



Extended Well Testing – Ngamia D Environment Project Report Study

Report Prepared for

Tullow Kenya B.V.

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Extended Well Testing – Ngamia D

Environment Project Report Study

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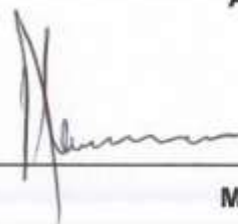
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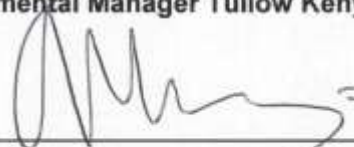
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1 Non-technical Summary

1.1 Overview and purpose of the project

As part of the proposed development of Blocks 10BB and 13T, Tullow Kenya B.V. (hereafter referred to as 'Tullow') wishes to complete an extended well test (EWT) at the existing Ngamia - D well-site ('Project'), located to the south of the town of Lokichar, Kenya. The well pad coordinates are 2° 12' 45.19"N 35° 45' 58.08"E at an elevation of about 722m above sea level.

Following discussion with NEMA (August 12th 2014), it was agreed that due to the limited scope and localised scale of the EWT activities an Environmental Project Report (EPR) could be prepared, in accordance with Part II, Section 7 of the Environmental (Impact Assessment and Audit) Regulations, 2003.

The purpose of the project is to appraise the hydrocarbon reservoir using the existing Ngamia-D well to obtain more information on reservoir characteristics, and assist in identifying the optimum method that can be used to recover the oil. Up to 1,500 bbls of reservoir fluids will be flowed per day, from Ngamia – D to allow observations to be made of reservoir characteristics during testing. In addition, EWT activities will also involve the completion of an injectivity test where water is reinjected back into the hydrocarbon reservoir. EWT activities are expected to start during Q3 2015 and be completed within a period of up to 12 months including the post crude oil reinjection.

1.2 Summary of the project

During the EWT at the Ngamia-D well site, most activities will take place within the existing site boundary. Well injectivity testing requires injection of water into the formation; the well site which will be used for injectivity testing is the Ngamia-3 well site. The water required for injectivity testing will be sourced from produced water from the Ngamia-D EWT activities and transferred to Ngamia-3 well site using a flexible hose. Additional make up fresh water will be transferred from Ngamia-1 to Ngamia-3 well site using a flexible hose.

A summary of project activities is provided below:

- **Site modification** - minor site modifications are required within the existing boundary of the well pad, including civil works to accommodate the crude oil storage tanks;
- **Installation and operation of EWT equipment** – this includes the following:
 - Installation of a single separator to separate reservoir fluids into gas, crude oil, and produced water;

- The flaring of associated gas to the atmosphere (no crude oil will be flared); and
 - The storage of crude oil and produced water. Crude oil will be stored in atmospheric aboveground steel storage tanks while produced water will be stored in existing water pits;
 - Reinjection of produced water, potentially mixed with freshwater to provide additional volume, on completion of EWT activities to test the injectivity of the reservoir; and
 - Two options are currently being considered: Either the reinjection of crude oil back into the reservoir, or the storage of crude until it can be exported in the future.
- **Supporting facilities** – the use of existing worker accommodation camps and existing borehole (Nakukulas-10). All wastes generated from the EWT activities will be collected in water-tight receptacles by a NEMA approved waste transporter for disposal in accordance with the Kenyan waste management regulations of 2006.
 - **Use of the public road network** – to transport workers, equipment and other materials required for the project.
 - **Site closure** – after the EWT is complete the equipment used for the test will be removed. The steel tanks used for the storage of crude oil (if this option is selected) will be positioned within the existing boundary and no additional land is required.

The construction of the Ngamia-D well pad, drilling of the wells, associated access roads, future site decommissioning and reinstatement following well closure have already been permitted in the Environmental Impact Assessment (EIA) of the proposed exploratory Well Drilling in Block 10BB, Turkana South and Turkana Central Counties by Africa Oil Kenya BV, October 2010 (License no. PR 7764 / 0001253 expiring 11 May 2015).

Additionally, Tullow commissioned another ESIA for the Kapese Integrated Support Base which is currently undergoing public review. The Kapese Integrated Support Base will provide accommodation facilities for workers that will not be accommodated at the Ngamia-D well site camp facility

The abstraction of groundwater from an existing borehole for Tullow's activities (including the EWT) has already been approved by the Water Resource Management Authority (WRMA) under an existing permit to abstract / use WRMA Form 010 as per Environmental Management and Coordination (Water Quality) Regulations (2006).

The EPR defined an environmental Area of Influence (AoI) of 2km based upon the results of air and noise modelling. A wider socio-economic AoI was defined as 10km, based on the proximity of nearby communities and use of the area surrounding the existing well pad for animal grazing land.

1.3 Stakeholder engagement

Stakeholder engagement was undertaken for two EWT well sites namely Amosing-1 and Ngamia-5. Due to technical reasons, the Ngamia-5 EWT was suspended and instead Ngamia-D was identified for EWT. Together with Tullow, KTL identified stakeholders and undertook two separate field trips in July and September 2014 to engage them on the EWT projects at the two well sites. Stakeholders for the EWT EPR included government officials at a County and sub-County level, community groups and representatives, and a selection of Non-Governmental Organisations (NGOs). The key findings of stakeholder consultations activities are summarised below.

- Stakeholders expressed concern associated with the potential for environmental pollution (water, air emissions, generation of dust, generation of noise), the project's contribution to global climate change which is perceived to be changing rainfall distribution patterns across the region, and the generation of waste; and
- Concerns were also raised with respect to the potential employment opportunities (it was confirmed that due to the limited scope of the works, no local employment was required), and the potential for Tullow to share the benefits associated with the future production of oil (it was confirmed that the export of oil to market was outside the scope of the project).

Overall, the outcome of stakeholder consultations indicated that there was support for Tullow's activities in the area and stakeholders were pleased to be involved in preparation of the EPR and wished to see community-level engagement continue during the implementation of the EWT project.

1.4 Impact assessments

An impact assessment was undertaken, using a risk-based approach, to identify the environmental and social risks and impacts associated with the EWT project. The outcome of the assessment process identified the following Minor residual impacts:

Routine events

- Deterioration to local air quality, creation of nuisance to local communities and reduction in availability of vegetation used for animal grazing due to the generation of dust from the use of vehicles along local road networks used.
- A potential for a reduction in the availability of local groundwater supplies and groundwater over abstraction resulting in deeper saline water mixing of with upper freshwater horizons due to the abstraction of groundwater from boreholes. An existing licensed borehole will be used for groundwater

abstraction and ongoing monitoring measures will be in place to check both groundwater elevation and quality.

