting natural resources located in such areas among other activities. According to section 51, NEMA will in consultation with relevant Lead Agencies prescribe suitable measures to ensure the conservation of biological resources and shall issue guidelines pertaining to sustainable conservation of these resources such as the selection and management of protected areas, land use methods that are compatible with the conservation of biological diversity and selection and management of buffer zones near protected areas.	Disposal of wastes into the environment during the project implemention would be contravening the law, Interference with steep slopes is not allowed by law, Interference with water sources and watersheds would be

Environmental Management and Coordination Act	The environmental impacts assessment and audit guidelines require that assessment be conducted in accordance with the issues spelt out in the second and third schedules of the regulations. These include coverage of the aspects on	
(Environmental Impact Assessment Regulations)	(ecological, social, landscape, land use and water considerations) and general guidelines on schedule 3 (impacts and their sources, project details, national legislation, mitigation measures, a management plan and environmental auditing schedules and procedures. To facilitate implementation of the law, regulations on Environmental Impact Assessment (EIA) and Environmental Audits (EA) have been established under Legal Notice 101, of Kenya Gazette Supplement No. 56 of 13th June 2003. Besides this, a number of other national policies and legal statutes have been reviewed to enhance environmental sustainability in development projects across all sectors. Some of the policy and legal provisions are briefly presented in the following sub-sections	Undertaking environmental impact assessment for the project before commencement (accomplished b y this report)
Environmental Management and Coordination Act (Environmental Management Regulations) Waste Management Regulations, 20 06 (Legal Notice No. 121)	Water Quality Management Regulations, 2006 (Legal Notice No. 120) These regulations were drawn under section 147 of the Environmental Management and Coordination Act 1999. In accordance with the regulations, every person shall refrain from acts that could directly or indirectly cause immediate or subsequent water pollution and no one should throw or cause to flow into water resources any materials such as to contaminate the water. The regulation also provides for protection of springs, streams and other water sources from pollution.	The proponent and the contractor will avoid discharging of any form of liquid effluent associated with exploration activities into the environment without appropriate treatment to meet the laid down standards

	Waste Management Regulations, 2006 (Legal Notice No. 121) The regulations are formed under sections 92 and 147 of the Environmental Management and Coordination Act, 1999. Under the regulations, a waste generator is defined as any person whose activities produces waste while waste management is the administration or operation used in handling,	Disposal of all materials for the works including solid wastes and debris (including those from the camp sites) should be in accordance with the standards outlined in this

100	Noise and Excessive Vibration Pollution Control Regulations, 2009. Part II section 3(I) of these Regulations states that: no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment and section 3(2) states that in determining whether noise is loud, unreasonable, unnecessary or unusual. Part II Section 4 also states that: except as otherwise provided in these Regulations, no person shall (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5cm per second beyond any source property boundary or 30m from any moving source. Part III, Section 11(1) states that any person wishing to (a) operate or repair any machinery, motor vehicle, construction equipment or other equipment, pump, fan, air-conditioning apparatus or similar mechanical device; or (b) engage in any commercial or industrial activity, which is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant levels prescribed in the First Schedule to these Regulations. Any person who contravenes this Regulation commits an offence. Section 13(1) states that no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations. These purposes include emergencies, those of a domestic nature and /or public utility construction. Section 14 relates to noise, excessive vibrations from construction, demolition, mining or quarrying sites, and states that: where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose requirements on how the work is to be carried out including but not limited to requirements regarding (a) machinery that may be used, and (b) the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations. It further states that the relevant lead agency shall ensure that mines and quarries where explosives and machinery used are located in designated areas and	Ensuring noise and vibration generated from construction machinery and camp sites) to the nearest receptors from the construction works does not exceed the guidelines under these regulations. The assessment may also generate increased traffic and associated noise to the immediate receptors.

	Air Quality Regulations Under the general prohibitions (Part II), section 5 states that no person shall act in a way that directly or indirectly causes immediate or subsequent air pollution. Among the prohibitions are priority air pollutants (as listed under schedule 2 of the regulations) that include general pollutants, mobile sources and green house gases. Odours are also prohibited under section 9 of the regulations (offensive emissions). Emissions into controlled areas such as schools, hospitals, residential areas and populated urban centers are also prohibited. Part VII on occupational air quality limits in section 29 states that an occupier of premises shall ensure that exposure of indoor air pollutants does not exceed the limits stipulated under the Factories and Other Places of Work rules or under any other law. Other sources are recognized at sections 32 and 33 are those arising from construction equipments and materials as well as particulate matter from demolitions of structures and buildings as well as stockpiled dry materials.	Ensuring controlled emissions including dust generated from earth works and material piles during construction. Control emissions from trucks to be used in the seismic ecploration
	Biodiversity Regulations Part II of Regulations, section 4 states that no person shall engage in any activity that may have adverse impacts on ecosystems, lead to introduction of exotic species or lead to unsustainable use of natural resources without an EIA licence. The regulation	Interference with the biodiversity (cutting down trees, removal of ground cover vegetation, disruption of animal movement tracks and habitats) along the road section corridors should be minimal.

The Water Act (Cap. 372)	This Act regulates abstraction of water from all sources. Also it prohibit pollution of water. Part II, Section 3 states "every water resource is hereby vested in the state, subject to any rights of use granted by or under the Act or any other law". Section 18 provides for national monitoring and information systems on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority to demand from any person, specified information, documents, samples or materials on water resources. Under these rules, specific records may be required to be kept and the information thereof furnished to the authority on demand. "The right to the use of water from any water resource is vested in the Minister except to the extent that is alienated by or under the Act or any other written law (Section 5)". Consequently, a water permit must be obtained before using any water resource. Section 29 (1), (2), and (3) stipulates the procedure for obtaining a water permit, while Section 4 states "except as provided in Section 33, an application for a permit shall be a subject of public consultation and where applicable, of environmental impact assessment in accordance with the requirements of the Environmental Management and Coordination Act, 1999". Section 32 requires that in issuing an abstraction permit, among other considerations, will be an assessment of the existing lawful use of the water as well as the efficient and beneficial use of the water in the public interest. Other aspect considered would be the likely effect of the water use to water resources and users as well as the strategic importance of the proposed water use. Subsection 3 states that the nature and degree of water use authorized by a permit shall be reasonable and beneficial in relation to others who use the same sources of supply or source of water. The Fourth Schedule on abstraction of ground water requires the person constructing a well within 800m of an existing well to apply tests that include the rate of pumping and the rest levels of water. In regard to obstruction or pollution of water courses or resources, section 94 states that no person shall obstruct, interfere with, divert or abstract water from any water resource. In addition, no person shall throw or convey any rubbish, dirt, refuse, effluent, trade waste or other offensive or unwholesome matter or thing into or near to any water resources in such a manner as to cause pollution of the water resources.	Disruption of natural drains and streams channels along the project road sections should be minimized, Contractor to ensure minimal or no discharge of silt and debris into the streams to the extent possible. Contractor to apply for water abstraction permit for construction purposes and abide to the conditions thereof. Ensure no pollutants from the construction areas or from construction is discharged into any of the springs and streams in the project area.