- The potential for the introduction of alien and invasive species affecting existing plant species, biodiversity and pastoralist livelihoods due to the use of road vehicles to transport equipment, materials and workers. Mitigation measures will be used to prevent the spread of invasive species associated with the use of road vehicles to the extent possible.
- A potential for soil and groundwater contamination due to the generation of hazardous and non-hazardous waste. An existing, licensed waste contractor will be used and their activities will be monitored on an ongoing basis.

Non-routine events

- Deterioration to local air quality (non-GHG emissions) and contribution to global climate change (GHG emissions) due to the potential for a release of gas to occur owing to a surge in gas volume during well testing.
- A potential for soil and groundwater contamination, deterioration to local air quality (non-GHG emissions) and global climate change (GHG emissions) and impact on community health and safety due to the potential for fire/explosion to occur during well testing.

The assessment process identified the following Moderate residual impact:

Routine events

- Increased risk to community health and safety resulting in an injury/fatality, or damage to private property and loss of livestock due to the use of road vehicles on the public road network and a road traffic incident.

1.5 Environmental and Social Management Plan and future inspections and audits

All of the mitigation and control measures identified were incorporated into an Environmental and Social Management Plan (ESMP) that will be discussed with Tullow's contractor(s) before they mobilise to the field. The purpose of this discussion will be to indicate Tullow's expectations from an environmental and social perspective and discuss and agree roles and responsibilities associated with the ESMP. During the completion of the EWT project, Tullow will also undertake a series of audits and inspections. Any corrective actions identified will be immediately recorded and written notices will be issued to the relevant contractors, supplemented by additional checks.

Acronyms

Terminology	Description
Aoi	Area of influence
bbls/d	Barrels per day
BOPD	Barrels of oil per day
CR	Critically endangered
EN	Endangered
EPR	Environmental Project Report
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EWT	Extended Well Test
FSEO	Field Stakeholder Engagement Officers
GIIP	Good International Industry Practice
GO	Governmental Organisation
GoK	Government of Kenya
GOR	Gas-oil ratio
KTL	Kurrent Technologies Ltd.
Lokichar Cluster	Oil and gas development fields
mmscfd	Million standard cubic feet per day
Mol%	Molar percentage
NEMA	National Environmental Management Authority
NGO	Non-Governmental Organisation
scf/stb	Standard cubic feet per standard barrel
South Lokichar Basin Development	Wider appraisal and development activities planned by Tullow in the South Lokichar Basin, Block 10BB and 13T
sq km	Square kilometre
WRMA	Water Resource Management Authority

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2 Contact details

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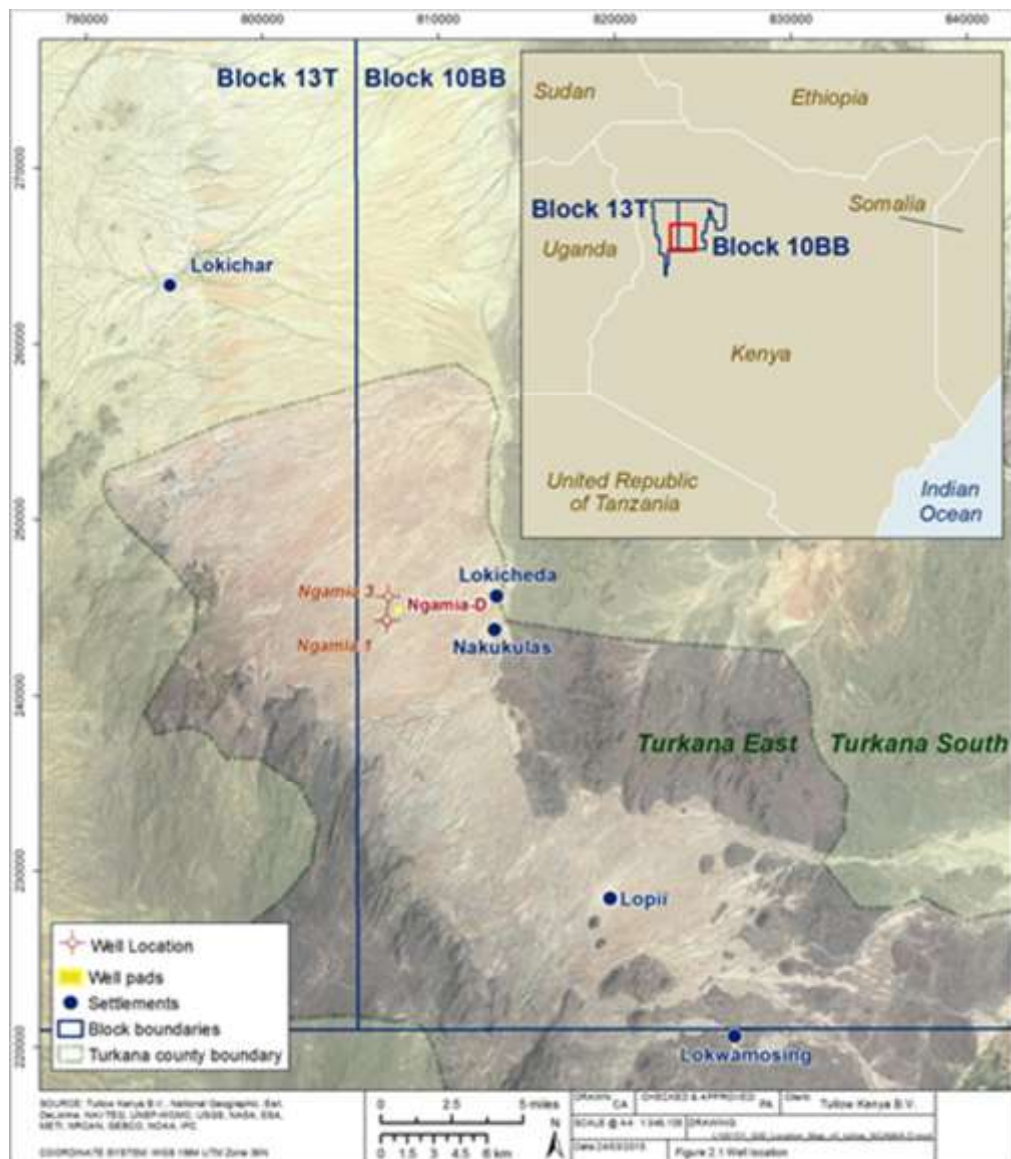
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3 Introduction

3.1 Overview

Tullow Kenya B.V. (hereafter referred to as 'Tullow') has interests in five onshore exploration block license areas in the East African Rift Basin of Kenya, covering c.67,000 km². As part of the proposed development of Block 10BB, Tullow wishes to complete an Extended Well Test (EWT) at the Ngamia-D well-site, located to the south of the town of Lokichar (see Figure 1 below). The coordinates for the existing Ngamia-D well pad are 2° 12' 45.19"N 35° 45' 58.08"E

Figure 1: Location of the Project site



Following discussion with NEMA (August 12th 2014), it was agreed that due to the limited scope and localised scale of the EWT activities an Environmental Project Report (EPR) could be prepared, in accordance with Part II, Section 7 of the Environmental (Impact Assessment and Audit) Regulations, 2003. On this basis, Tullow have prepared an EPR as a single submission to NEMA in support of the change of land use. In accordance with the Environmental Management and Coordination Act 1999, Tullow has commissioned local environmental consultants, Kurrent Technologies Ltd. (KTL) (NEMA Reg. No. 0191 as a 'Lead Firm'), to prepare the EPR.

3.2 Project Purpose

The purpose of the project is to appraise the hydrocarbon reservoir using the existing Ngamia-D petroleum well to obtain more information on reservoir characteristics, and assist in identifying the optimum method that can be used to recover the oil. Up to 1,500 bbls of reservoir fluids will be flowed per day, from Ngamia-D to allow observations to be made of reservoir characteristics during testing. In addition, EWT activities will also involve the completion of an injectivity test where water is reinjected back into the hydrocarbon reservoir.

3.3 Project Summary and Scope of the EPR

The activities assessed in this EPR are specifically associated with the change of use for the existing well pad at Ngamia-D from exploration to appraisal. No new additional land will be required for the EWT activities; typical EWT activities require water; for injectivity test, water will be transferred to Ngamia-3 well site from two locations namely, produced water from Ngamia-D and fresh make up water from Ngamia-1 abstracted from a nearby borehole. The water will be transferred to Ngamia-3 well site from Ngamia-D and Ngamia-1 using a flexible hose (similar in size to a standard fire hose). Placing a flexible hose on the ground along the existing roads from Ngamia-D and Ngamia-1 for transferring water from one well site to another will have minimal environmental and social impacts. EWT activities are expected to start during Q3 2015. A summary of project activities is provided below.

- **Site modification** - minor site modifications are required within the existing boundary of the well pad, including early civil works and construction of crude oil storage tanks. No additional land is required;
- **Installation and operation of EWT equipment** – this includes the following:
 - Installation of a single separator to separate reservoir fluids into gas, crude oil, and produced water;
 - The flaring of associated gas to the atmosphere (no crude oil will be flared); and

- The storage of crude oil and produced water. The crude oil will be stored in above ground steel storage tanks while the produced water will be stored in existing water pits at the Ngamia-D well site;
- Reinjection of produced water, potentially mixed with freshwater, on completion of EWT activities to test injectivity of the reservoir; and
- Either reinjection of crude oil back into the reservoir, or the storage of crude until it can be exported in the future.
- **Supporting facilities** – the use of existing worker accommodation camps, use of existing groundwater boreholes
- **Use of the public road network** – to transport workers, equipment and other materials required for the project.
- **Site closure – after the EWT** is complete the equipment used for the test will be removed. The steel tanks used for the storage of crude oil (if this option is selected) will be positioned within the existing boundary. No additional land is required.

The construction of the Ngamia-D well pad, drilling of the wells, associated access roads, future site decommissioning and reinstatement following well closure have already been permitted in the Environmental Impact Assessment (EIA) of the proposed exploratory Well Drilling in Block 10BB, Turkana South and Turkana Central Counties by Africa Oil Kenya BV, October 2010 (License no. PR 7764 / 0001253 expiring 11 May 2015). Additionally, Tullow commissioned another ESIA for the Kapese Integrated Support Base which is currently undergoing public review. The Kapese Integrated Support Base will provide accommodation facilities for workers that will not be accommodated at the Ngamia-D well site camp facility.

The abstraction of groundwater from an existing borehole for Tullow's activities (including the EWT) has already been approved by the Water Resource Management Authority (WRMA) under an existing permit to abstract /use WRMA Form 010 as per Environmental Management and Coordination (Water Quality) Regulations (2006).

3.4 EPR Process

3.4.1 Aims and objectives

The aim of the EPR is to identify the areas of the project where significant environmental and social affects may occur, and to identify mitigation measures that reduce the probability and/or severity of these affects.

The objectives of the EPR process are to:

- Identify potential environmental and social risks and impacts associated with the EWT;

- Integrate environmental and social considerations into project planning and design activities, in order to achieve a high standard of environmental and social performance during project implementation; and
- Consult with stakeholders at an early stage of preparing the EPR.

3.4.2 Environmental and social data sources

As part of Tullow's ongoing exploration activities, a significant amount of environmental and social data has been collected from various field studies and publicly held sources and this information was used during preparation of the EPR. Two field visits were also undertaken (14 to 21 July 2014 and 02 to 03 September 2014) to check the reliability of existing data and gather additional information in the field.

3.4.3 EPR study team

Table 1 identifies the core EPR team. Curricula vitae for these staff are attached in Appendix 1. The NEMA registration certificates and practicing licenses for the EPR team are presented in Appendix 2.