Water Resources Management Rules (2007)	In addition to the Water Act 2002, the main document outlining the regulations is the Water Resource Management Rules 2007. The rules set out the procedures for obtaining water use permits and the conditions placed on permit holders. Sections 54 to 69 of the Water Resources Management Rules 2007 impose certain statutory requirements on dam owners and users in regard. These provisions address: Technical design report in respect of the water use permit; • Operational information to be lodged with WRMA; • Dam safety measures and requirements for inspections; Requirements for procedures to notify downstream communities in the event of unexpected releases. Section 104 of the Water Resource Management Rules requires certain water permit holders to pay water use charges. The intention of the water use charges was to: Raise revenue for water resource management; Raise revenue for catchment conservation activities;	Apply and obtain a water abstraction permits for construction water and abide by the conditions established under the rules.
The Public Health Act (Cap. 242)	Part IX section 115 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Any noxious matter or waste water flowing or discharged into a watercourse is deemed as a nuisance. Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitate the breeding or multiplication of pests shall be deemed nuisances. The Act addresses matters of sanitation, hygiene and general environmental health and safety	Obtain a public health certificate for the construction operations and particularly the construction camp sites.

Land Acquisition Act (Cap. 295)	This Act provides for the compulsory or otherwise acquisition of land from private ownership for the benefit of the general public. Section 3 states that when the Minister is satisfied on the need for acquisition, notice will be issued through the Kenya Gazette and copies delivered to all the persons affected. Full compensation for any damage resulting from the entry onto land to things such as survey upon necessary authorization will be undertaken in accordance with section 5 of the Act. Likewise where land is acquired compulsorily, full compensation shall be paid promptly to all persons affected in accordance to sections 8 and 10 along the following parameters; Area of land acquired, The value of the property in the opinion of the Commissioner of land (after valuation), Amount of the compensation payable, Market value of the property, Damages sustained from the severance of the land parcel from the land, Damages to other property in the process of acquiring the said land parcel, Consequences of changing residence or place of business by the land owners, Damages from diminution of profits of the land acquired. Part II of the Act allows for the temporary acquisition of land for utilization in promotion of the public good for periods not exceeding 5 years. At the expiry of the period, the Commissioner of Land shall vacate the land and undertake to restore the land to the conditions it was before. Any damages or reduction of value shall be compensated to the land owners.	In cases where limited realignments will be necessary for road sections outside the park areas, this provision will apply.

Public Roads and Roads of Access Act (Cap. 399)	Sections 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on the adjacent land owners seeking permission to construct the respective roads.	
The Wildlife Conservation and Management Act (Cap 376)	The Act provides for protection, conservation and management of wildlife in Kenya. Introduced in 1976, the Act empowered the Director of Wildlife to protect animals and vegetation, both inside and adjacent to national parks and reserves. An amendment of the Act was enacted in 1999 establishing the Kenya Wildlife Services with the principal objective of managing the protected areas in arid and semi-arid lands (ASAL), to ensure conservation of the flora and fauna; and utilization of wildlife resources on a sustainable basis. Section 15 empowers the Minister to ensure the security of animals and plant life in national parks, reserves and surrounding ecological zones. Areas could also be declared protected, prohibited or restricted and appropriate regulations developed. Section 29 prohibits any hunting on any private land unless a game license has been issued and endorsed accordingly, and only by the land owner or a legal leaser. Under the same Act, sections 30 and 31 allows the killing or injuring of wild animals for protection of human life and property, while section 62 provides for the compensation procedures for any person who suffers any bodily injury or is killed by wild animals so long as no offence was being committed during the incident or if it happens during normal wildlife utilization activities. Section 63 indicates that an application can be made for livestock land use in the vicinity of a national reserve, but this will also include game ranching, cropping and wild life utilization.	This will apply in the interaction of wildlife.

Factories Act	Section 53 of this Act requires that workers employed in a process involving exposure to wet or to any injurious or offensive substances, suitable protective clothing and appliances (gloves, footwear, goggles, and head coverage) shall be provided. Section 4 of Kenya subsidiary legislation of 2004, Legal Notice No. 31 of Kenya Gazette Supplement No. 25 of 24th May, 2004 of the Factories Act Cap 514, requires that, all factories or other workplace owners to establish a safety and health committee, which shall consist of safety representatives from the management and the workers. The number of the committee members will range from 3 to 7 depending on the size (number) of employees. The Act also requires the management to appoint a competent person who is a member of the management staff to be responsible for safety, health and welfare in the factory or workplace. Section 13 goes ahead to state that a health and safety audit of the workplace be carried out every twelve months by a registered health and safety adviser. If the owner(s) or management contravenes any of the rules, he/she shall be guilty of an offence.	This law is applicable on the management of workers during the assessments Occupational Health and Safety rules are enforceable by law.
The Mining Act (Cap. 306)	Section 26 of the Act requires that if a mining operation causes disturbance, nuisance and/or damage to land occupiers, land, crop, plants, buildings, installations, etc., it shall be the responsibility of the miner to pay any related compensations. Following on this, section 57 requires treatment and/or removal of any tailings on land and/or grass left after the mining activities. Regarding health and safety section 69 states that a mining inspector may identify any mine, matter, thing or practice that is dangerous or a threat to bodily injury of any person or stock and will notify the miner for removal of the said danger. Other related sections of the Act are 72, 73, 75 and 76	Applies in all material site extraction sites, particularly the hard stone quarries (though it is likely the aggregates will be obtained from commercial quarries).