Table 1: EPR key team members

Name	Company	Role	Qualifications	Years of Experience
Sanjay Gandhi (registered with NEMA to submit EPRs and EIAs).	KTL	EPR Team Lead	Bsc Hons Civil Engineering	25
Gideon Owaga	KTL	Sociologist	BA. Sociology and Public Administration, MA Rural Sociology and Community Development	4

3.5 Report Structure

The structure of the EPR is summarised below:

- Section 1: Non-technical summary
- Section 2: Contact details
- Section 3: Introduction to the project

- Section 4: Legislation and policy framework
- Section 5: Project description
- Section 6: Methodology for undertaking the environmental and social assessment
- Section 7: Analysis of alternatives
- Section 8: Environmental and social baseline
- Section 9: Stakeholder Engagement Plan
- Section 10: Environmental and social impact assessment
- Section 11: Environmental and social management plan
- Section 12: Conclusions
- Section 13: References

Appendices

- Appendix 1: CVs of KTL Staff
- Appendix 2a: KTL NEMA Practicing License – 2015
- Appendix 2b: Lead Expert Practicing License – 2015
- Appendix 3: Payment for the EIA licensing fee
- Appendix 4: Letter to NEMA
- Appendix 5a: Registration sheets (Lokicheda)
- Appendix 5b: Stakeholder Engagement Log No. 01- (Lokicheda)
- Appendix 5c: Issues and Response Report – (Lokicheda)
- Appendix 6a: Registration sheets- (Nakukulas)
- Appendix 6b: Stakeholder Engagement Log No. 02- (Nakukulas)
- Appendix 6c: Issues and Response Report – Nakukulas FGD (Men)
- Appendix 6d: Issues and Response Report-Nakukulas FGD (Women)
- Appendix 7: Public stakeholder meeting and baseline photos (Lokicheda and Nakukulas)

4 Legislation and Policy Framework

4.1 Introduction

The purpose of this section is to present the applicable regulatory and legislative framework that is relevant to the project.

4.2 National

4.2.1 National regulatory authorities

The key national regulatory authorities involved in permitting and environmental management of the oil and gas in Kenya are outlined below:

- **Ministry of Energy and Petroleum (MoEP):** is the government ministry responsible for facilitating the provision of clean, secure, sustainable and affordable energy services for social-economic development while protecting the environment. The technical department relevant to the Project is the Petroleum Energy Department (PED). The PED is mandated to carry out exploration for oil and gas within Kenya.
- **Ministry of Environment, Water and Natural Resources (MEWNR):** is the government ministry responsible for the governance for sustainable use of natural resources in order to secure livelihoods and economic prosperity. The Ministry is composed of four technical departments (Mines and Geology, Resource Survey and Remote Sensing, Meteorology, and Environment) as well as one major parastatal – the National Environment Management Authority (NEMA). The Directorate of Environment is responsible for the overall coordination of environment and is involved in policy formulation, development and advice on environmental matters in the Ministry.
- **National Environmental Management Authority (NEMA):** is the government lead agency focused on implementing the Environmental Management and Coordination Act (EMCA) enacted in 1999.
- **WRMA:** is a state corporation charged with being the lead agency in water resources management in Kenya. In order for WRMA to undertake its stipulated responsibilities, the Water Act (2002) provides for decentralised and stakeholder involvement; implemented through regional offices of the Authority based on drainage basins (catchment areas) assisted by Catchment Area Advisory Committees (CAACs).

4.2.2 Constitution, national policies, strategies and action plans

The Kenyan legal hierarchy comprises the Constitution, National Policies, international treaties and agreements, primary legislation (laws and acts / bills) and subsidiary legislation (such as notices, rules and orders).

The **2010 Constitution** enhanced protection and enforcement of fundamental rights and established a two-tier structure of government through the National and County Governments. The re-distribution of the functions and powers between the two levels has resulted in differences in approaches between the Constitution and national legislation that has necessitated the review and update of national policies for the oil and gas and energy sector, and additional environmental legislation.

The relevant key national policies, strategies and action plans that are relevant to this project include the following:

- **Kenya Vision 2030:** the current national development blueprint for the period 2008 to 2030. The objective of Vision 2030 is to transform Kenya into a middle income country with a consistent annual growth of “10 % by the year 2030”. One of the aims of the vision is to make Kenya a nation that has a clean, secure and sustainable environment by 2030. This will be achieved through promoting environmental conservation to better support the economic pillar. Improving pollution and waste management through the application of the right economic incentives in development initiatives has also been raised as being critical to Vision 2030.
- **Sessional Paper No. 6 of 1999 on Environment and Sustainable Development:** established to aid in ensuring that development policies, programmes and projects take environmental considerations into account; that an independent EIA Report is prepared for any development before implementation; and that effluent treatment standards conform to acceptable health standards (this is replaced by the National Environmental Policy 2013).
- **National Environmental Policy 2013:** aims to achieve a better quality of life for present and future generations through sustainable management and the use of the environment and natural resources. The policy focuses on providing a framework for an integrated approach to planning and sustainable management whilst promoting research and capacity development through the use of innovative environmental management tools. In particular, it sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources, recognising that natural systems are under intense pressure from human activities particularly for critical ecosystems including forests, grasslands and arid and semi-arid lands; the Lokichar Basin falls into the arid and semi-arid lands (ASAL) category.
- **National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999):** established with an objective to preserve, conserve and protect available water resources and allocate it in a sustainable rational and economic way.
- **National Water Policy, 2012:** developed in line with the mandate, vision and mission of the ministry responsible for water affairs in Kenya. In essence

the Policy is built on the achievements of the sector reform commenced with the Water Act 2002 and based on the sector principles outlined in the National Water Policy 1999. In order to address the goals of Vision 2030 and take account of the effects of climate change and other factors, a National Water Master Plan 2030 is being developed.

- **National Environment Action Plan (NEAP) 2007:** provides a framework for the implementation of the Environment Policy and realisation of the National Millennium Development Goals and Vision 2030. It outlines methods to combat climate change including mitigation and adaptation, improving inter-sectoral coordination, mainstreaming sustainable land management into national planning, policy and legal frameworks and undertaking research on the impact of climate change on environmental, social and economic sectors.
- **Draft National Energy Policy (February 2014):** sets out the national policies and strategies for the energy sector that are aligned to the new Constitution and in tandem with Vision 2030.
- **National Policy on Gender and Development (NPGD) 2002:** provides a basis for the Government to underscore its commitment to advancing the status of women by address any existing imbalances through policy formulation and implementation taking into account different needs and skills of men and women.
- **The Kenya AIDS Strategic Framework (KASF) 2014/15-2018/19:** Provides the Strategic guide for the country's response to HIV at both national and county levels. The framework addresses the drivers of the HIV epidemic and builds on achievements of the previous country strategic plans to achieve its goal of contributing to the country's Vision 2030 through universal access to comprehensive HIV prevention, treatment and care.

4.2.3 National legislative framework

A summary of Kenya's environmental and social legislation and guidelines, as of June 2014, that are relevant to the Project is presented in Table 2.

Table 2: Summary of relevant legislation and guidelines

Legislation	Summary
<i>Oil & Gas / Energy</i>	
Petroleum (Exploration and Production) Act, 1986	Provides regulations on petroleum agreements relating to the exploration for, development, production and transportation of, petroleum and for connected purposes.
Petroleum Development Fund Act, 1991	Established a Petroleum Development Fund and the imposition of a petroleum development levy and for connected purposes.