Transport Licensing Act	Section 4 provides that no person shall, except under and in accordance with the terms of a license use a motor vehicle on a road for the carriage of goods for or in connection with any trade or business carried on by him. The act provides that all authorized goods vehicles shall be maintained in a fit and serviceable condition. The licensing authority may attach to a license of any class a condition that the authorized vehicle shall or shall not be used in a specified area or over a specified route or a condition that certain classes or description of goods shall or shall not be carried.	This will apply for the material haulage trucks The operators have an obligation to observe traffic regulations and rules at all times

Physical Planning Act (Cap286)	Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land. The plan shows the manner in which the land in the area may be used. Section 29 of the physical Planning Act gives the county councils power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development. Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. The act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original conditions within a period of ninety days. If no action is taken, then the council will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also states that no person shall carry out development within the area of a local authority without development permission granted by the local authority. At the same time, sub-section 5, re-enforce it further that, no licensing authority shall grant under any written law, a license for commercial use for which no development permission had been granted by the respective local authority. Section 36 states that if in connection with development application a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an Environmental Impact Assessment report. The environmental impact assessment report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA 1999. Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to its original conditions.	The Local Authorities in the respective project areas may require compliance with certain conditions in line with physical planning of the respective areas.

The Land Planning Act (Cap. 303)	Section 9 of the subsidiary legislation (The development and use of land regulations 1961) requires that before the local authorities submit any plans to the Minister for approval, steps should be taken as may be necessary to acquaint the owners of any land affected by such plans. Particulars of comments and objections made by the landowners should also be submitted.	
Agricultural Act (Cap 218)	Agriculture act. which provides for the development of agricultural land in accordance with accepted practices of good land management and practices (use of land in such a manner as to protect the land as a resource)	

16.4. Institutional Framework

EMCA (1999)

In order to make the Act operational, the EMCA has established various administrative structures. These include the National Environment Committee (NEC), the National Environment Management Authority (NEMA), the Public Complaints Committee (PCC), the NEMA Board, Provincial and District Environment Committees, the National Environment Tribunal (NET). The apex body under the Act is the NEC, which amongst other things is charged with the responsibility of developing the national environment policy in Kenya as well as to set annual environmental goals and objectives.

NEMA is the organ that has been established to exercise general supervision and coordination over all matters relating to the environment in Kenya. Further NEMA is the Government's principal instrument in the implementation of all polices relating to the environment. The PCC was formed to investigate environmental complaints against any person, submit their findings/recommendations to the NEC and to submit periodic reports of its activities to the NEC.

All project proponents must comply with the following administrative requirements:

- The projects to be subjected to EIA/EA are specified in the second schedule of the Environmental Management and Coordination Act. Besides the scheduled activities, the Act empowers the Minister to prescribe for EIA/EA appraisal of any other activity, which in his view carries significant environmental impacts

- NEMA administers the EIA/EA on behalf of the Minister responsible for the environment. EIA/EA is applicable to both public and private sector development projects and programmes

- NEMA provides a framework for dispute resolution

- A scheduled activity cannot receive the necessary authorization from NEMA to proceed or continue operating, until all EIA/EA requirements have been fulfilled and accepted by NEMA and its lead agencies

- EIA/EA licenses are granted when NEMA and the Minister are satisfied that EIA has been satisfactorily conducted and realistic and achievable Environmental Management Plan of an activity has been sufficiently developed (vi) All formal submissions under the EIA guidelines are made to NEMA. NEMA keeps a register of all projects and programmes currently being appraised under the EIA/EA guidelines

- The undertaking of all EIA/EA and subsequent reporting are the responsibility of the project proponent. NEMA on behalf of the Government, provide the procedures and technical advice to project proponents on how to comply with the EIA/EA requirements.

- The EIA/EA studies are carried out by experts or teams of experts recognized and registered by NEMA.

In order to make the Act operational, the EMCA has established various Institutional structures. These include:

- The National Environment Committee (NEC): NEC is the apex body under the Act, which amongst other things is charged with the responsibility of developing the national environment policy in Kenya as well as to set annual environmental goals and objectives.

- The National Environment Management Authority (NEMA): NEMA is the organ that has been established to exercise general supervision and coordination over all matters relating to the environment in Kenya. Further NEMA is the Government's principal instrument in the implementation of all polices relating to the environment.

- The Public Complaints Committee (PCC): The PCC was formed to investigate environmental complaints against any person, submit their findings/recommendations to the NEC and to submit periodic reports of its activities to the NEC.

- The NEMA Board

- Provincial and District Environment Committees

- National Environment Tribunal (NET).

17. Anticipated potential Impacts and Mitigation Measures

17.1. General Overview

Risks emanating from the project development are in the social and physical environment as well as economic aspects.

The linkages can be explained as follows;

- Natural resources (land and soil, water resources, vegetation cover, wetlands, escarpment, wildlife, etc.)

- Natural resources are linked to the environmental status and composition and the welfare of people is directly affected by the type and abundance of natural resources.

- Physical environment (hydrology, physiology and drainage)

- Physical environments affect the welfare of people like for example in terms of sanitation, soil type and fertility and are determinants of economic status.

- Social aspects (population and settlement trends, land use patterns, institutional distribution, water sources, health and safety among others) are interlinked.
- Economic issues including income generation, trading opportunities, transportation, agricultural productivity, mining, livestock production, etc. are also interlinked.

The key linkages are summarized in the table below

Table 17: Linkages and Concerns

No.	Focal Areas	Linkages/Environmental Concerns
1	• Natural Resources (wildlife, forests, vegetation/plant species, water sources, land, air, wetlands, etc.)	• Land degradation through disturbance of the soil and the flora and fauna in the soil, • Pollution of sources of water e.g. springs, stream, rivers, wetlands, etc., • Underground water quality degradation from development of the cut-lines and use related pollutants (oil, grease, paint and asphalt), • Permanent destruction of vegetation cover along the cutline routes, diversions, contractors camp sites, materials holding areas and/or borrow pit sites (quarries), • Disruption of wildlife and general biodiversity. Effects may also be felt in this wildlife and drought resistant biodiversity rich area or Emissions into the air of dust (during earth moving and machinery movement) and smoke/hydrocarbons from equipments being used during the proposed exercise • Degradation of wetlands and other hydrological regimes in the project area. Other aspects as may be identified in the field, • Interference with the wildlife habitats and migratory corridors
	• Physical Environment (topography, land forms, geology, hydrology, climate	• Interference with the hydrological trends and hence surface runoff, • Effects on the drainage systems and hydrological regimes, particularly with increased magnitude in surface runoff, • Effects on sub-surface geological formations as a result of earth moving activities, • Interference with sensitive features such as old trees, public amenities, cultural features, etc
	• Social and economic • Environment • (Populations trends,	• Population and settlement trends upon commissioning of the road, • Migration of outsiders for to seek employment, • Increased moral decay during operations due to migration of

	settlement, land use, infrastructure, economic activities etc	different people, • Changes in land use and urban growth trends, • Changes in major economic activities e.g. Settlements. • Benefits of the proposed project to the country, • Changes in socio-cultural practices and lifestyles due to external influence, • Additional issues anticipated from social interactions.