Legislation	Summary
Environment	
Environmental Management and Coordination Act (EMCA), 1999	Provides an appropriate legal and institutional framework for the management of the environment and for the matters connected directly or indirectly. EMCA makes it a mandatory requirement for an EIA study for certain activities (defined in list in the Second Schedule) to be carried out by proponents and for NEMA licensing of the EIA – see below. Operators of projects are then to carry out Environmental Audits in order to determine the level of conformance with commitments in the EIA study and license conditions. EMCA provides for the use of international standards where no national equivalents exist.
Environmental (Impact Assessment and Audit) Regulations, 2003	Includes the procedure for conducting EIA/ESIA studies by detailing the parameters to be evaluated during the study. It also provides guidelines on the payment of the EIA license fees, procedures for environmental audits and development of environmental monitoring plans.
Environmental Management and Coordination (Water Quality) Regulations, 2006	Includes permitting schemes for ‘domestic use’ and effluent disposal in relation to the following: Protection of sources of water for domestic use; Water for industrial use and effluent discharge; and Water for agricultural use. Water abstraction and use involves a 2-stage process, comprising a permit to construct works followed by a permit to abstract / use subject to all construction permit conditions being fulfilled.
Environmental Management and Coordination (Noise and Excessive Vibrations)(Control) Regulations, 2009	Applies to the operation of equipment or machinery and engagement in commercial or industrial activity that is likely to emit noise or excessive vibrations. The regulations set out requirements in regards to the following: Prohibition of excessive noise and vibration; Provisions relating to noise from certain sources; Provisions relating to licensing procedures for

Legislation	Summary
	certain activities with a potential of emitting excessive noise and/or vibrations; and Noise and excessive vibrations mapping.
Environmental Management and Coordination (Waste Management) Regulations, 2006	Includes regulations on the permitting of waste transport and waste management activities in regards to: Domestic wastes; Industrial wastes; Hazardous and toxic wastes; Pesticides and toxic substances; Biomedical wastes; and Radio-active substances. The Third Schedule sets out standards, guidelines and procedures for incinerators.
Wildlife Conservation and Management Act, 2013	Includes the Red List of protected and endangered species within Kenya.
Environmental Management and Coordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006	Includes regulations on: engagement in activities with an adverse impact on any ecosystem; introduction of any exotic species; and unsustainable use of natural resources.
Land Act, 2012	Consolidates and rationalises land laws to provide for the sustainable administration and management of land and land based resources. (NB: a draft Community Lands Bill is being formulated currently).
Water	
Water Act, 2002	Provides for the conservation and controlled use of water resources in Kenya.
Water Resources Management Rules, 2007	These Rules implement provisions of the Water Act, 2002, and apply to all policies, plans, programmes and activities to which the Act applies. They stipulate requirements for amongst others: water course designation, public notification and consultation; release and use of stored water; groundwater development

Legislation	Summary
	authorisation; and regulation of groundwater development.
Social	
National Policy on Gender and Development (NPGD) 2002	This policy provides a basis for the Government to underscore its commitment to advancing the status of women by address any existing imbalances through policy formulation and implementation taking into account different needs and skills of men and women
The Kenya AIDS Strategic Framework (KASF) 2014/15-2018/19	Provides the Strategic guide for the country's response to HIV at both national and county levels. The framework addresses the drivers of the HIV epidemic and builds on achievements of the previous country strategic plans to achieve its goal of contributing to the country's Vision 2030 through universal access to comprehensive HIV prevention, treatment and care.
Kenya Vision 2030	The objective of Vision 2030 is to transform Kenya into a middle income country with a consistent annual growth of "10 % by the year 2030". One of the aims of the vision is to make Kenya a nation that has a clean, secure and sustainable environment by 2030. This will be achieved through promoting environmental conservation to better support the economic pillar. Improving pollution and waste management through the application of the right economic incentives in development initiatives has also been raised as being critical to Vision 2030.
Constitution of Kenya 2010 – Bill of Rights	This is an integral part of Kenya's democratic state and is the framework for social, economic and cultural policies. It seeks to recognise and protecting human rights and fundamental freedoms and to preserve the dignity of individuals and communities, promote social justice and the realisation of the potential of all human beings.
Occupational Safety and Health Act, 2007 (OSHA)	Makes provisions for the health, safety and welfare to be observed by employers and persons employed in places of work. Its scope

Legislation	Summary
	has been expanded through amendments to cover all workplaces including offices, schools, academic institutions, factories, and plantations. It also establishes codes of practices approved and issued by Directorate of Occupational Safety and Health Services (DOSHS) which regulates OHS performance.
Work Injury Benefit Act, 2007 (WIBA)	Provides for compensation for employees on work related injuries and diseases contracted in the course of employment and for connected purposes. The act includes compulsory insurance for employees.
Public Health Act (Cap 242)	States that no person shall cause nuisance or condition liable to be injurious or dangerous to human health.
Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005	Provides statutory guidelines for the enforcement for occupational noise within workplaces.
Employment Act, 2007	Defines the fundamental rights of employees, to provide basic conditions of employment of employees, and to regulate compliance.

4.2.4 International protocols, agreements and treaties

Table 2 above identifies relevant international environmental and social development agreements to which Kenya is a party. Kenya is also a signatory to a range of International Labour Organisation Fundamental (and other) Conventions which are summarised in Table 3 and Table 4

Table 3: International environmental agreements relevant to Kenya

Issue	Convention and Objective	Summary	Kenyan Status
Biodiversity	International Plant Protection Convention - new revised text approved by Resolution 12/97 of the 29th Session of the FAO Conference in November 1997 – Declaration	To prevent the spread and introduction of pests of plants and plant products and to promote measures for their control.	Multilateral

Issue	Convention and Objective	Summary	Kenyan Status
	Convention on Biological Diversity	To ensure the conservation of biological diversity; the sustainable use of its components and the fair and equitable sharing of the benefits.	Multilateral
	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)	To protect migratory species of wild animals and their habitat.	Multilateral
	Convention on International Trade in Endangered Species of Wild Flora and Fauna	To ensure that international trade in specimens of wild animals and plants does not threaten their survival.	Multilateral
Climate Change	Kyoto Protocol to the UN Framework Convention on Climate Change	To reduce or limit the emission of gases contributing to the "greenhouse effect" and causing climate change in the industrialised countries	Multilateral
	United Nations Framework Convention on Climate Change	To achieve stabilisation of greenhouse gas concentrations.	Multilateral
Cultural	UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage	To ensure that effective and active measures are taken for the protection, conservation and presentation of the "cultural and natural heritage" on its territories.	Multilateral
	UNESCO Convention for the Safeguarding	To safeguard and ensure respect for the	Multilateral

Issue	Convention and Objective	Summary	Kenyan Status
	of the Intangible Cultural Heritage	world's Intangible Cultural Heritage, including raising awareness of the importance of intangible heritage and encouraging international cooperation and assistance.	
Democracy	Partnership agreement between the members of the African, Caribbean and Pacific (ACP) Group of States of the one part, and the European Community and its Member States, of the other part, signed in Cotonou on 23 June 2000 - Protocols - Final Act - Declarations	To promote and expedite economic growth with a view to contributing to peace and security and to promoting a stable and democratic political environment.	Multilateral
Desertification	United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	To combat desertification and mitigate the effects of drought with a view to achieving sustainable development.	Multilateral
Ozone	Amendment to the Montreal Protocol on substances that deplete the ozone layer, adopted at the ninth meeting of the Parties	To ensure effective protection of the ozone layer by regulating trade in substances that depletes it.	Multilateral
Waste	Basel Convention on the control of transboundary movements of	To lay down obligations with regard to ensuring that	Multilateral

Issue	Convention and Objective	Summary	Kenyan Status
	hazardous wastes and their disposal	transboundary movement of wastes is reduced to the minimum consistent with the environmentally sound and efficient management of such wastes.	

Table 4: International Labour Organisation (ILO) Fundamental and other conventions

Issue	Convention	Summary	How applied in Kenya
Women's Rights	International Labour Organisation (ILO) Convention No. 89 on Women's Rights and Working Conditions	These conventions set out basic principles and rights at work in regard to gender equality	The principles and rights set out in these Conventions are generally adopted in the 2010 Constitution and in Kenya's Employment Law, 2007, plus the Industrial Relations Act, 2007, the Workers' Injury Benefit Act, 2007; and the Occupational Safety and Health Act, 2007.
	ILO Discrimination (Employment and Occupation) Convention 1958 (No. 111)		
	United Nations Convention on the Elimination of all Forms of Discrimination Against Women		
	ILO Worst Forms of Child Labour Convention, 1999 (No. 182)		
	ILO Child Rights and Working Conditions Convention No. 90		
	ILO Forced Labour Convention, 1930 (no. 29)		
	ILO Abolition of Forced Labour Convention, 1957 (No. 105)		

Issue	Convention	Summary	How applied in Kenya
Labour Rights	ILO Right to Organize and Collective Bargaining Convention, 1949 (No. 98)	These conventions set out basic principles and rights at work in regard to representation	
	ILO Freedom of Association and Protection of the Right to Organize Convention, 1948 (no. 87) ^{*1}		
Occupational Health and Safety	ILO Occupational Safety and Health Convention, 1981 (No. 155)	These conventions set out basic principles and rights at work in regard to workplace health and safety management	

4.3 Tullow Oil Policies and Standards

Tullow is committed to completing the project in accordance with applicable company policies, national legislation, international treaties and protocols.

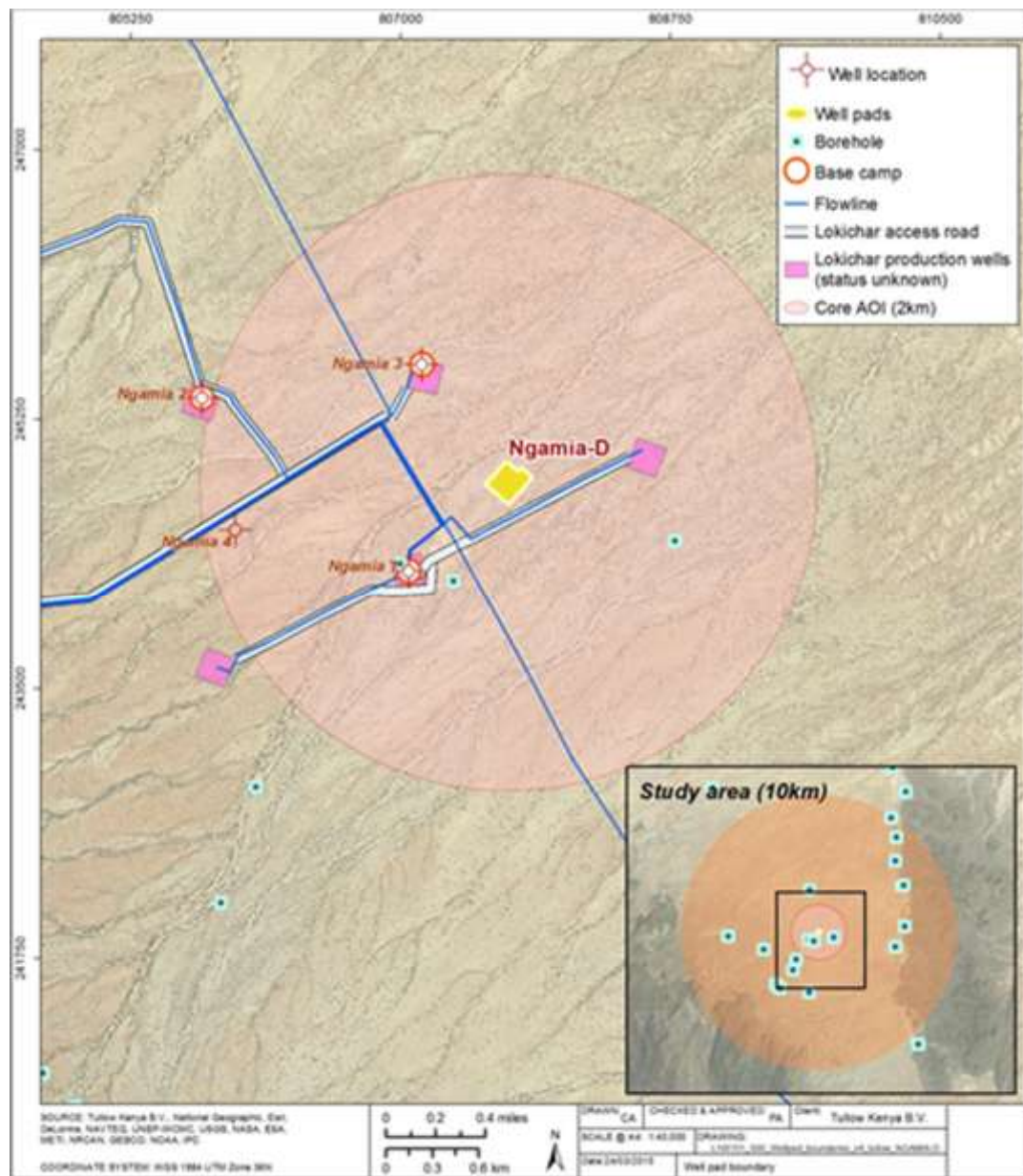
¹ Kenya has not ratified the Freedom of Association and Protection of the Right to Organize Convention, 1948 (no.87).