Table 18: The Environment and Social Management Plan (**ESMP**): **Design and Construction Phase**

Possible Negative impact	Recommended Mitigation Measures	Estimated cost of mitigation Ksh.	Responsibility	Time schedule and Monitoring frequency
17.2. Biophysical impacts and Mitigation				
• Vegetation loss • and Soil erosion	1. The developer will undertake grass planting as the construction progresses to avoid the solid being washed or carried by wind. Places of least vegetation cover will be identified for the campsite and only construction points will be completely cleared to ensure minimum vegetative disturbance. Proper roof catches and gutters will be put in place to control the possible increased runoff. Temporary storage tanks will be supplied to trap this water for irrigating planted vegetation. 2. Wherever possible vegetation within the should be preserved and where plants must be uprooted they should be recycled into use as construction materials, firewood or converted into soil manure	500,000/=	Site Engineer	As project progresses, Audited annually
• Soil disturbance through vehicle movements, digging of pits and scooping of	1. During construction movement of vehicles carrying materials is likely to be comparatively high. The contractor can minimize vehicle movement outside the camp as much as possible. Alterations of soil surface should be avoided as			

surface soil	much as possible			
• Preservation of archaeological materials	2. The contractor should be observant when excavations are made during the construction to note presence of archaeological materials and other materials of cultural value buried in the soil. Where such materials are found the contractor should liaise with the National Museums of Kenya in Nairobi on how they can be removed or preserved.			
• Air pollution from moving vehicles	1. Pour water on vehicle paths to reduce dust 2. When possible vehicles should when most people and livestock are indoors			
• Noise from movement of Vehicles	1. Use vehicle and machinery equipment that are of good mechanical conditions 2. Ensure the machines used are adequately serviced			
• Interference with livestock when grazing	1. Make sure livestock are not in the area of construction			
• Vibrations on the ground				

• Constraints on local hydrology				
Socio-economics				
• Interference with movement patterns of people				
• Cultural conflicts between locals and the incoming workers				
• Competition on the supplies in the local markets				

Table 19: ESMP: **Operation Phase**

Negative impact	**Proposed Mitigation Measures**	**Monitoring**	**How to Monitor**	**Responsibility**	**Time schedule and Monitoring frequency**	**Estimated costs for mitigation K.Sh.**
17.3. Biophysical impacts and Mitigation						
• Soil disturbance • Landscape interference at the Campsite	The stripped top soils and tailings from the site leveling and clearing process will be used to build and strengthen the perimeter wall. Care will be taken not to interfere with the course of the seasonal streams, by leaving clearance of at least 30m from the operations points. This is in keeping with the Legal Notice 120 – Water Quality Regulations 2006.	Soil condition and dislocation soil perimeter wall	Observations on the soil surface, exposures, stream blockages undisturbed flow of surface runoff	Site Engineer	Daily monitoring and Annual Audits	200,000/=

• Ponding risk from construction	1. The proponent will do landscaping, and fill the depressions including borrow pits. Sporadic torrential rains may fill up pits still in use with water. In such cases supplemental pumping into suitably designed drainage outlets into the seasonal stream will be ensured. The quality of the discharged water will be monitored in keeping with the legal Notice 120, of 2006.	surface soil conditions Quality of discharge water	Observe soil translocation	Proponent	Monthly	
• Loss of plant life and associated bio-communities	1. Although plant diversity is low at the proposed site, the proponent will incorporate greater species diversity in their rehabilitation and landscaping programmes. The services of knowledgeable curator/botanist will be employed to implement this feature. Close collaboration and assistance will be sought and built with the Kenya Forest Service and for supply of appropriate forbs seeds and establishing tree nurseries in the rehabilitation programme	Vegetation cover around the camp	Site Engineer and the proponent	Proponent	Monthly	350,000/=

• Increased surface runoff and soil erosion	1. Since the area is arid and semi-arid the amount of continual Run-off will be minimal and therefore of little impact. However, the proponent will construct surface rainwater trap pits and cut-off drains to check occasional runoff. Roof catchment's gutters connected to tanks will harvest excess rainwater in the campsite. The water would also be used for irrigating planted vegetation, outdoor cleaning such as of vehicles and toilet cleaning, thereby reducing demand on water supply.	Surface water movements and Soil trans location	Note changes in volumes of surface runoff. Amounts of soil deposition by surface water	Proponent or contractor	Quarterly inspection and Annual Audit	510,000/=
• Air pollution from dust and engine exhaust gases	1. Prompt compaction of loose soils and aggressive grass replanting will be implemented. Water will be sprinkled onto the disturbed soil to reduce flying dust. However, the drilling operation will produce no dust as the disturbance will be occurring underneath the soil surface. Employees/ construction workers will be provided with personal protective equipment (PPE), to	Presence of dust on the roads and the exposed surfaces within the camp	Observe for the presence of dusts on the roads	Contractor / proponent	Occasionally	500,000/=

	reduce possible dust and noxious gas inhalation.					
• Obstruction by disposed excavated Soil	1. Public movement through the campsite area will generally be limited. However, emergency responses, which might be hindered by the obstruction, will be provided for by clear operating procedures. Most of the excavated materials will be used for fill-ups and some will be applied in landscaping.	presence of excavated soils on the surface, paths and movement areas	checks and observations	Proponent and contractor	Regularly	Cost combined as above
• Alternation of Soil geochemistry	1. All material retrieved from the drilling that may alter the geochemistry of the soil, will be mixed with surface soils and buried in a pit to make sure they are not exposed	Checking and observing	Note presence contaminated soils	Proponent	Annual Audits	300,000
• Waste into the Environment	1. This area is not connected to any organized sewerage network. The Campsite will be equipped with toilet and washing facilities fully connected to licensed septic tanks as witnessed in the previous camp in the same block. Appropriate sized	Inspection	Noting any improper waste disposal	Proponent	Regular	500,000/=