5 The Project

5.1 Project Location

The Ngamia-D well site, located within Block 10BB in the Turkana South County of Northwest Kenya, is 23 km south- southeast of Lokichar (see Figure 1). The coordinates for Ngamia-D well pad are 2° 12' 45.19"N 35° 45' 58.08"E. A location map of the EWT well site is shown in Figure 2 **Error! Reference source not found.**

Figure 2: EWT site and surrounding boreholes

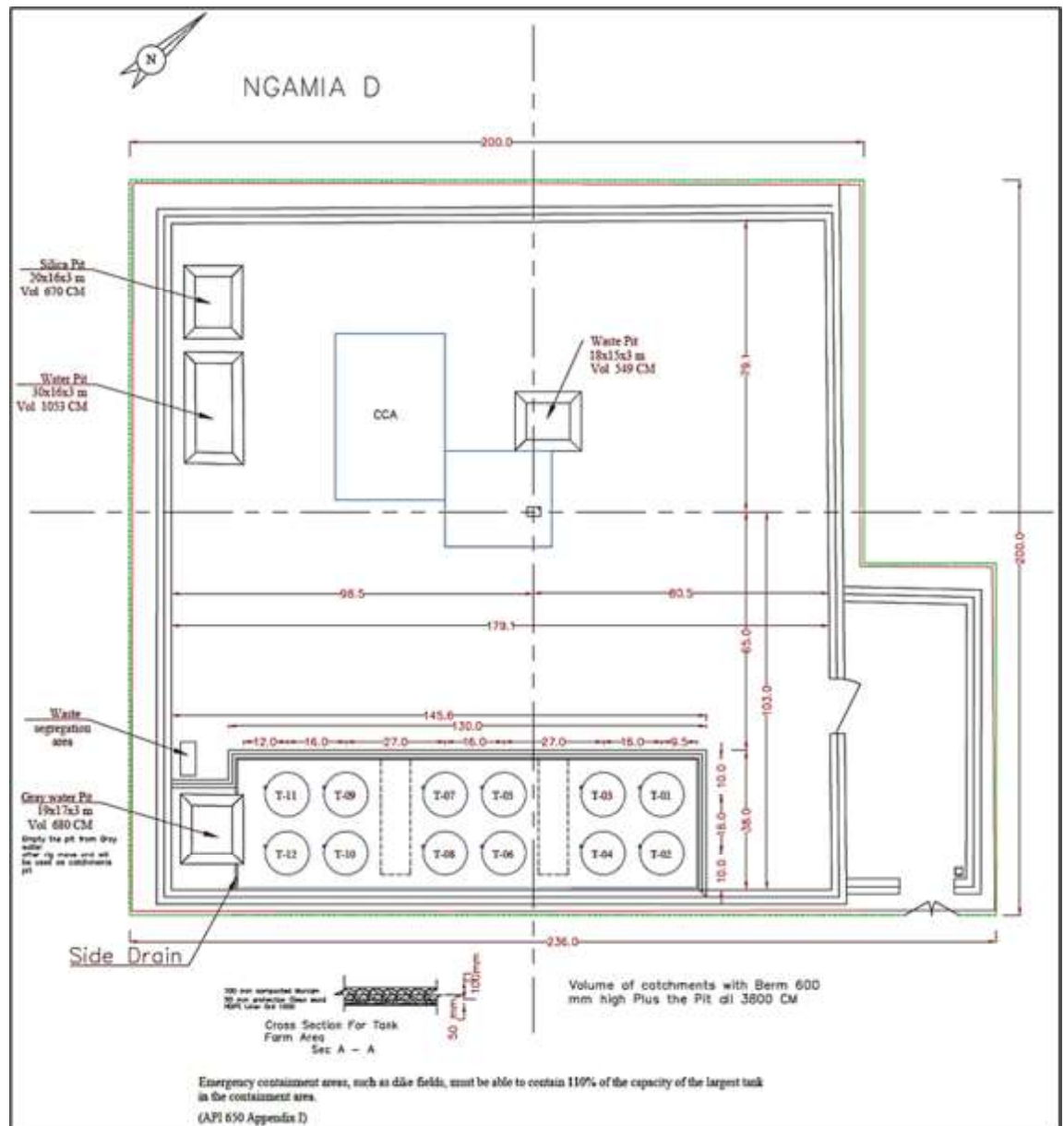


5.2 Site Overview

5.2.1 Site layout

The proposed revised layout of the Ngamia –D well pad is illustrated in **Error! Reference source not found.** below. The existing well pad footprint (the site boundary) is 236m x 200m which will not be altered.

Figure 3: Ngamia -D well site revised layout



5.2.2 Site preparation and EWT installation

Minor civil construction works will be required within the existing well site for the construction of a lined, dyke earthen bund to contain the oil storage tanks. The existing drilling water pit at Ngamia-D is adequate to accommodate the anticipated 2,385 cubic metres of produced water that is expected to be generated.