	portable toilets will be availed to the field staff during their working hours and to keep with the movement of operations. The proponent will ensure that it enlists a licensed private company specialized in the handling oil and solid waste. Biodegradable kitchen waste will be composted on site for tree planting manure. A Good housekeeping as part of the company policy will be implemented at the facility.					
• Surface and Ground Water Contamination	1. The drilling project area does not have permanent surface running river or stream. The seasonal streams on site are dry beds only holding water occasionally during the wet rainy season. The mining operations may have to stop temporarily during the very wet season when working in the area becomes difficult. The project will have an adequate drainage on site containment to minimize uncontrolled storm water. Well documented procedures for maintenance of the drainage system will be	Checking and inspection of surface water and ground water	sampling water for testing	Proponent	Regularly	200,000

	implemented and staff will be trained accordingly. Oil waste will never be allowed into the environment; proper containment and accidental spill absorption regime will be implemented at all times.					
• Air pollution	The amount of dust getting into the air will be minimized by pouring water during the dry days. Air pollution by gaseous wastes from machineries will be minimized by making sure that machines in operation are in good mechanical order and are serviced	dust particles gaseous emissions from machineries	the amount dust particles in the air the gaseous emissions from machineries	Proponent Contractor	Regularly	300,000
Movement of vehicles and individual	1. People should be instructed to walk, and drive vehicles only on the designated routes.	Movement of vehicles	Checking on the paths used by vehicles	Proponent		
• Chemical Discharge and emissions (e.g., chemical from drilling operations)	Machine operators should be instructed to discharge chemicals only in the designated places.	monitor chemical discharges and emissions	Checking and testing chemical discharges	contractor /drilling manager	Regularly	500,000
• Light from burning/	The light from burning or flaring should not disturb residents					

flare	in the neighbourhood					
• Disposal of Muds and cuttings	Muds and cuttings should be disposed only into the designated places	Monitor the disposal of muds and cuttings		Proponent	Regularly	100,000
• Disposal of sewer from the camp	A sewer treatment plant to be installed	all the sewer to be treated to adequate standards be discharge	checking the sewer to make sure that it is treated before discharge	Proponent	Regularly	100,000
• Disposal of waste water from washings	Waste water should be collected into one place where it can evaporate or be treated and recycled into agricultural use	Monitor the flow of waste water from kitchens and washing areas	Checking where waste water is disposed	proponent	Regularly	100,000
• Barriers to wildlife movement	The campsite should not be located in unique habitats where rare wildlife inhabit or go to feed or take water	Presence and movement of wildlife	Observe and inquire from residents the presence and movement of wildlife.	Proponent	Before setting up the camp	100,000
• Threats on biodiversity – loss of habitat	Camp users should not disturb wildlife outside the camp during the day and at night	Monitoring the movement of camp users outside the camp	Checking the movement of people outside the	Proponent	Regularly	100,000

			camp			
• Contamination from drilling fluids and completion brines	Should be treated through flocculation and solids removal so that supernatant can be safely discharged. Solids to cuttings pit for solidification and burial	monitor the disposal of drilling fluids	Checking where the fluids are disposed	Proponent	Regularly	
• Contaminated soil	Labelled, containerized and sent off-site for further handling/disposal	movement of soils should be to designated areas	Observations on the where contaminated soils are put	Proponent	regularly	100,000
• Wastes from batteries	Labelled, containerized and sent off-site for further handling/disposal	Make sure waste batteries are thrown into the designated areas	Observations	proponent	regularly	100,000
• Effects from produced hydrocarbons	Hydrocarbons will be flared through a conventional burner. Large quantities from extended tests will may be shipped off-site for sale or other uses	The disposal of hydrocarbons produced from drilling	Check to make sure hydrocarbons are flared	Proponent / drilling Manager	Regularly	50,000
• Used medical wastes	Collected, labelled as biomedical waste, and sent offsite for disposal. Review possibility of safe incineration for readily combustible items	Monitor the handling and disposal of medical wastes	make sure they are always incinerated outside the camp	Proponent and contractor	Regularly	50,000

17.4. Socio-economic Impacts and Mitigation

• Disease transmission through social interaction	1. Special trainings will be conducted for employees on HIV, and related social health risks. The company, through its social responsibility, will extend community education into the surrounding areas	100,000/=	Site Engineer			Quarterly and at Annual Audit
• Noise pollution nuisance	1. The contractor will ensure that the operations of most of the machinery such as vibrators, loaders graders are well serviced and that all workers are provided with and using PPE such as earmuffs. Although there are only a few and scattered residential dwellings in the project area noise surveillance instruments will be availed periodically to check on any excesses.	In-house	Site Engineer			Annual Audit and Daily monitoring
• Traffic congestion and accidents	1. The earth road network is not a busy one. Logistical procedures will ensure ease of movement. Materials will be packed		Site Engineer			Daily monitoring

	properly in specialized carriers to reduce chances of falls on the road. Assistance will be sought from Traffic Department where necessary					
• Cultural conflicts with foreigners	1. Proponent should instruct the workers at the camp not to interfere with the cultural practices and religious beliefs of the local people.	Monitor the interactions between the workers and the locals	Make sure all workers have received the instructions and training	Proponent and contractor	Regularly	100,000
• Impacts on local infrastructure	1. Make sure the local infrastructure is not constrained by activities of the proposed project 2. Construction of infrastructure should use locally available materials as much as possible	monitor efficiency operations of the local infrastructure e.g. roads, mosques, recreation centers etc.	Check or inquire from local to identify and rectify and constraints arising from the presence of the project in the area	Proponent	at the beginning of the project	200,000
17.5. Health and Safety Impacts and Mitigation						
• Health deterioration of facility workers	1. Dust containment and suction systems will be installed on the campsite. Use of PPEs will be strictly enforced. Welders will	220,000/= annually	Site Engineer			Progressive, Annual Audit

	be provided with respirators, eye protections and dustcoats to minimize inhalations. Regular medical checks will be done and records maintained of the employees. Staff working at the plant will have medical cover. Sanitation related education and practice would form part of the facility's regular routine, to avoid incidences of infections such as cholera, bilharzias and malaria. Swapping of work stations for staff will reduce level exposure.					
• Challenges for foreign disease	1. The camp should have a clinic equipped with drugs and qualified medical personnel so as to contain any diseases among the workers.	Make sure all ailments are treated within the camp	Disease screaming and tests	Proponent	regularly	500,000
• Insecurity due to presence of many people	1. The proponent should organize with local administration to make sure that presence of the camp occupants (workers) in the area does not cause insecurity inside and outside the camp.	Monitor security situation in and around the camp	Inquiries from the local administration Checking with camp managers	Proponent	Regularly	300,000

• Exposure of foreigners to zoonotic diseases or similar outbreaks or vise versa – foreigners passing zoonotics to local livestock	1. Contacts with local livestock should be minimized and it has to happen disinfection should be done beforehand	monitor occurrences of zoonotic diseases	discussions and checking with local Vets	Proponent	Regularly	200,000

Table 20: ESMP: Decommissioning Phase

Negative impact	**Proposed Mitigation Measures**	**Estimated cost of mitigation Ksh.**	**Responsibility**	**Time schedule and Monitoring frequency**
17.6. Biophysical Impacts and Mitigation				
Un-aesthetic derelict land drainage	Proper site restoration or reconstruction measures will be carried out in the event of complete phase-out of the project campsite. Landscaping and plant enrichment will be done at phase-out. Environmental, health and safety legal requirements will be followed	200,000/=	Drilling Engineer	Post-check evaluation
Soil chemical composition and poisoning	The contractors will immediately identify areas in the campsite where soils have been contaminated, scoop it and bury it in a pit where it is not exposed to people, livestock and wildlife including the below ground organisms as explained in the oil spill contingency arrangements	200,000	Proponent	Checking soil contamination and disposal

Re-vegetating the abandoned land	The contractor will take the responsibility of re-vegetating the abandoned camp site only with indigenous plant species.	300,000	The contractor	
Ground leveling	Before deserting the camp, the ground should be leveled by spreading heaps of soil and the soil fence	200,000	Proponent or drilling manager	Make sure the ground is level – no heaps of soil left behind
Burying of pits and dumps	The pits used in the camp for various purposes should be buried and covered with clean soil.	200,000	Proponent / drilling manager	make sure ni pits are left open
Socio economic Impacts and Mitigation				
Loss of jobs and livelihoods	The company will implement a comprehensive layoff and severance package for those who may not be redeployed.	In-house	Managing Director	Terminal evaluation
Noise pollution	The contractor will ensure that the required noise levels are observed during the decommissioning phase. Noise surveillance instruments will be availed periodically to check on any excesses.	As above	Site Engineer	Progress monitoring

17.7. Health and safety Impacts and Mitigation

Loss of hearing	Use of PPE like earmuffs will be enforced	As above	Site Engineer	Spot-checks
Bodily injuries and accidents	The contractor will ensure supervision of work and handling of equipment is restricted to only skilled and experience personnel to prevent accidents. Debriefing on safety procedure for site workers will precede any such works. Both the contractor and proponent will observe work ethics and worker's compensation in case of injury or loss. PPE like helmets, overall, nose and eyes protection hand gloves and boots, all of suitable quality will be used. Use of PPE like earmuffs will be enforced.	As above	Site Engineer	Spot-checks

18. Conclusions and recommendations

The information herein describes the salient biophysical and socio-economic features of the project area, the potential impacts of the proposed development and mitigation measures to be put in place as a responsibility of the proponent and the contractor.

From the investigation results, it is evident that the benefits of the project will mainly be of economic in nature, with potential minor adverse effects on the social and biophysical environments. However, the mitigation measures when implemented will not only ensure that the positive effects and potential of the proposed development are enhanced, but also that the anticipated potential negative impacts and possible social conflicts are greatly minimized. It is therefore recommended that the proponent conform to the proposed environmental management regime through practical, deliberate and resource allocation attentions. The proponent and the exploratory drilling contractor should adopt an internal capacity building mechanism for their staff so that they become adequately sensitized and knowledgeable about the test oil drilling project's social-economic-environmental interrelationships. The staff should be able to contribute to the fulfillment and improvement of the proponents' endeavors towards becoming fully compliant with acceptable environmental practice in all their exploration project works in this part of the world.

The Management and Directors should be supportive in terms of leadership and resource allocation to the development and improvement of relevant policies and practices such as internal environmental monitoring, annual audits, good housekeeping and reporting of incidences to the relevant authorities. It is also recommended that the company seek competent assistance from professionals and experts in developing the staff capacity and carrying out specialized tests, designs and monitoring of various projects related parameters that could be beyond the company's internal capability. In addition, the proponent is advised to ensure that consultations and linkages are developed and maintained with relevant Lead Agencies in the exploration and mining sector as well as the National Environment Management Authority.

19. References

Appendix

Appendix 1: Minutes of the Community Public Participation forums

Minutes 1

MINUTES OF A PUBLIC PARTICIPATION MEETING HELD AT LAGBOGAL – AT CHIEF'S OFFICE

Number of attendants = 12

The meeting started at 10.00 AM with a word of prayer from one of the participants. Then followed by introduction of the EIA consultants by the CLO and the Chief Mr. Aden introduced the participants.

The consultants explained that they have been sent to Lagbogol to speak to the people about their intention to proceed to exploratory drilling phase in the area within Lagbogol North and Korich locations. The specific sites were not already identified but will be identified soon. The purpose of the meeting was to solicit for their views about the potential effects that they think the proposed activities will bring to the area and any precautionary measures that need to be taken to prevent any negative effects.

The participants were assured by the consultants that comments made in the meeting will be held in confidence and that no mention of names against responses. All responses will be be used strictly for statistical purposes.

The following comments were raised by the participants.

Participant comment 1

The participant believed that environmental degradation started after the previous exploration. He lamented that throat cancer started after exploration by the previous companies. In response to this the consultants explained the probable causes of cancer to the participants and de-linked exploration activities from the origin or spreading of cancer.

Participant comment 2

The participant said that the people working in the camp should involve the locals in their activities to allay fears and suspicions. She also recommended investigation into the cause of throat cancer in the area. She recommended for the establishment of a local environmental committee to monitor effects on the environment.

Participant comment 3

One of the participants appreciated the approach of public participation saying that the views of the local people can be heard. He was opposed to coming of foreign people to their area arguing that it will affect their cultural and traditional lifestyles. Other participants however, were quick to remind him that the oil exploration team is not new in the area as it is only relocating from another location in the area. He cited oil politics as one of the disadvantages of exploring and exploiting oil. He was apprehensive of socio-economical impacts.

Participant comment 5

The participant welcomed the EIA Consultants and agreed that the project is good but expressed concerns with its implementation in regards to environmental degradation. He asked for conservation of the environment during implementation. He requested that priority be given to the locals when it comes to employment.

Participant comment 6

A participant asked for alternative sources of income be made for the locals affected by the activities and said that resettlement of affected villagers and their house, and other resources affected should be compensated.

Participant comment 7

The participant recognized previous efforts by companies that came earlier. He appreciated the change in approach by the government, which involves the local people (wananchi) before the commencement of such projects. He commented that as pastoralists, such activities are destructive to their lives for they do not add value to the livestock that they depend on. He remembered activities that took place in 1969 which are suspected to have left poison behind. Agrees that if oil is found it will be beneficial to many but may result by displacements of people. He also urged the foreigners to respect their culture, heritage and religion.

Participant comment 8

One participant expressed the fears of environmental degradation as a result of the activities. He urged for corporate and social responsibility from the proponents.

Participant comment 9

The participant talked on the potential negative impacts based on his observation in areas where surface oil exploration had taken place. He mentioned of cases where excavations were made on cemeteries, human settlements and other sensitive areas. He recommended that compensation should be made to those affected and urged that the locals should be employed and notices for the same should be to locals and through Chiefs' offices.

Minutes 2

MINUTES OF PUBLIC PARTICIPATION MEETING HELD AT KORIC CHIEF'S CAMP

Number of attendants = 15

The meeting started at 2:30 PM with a word of prayer from a participant. The prayer was followed by introduction of the Consulting team by the community Liaison Officer. The Chief of Korich Location introduced himself and requested the participants to introduce themselves. After all the introductions were made the consultant explained the purpose of the meeting.

The consultant explained that the Lion Petroleum Corp. that has been exploring for oil in the region is now interested into moving to the next stage which is drilling of test wells to look for oil. This will involve setting up a campsite from where the oil testing will be drilled as well as two water bore holes to provide water for drilling purposes. The consultant informed the participants that the purpose of the meeting was to let them know of the intended activities and ask them if they knew of anything that may be affected the proposed activities.

The participants were requested to speak freely without fear of victimization by anybody. They were assured that their comments will be used only for statistical purposes and that no names would be attached to comments.

Participant comment 1

A participant urged the importance of respect to the religious, cultural and way of life of the local residents. He stressed the importance of conservation of the local vegetation and associated biodiversity which are both important as pasture and medicine.

Participant comment 2

A participant explained how he fully agrees with the implementation of the project and would want the whole exercise to be completed in good time to know the availability of the resource. He would want any business associated with this exercise to be contracted to the locals. Also stressed that Kenyan labour laws be observed during recruitment and employment of the locals

Participant comment 3

A participant hailed the initiative to explore for oil in the area and also the exercise of public participation before initiation of such the project. Whereas he fully agreed with the implementation of the project, he stressed the importance of involving the youths of the area through employment. He also asked that notices for such vacancies should be through local notices and local leaders.

ANSWER. The consultant took the participants through the legal position of the government as stipulated by the Environmental Management and Conservation Act of 1999 and the processes involved in coming up with an environmental impact assessment and management plan. He explained the involvement of the public and their responsibility as good citizens.

Participant comment 4

An elder from the location narrated the past experience they have had from previous oil exploration in the area. He remembered the activities of firms like BP Shell, Chevrolet and Amoco. There was no involvement of the local people and the residents become suspicious of the activities that were taking place. The participant stressed the importance of involving the locals in such activities and agreed that the project should go on.

Participant comment 5

One participant explained his experience with oil exploration companies. He explained to other participant his involvement and the exercise of drilling of test wells. From his explanations, the participants got satisfied that the already completed phase of surface exploration was more disastrous to the environment than the phase the proponent is moving into. This made them to be less worried about the environment.

Participant comment 6

A participant raised an issue of waste management around and within the exploration camp sites. His concern was that from previous experience, waste generated often attracts wildlife closer to settled areas. He also proposed that project proponents have to be sensitive to their religious, cultural and be obedient to public order in the area.

Participant comment 7

An elder participant welcomed the project and hoped for further dialogue between the proponent and the local community in order for the project to benefit the locals and the proponent to have no interruptions from the public.

Participant comment 8

A participant rose to ask a question on who was the initiator of the project

ANSWER. The consultant elaborated further on the processes involved in licensing of oil exploration blocks by the government of Kenya and all the parties involved in this process. The participant also raised questions over the manner in which some projects have been carried out.

Interjection by other participants stated that explanations from the implementers were thought to be in order.

Participant comment 9

A participant women Leader asked for respect of the local culture and religion but also stressed the involvement of the local youth through any employment that would arise with the exploration exercise.

The meeting ended at some minutes past five O'clock with a word of prayer from one of the elders with a consensus that the project should go on.

Appendix 2.

A sample of calendar of events of assistance to the public

Ser	Date	Project	ROC Ksh ($)	Remarks
1	8 Jan	Dozer work on 3 pans in Qanjara	72,000 ($832)	All from small scrapes. Locals surprised we returned and grateful. 6 Hrs
2	11/12 Jan	Dozer work Korich pan	66,000 ($765)	Well received. Extension of pan we constructed in 2013
3	25 Jan	Dozer work Guitich	72,000 ($832)	From scratch.
4	3 Feb	Pan 1 Backhoe 3 hours	64500 ($750)	Mohamed Y Hussein Lie 8 point 1256 (finished 4/2)
5	3 Feb	Pam 2 Backhoe 3 hours	64500 ($750)	Mohamed h Omar Line 8 Pt 1250
6	3 Feb	Pan 3 Backhoe 3 hours	64500 ($750)	Ahmed D Kheir Line 8 1238
7	4 Feb	Pan 4 Backhoe 2.5 hours	64500 ($750)	Abdi Ahmed Gedi Line 8 Pt 1197 (Not complete – 30 min to do)
8	7 Feb	Pan 5 Backhoe 3 hours	64500 ($750)	Mohamed M Elmi Line 2 Pt 1505
9	7/8 Feb	Pan 6 Backhoe 3 hours	64500 ($750)	Abdi Yussuf Line 2 Pt 1471
10	8 Feb	Pan 7 Backhoe 3 hours	64500 ($750)	Guliye Ali Line 3 Pt 1521

11	8 Feb	Pan 8 Backhoe 0.5 hours	64500 ($750)	Abdi A Kheir Line 3 Pt 1510 (Not complete – 2.5 hrs to do)
12	Mar	Pan 9 Backhoe	64500 ($750)	Issac Maalim Line 8 Pt 1195
13	Mar	Pan 10 Backhoe	64500 ($750)	Noor Maow Line 1 Pt xxx
14	Mar	Pan 11 Backhoe	64500 ($750)	Ahmed Billow Line 3 Pt 1541
15	Mar	Pan 12 Backhoe	64500 ($750)	Maalin a Gart Line 3 Pt 1588
16	Mar	Pan 13 Backhoe	64500 ($750)	Adan Hussein Line 9 Pt xxx
17	Mar	Tbc – one for Chief Lag South		Not promised
18	16 Mar	Water delivery to Lagbogol North School	Cost to come	Happened but no costing details yet

Appendix 3.

Terms of reference for the lion petroleum community steering committee

NAME

Lion Petroleum Community Steering Committee

FUNCTION

The function of the committee is as follows:

To discuss and report back on any community issue concerning Lion Petroleum operations.

To ensure a fair and transparent division of any Lion Petroleum requests for labour and contracts.

Contracts are subject to the bid being competitive and to a required standard. Lion Petroleum (or contractors employed by Lion Petroleum) reserve the right to reject any contract recommended by the Committee.

This is an advisory committee, and Lion Petroleum are not obliged to follow committee recommendations.

MEMBERS

The Committee shall consist of the following:

ACC - Chair

4 Chiefs (Lagobal North, Korich, Qanjara, Lagobal South)

4 Elders (Lagobal North, Korich, Qanjara, Lagobal South)

Youth Rep

2 x Women's Rep

1 x Asst Chief (Bus Bus)

Ex Officio (non-sitting members)

Taipan Rep

County Reps (MCA) from Ademasajida and Hadabo Athiboro Ward

A Rep from the MP's office.

CLO's – One of whom should take the minutes

Membership can change with the agreement of the Chairman.

The role of ex-officio members is as follows:

Not required at meetings but can attend. 1 x CLO is required to take minutes.

Are sent copies of minutes

Are there primarily as observers, and should not attempt to influence the decisions of the Committee.

LIFE OF COMMITTEE

The Committee can be absolved and resurrected at the discretion of Lion Petroleum. This decision will depend on the program of operations

QUORUM

A quorum exists as long as the Chair and at least one member of each major village (Lagobal North, Lagobal South, Qanjara, Korich) is present.

FREQUENCY OF MEETINGS

During operations, the Committee will meet once a month. Extraordinary meetings can be called at the discretion of Lion Petroleum

The Committee can hold its own meetings, but lunch/travel allowance will only be paid f called by Lion Petroleum.

REPORTING

Minutes are to be sent to all ex officio members and each meeting is to start with a review of the previous minutes.

Appendix 4

Community diary 1 jan –19 feb 2014

Note: At the foot of this document there is a list of visits to Block 2b and significant events. There is also a section on 3 issues relating to this seismic programme. Wajir County Fees, the formation of a local (Wajir West) Committee to allocate labour requirements, contracts and the poc for any local issues, and the late requirement to conduct operations in Wajir South. Also included is the latest minutes of the Community Steering Committee Meeting and TOR's.

Delays: No delays to work due to local objections. Higher CSR Concerns: No issues with authorities (Chiefs/CCs/MCAs/politicians).

Delays: Minor delays to work due to local objections – not amounting to standby charges. Higher CSR Concerns: Some issues which need addressing with the authorities.

Delays: Major delays to work due to local resistance incurring standby charges. Higher CSR Concerns: Urgent issues with the authorities which need addressing otherwise progress will be threatened.

19 FEB – Delays - Higher CSR Concerns - .

15.27 Km recorded of line 10 – All acquisition complete. Work has started to dismantle the camp, and local staff will start to be laid off (all have achieved the promised minimum of 1 months' work).

Two outstanding projects:

1. Backhoe still has approx. 7 pans to complete 2-3 days work

2. A single delivery of water to the new school at Lagboghol North. This is being arranged through BGP.

18 FEB – Delays - Higher CSR Concerns - .

1.86 km of line 10 recorded (East to West) until spread ran out. Further delay on Backhoe but programme confirmed. Further report from Chief Lagbogal South that he has spoken to his people and explained relations between us are good.

No issues.

17 FEB – Delays - Higher CSR Concerns - .

15.21 Km recorded and line 9 complete. Only 2.43 Km of line 10 cleared since dozer too close to line 9 recording to operate. Line 10 clearance and surveying will continue 18 Feb.

Programme for backhoe to be confirmed once serviceable.

WM spoke to a construction company in Wajir and has contacted committee inviting local bids for road and camp construction.

Close out letter and BGP demobilisation plan delivered to NEMA (HQ and Wajir office).

16 FEB – Delays -  Higher CSR Concerns -  .

3.7 Km recorded. Line 6 complete and started on line 9 (2.68). One battery stolen from line 6. Line clearance continues on line 10. No issues, but one family who had previously been promised work on their dam again blocked the track since the work had not been completed. CLO's/Chief explained problem with backhoe being u/s. Backhoe should be serviceable this week. WM wrote to County Minister explaining decision re dropping Wajir South tails – acknowledged with thanks.

Clinic conducted 6 medical consultations.

15 FEB – Delays -  Higher CSR Concerns -  .

14.31 Km recorded, layout of line 6 complete, started clearing line 10 (albeit only with the mulcher). Line 10 is heavy scrub.

WM had a meeting with Primary Chief Lagbogal South to clear the air. Chief has no issues with Lion Petroleum and gave his views on the issue. WM invited him to remain represented on the Committee which would allow a direct link between him and Lion rather than having to go through a chain of command. The meeting ended amicably. Deputy AP Commander passed through from Nairobi and asked WM for fuel – referred to BGP. Clinic conducted 6 medical consultations.