5.2.3 Crude tank farm installation

Within the existing well pad, a crude tank farm consisting of 12 vertical cylindrical low pressure storage tanks will be installed. The volume of each individual tank is 5,000 bbls (11.80 x 7.36 metres). The maximum vertical height of the each tank assuming a roof slope of 1:12 plus PVV valve vent pipe, is 9.1 m above grade. Each tank will be constructed in compliance with the appropriate international standards for vertical cylindrical low pressure storage tanks (API 12 Series Tank - Specification API Spec 12B). A lined earthen bund will be constructed to contain the crude storage tanks. The bunds will be designed to accommodate the 12 tanks, totalling c. 4,000 sq metres (120 x 35 metres) within the existing site perimeter. Bunding will be undertaken in accordance with API RP 12R2 Practise for Setting, Maintenance, Inspection, Operation and Repair of Tanks in Production Service. This includes a requirement for the bund to:

- Contain, at a minimum, the volume of the largest tank enclosed plus an allowance for rainwater (nominally 10 % additional tank volume, i.e. 5,000 bbl x 1.1 = 5,500 bbls = 870 m³);
- Be impervious to effectively contain any spilled oil;
- Have a sloped base to drain rainwater water away the tanks;
- Have a tank foundation or grade band (steel band to contain a suitable backfill material like sand or pea gravel for an unanchored tank) that will be slightly elevated, level, and larger in diameter than the tank itself, with the surrounding area graded to provide good drainage away from the tanks;
- The grade band foundation will be one to one-and-one-half feet larger in radius than the diameter of the tank and may be embedded in the soil. The grade band and fill shall be level within $\pm\frac{1}{4}$ inch. The grade band will be anchored in place with stakes and backfilled, but the tank is unanchored and will have a grade band type foundation (a steel band used to contain a suitable backfill material like sand or pea gravel for an unanchored tank);
- Have a pipe drain, if required, at the lowest point to permit draining any accumulations of storm water and a locked-closed valve outside the drainage area to ensure proper containment and control of fluids other than storm water;
- Be designed to drain the oil away from the tanks to a perimeter ditch or sump in the event of a tank failure. In the event of a tank fire and subsequent tank

rupture, the oil will be drained away from the adjacent tanks, reducing the risk of a cascade of tank failures; and

- Storm water will be able to be collected in bunds and allowed to evaporate - any residual water will be analysed and treated to national environmental standards prior to release.

5.2.4 Tank venting

Pressure Vacuum Vent (PVV) valves (Motherwell Tank Protection Fig 383 PVV valve (8" Inlet)) will be fitted to the roof of each tank (approximately 7.6 m above grade). The valve will have a short (c. 1.5 m) vertical discharge from the valve, giving a total elevation of 9.1 m above grade. The valve will not be a continuous vent.

5.2.5 EWT equipment

All of the EWT equipment will be transported to the site using road vehicles and will include steel tank components for on-site construction, separators, heaters, pumps and eight climate-controlled containers for office space, material storage, laboratory equipment, generators and air compressors. All air compressors will be stored within acoustically enclosed containers. Once the EWT is complete, the equipment will be removed. The containers are used (expected to comprise 12) to transport equipment to the site will be positioned within the existing site boundary. No additional land will be required.

Up to 6 diesel-powered generator will be used to provide electricity to the EWT equipment.

The following equipment will be installed above ground:

- Crude oil storage tanks: the max height to top of the PVV line will extend 30 ft or 9.1 metres above grade;
- Separator/stabilisation tank: a nominal 65,000 LTR tank will have the dimensions of 40ft x 8ft x 9ft 6" or 12.2 x 2.4 x 2.7 metres; and
- Hydraulic rod pump: a vertical hydraulic ram mounted on the wellhead and a hydraulic power pack. The top of the ram is circa 10.67 – 12.2 metres from grade.

5.3 Completion of EWT activities

The testing of the well will last approximately 75 days. The predicted gas-oil ratio (GOR) is between 300 and 70 scf/stb, and the predicted produced water cut is 0 to 30%, resulting in the following generated at the surface each day:

Crude oil: 500 to 1,500 bopd; and

Associated gas: up to 0.5 to 1mmscfd; and

Produced water: Up to 500bbls/d.

During testing, crude oil will be pumped using a downhole pump through a flowline into a heat exchanger, connected to a separator/stabilisation tank where the oil is stabilised, degassed and free water separated, and then transferred (by flowline) into a nearby storage tank.

5.3.1 Flaring

Crude oil will not be flared. Associated gas will be separated from reservoir fluids and flared. Gas volumes are expected to be minimal and due to the low volume of gas expected, it is not possible to use the gas for another use such as power generation.

Associated gas will primarily be Methane (approx. 70-80 mol%) with the remainder being mainly ethane and a smaller percentage of propane. No H₂S has been detected in the previous well tests of Ngamia-1/1A and none is expected. CO₂ was reported from nil - 0.6 mol% in various reservoir units except one reservoir unit showed up to 6.5 mol% of CO₂. The field is compartmentalized and fluid properties may be variable from one compartment to other. The Ngamia-1/1A was drilled towards the Eastern side of the field where the current EWT campaign is planned. However, recent data from Western compartment has shown CO₂ levels up to 19 mol%.

The temperature of the gas at the flare tip is anticipated to be between 50°C and 75°C, depending on the depth of the hydrocarbon reservoir zone being tested.

The flare will comprise a horizontal pipe that leads to a ground flare pit. The flare line will be placed above the ground and the pit will have sloping earthen sides. The maximum and minimum gas flare volumes are 0.36 MMscf/d to 0.01 MMscf/d.

5.3.2 Produced water storage, reinjection and the use of chemicals

Produced water from the separator will be transferred into existing lined pits located within the existing Ngamia-D well pad. The produced water pits will be dosed with a biocide to prevent bacterial growth.

Produced water from Ngamia-D well site will be re-injected back into the reservoir through Ngamia-3 well site; the straight-line distance between these two well pads is about 1.2km. The produced water will be transferred using a flexible hose laid on the existing roads between Ngamia-D and Ngamia-3, a distance of about 2.8km. If the produced water is insufficient for well injectivity testing, make up fresh water will be transferred from Ngamia-1 well site to Ngamia-3 well site a distance of about 2.3km. Ngamia-1 receives fresh water via an underground pipeline laid from the Nakukulas-10 borehole.

The purpose of the reinjection is to check the overall injectivity of geological formations. Prior to reinjection, produced water will be treated with a demulsifier, scale inhibitor, and oxygen scavenger.

5.3.3 Crude storage, reinjection and disposal

Storage volumes

The maximum oil storage on Ngamia-D will be 60,000 bbls.

Reinjection of crude

After the EWT is complete crude oil will either be reinjected back into the hydrocarbon reservoir using the Ngamia - 8 well at the Ngamia-D well pad, or temporarily stored until the oil can be exported as part of the wider Phase 1 South Lokichar Basin Development Project. The preferred option is to reinject the crude oil. Due to the waxy characteristics of the crude, the oil will need to be heated above ambient temperature to reduce the viscosity enough to be transferrable. The oil will be transferred in batches of approximately 350 bbls to smaller “re-heat” tanks to raise oil temperature above 85°C until all the wax is back in solution, before being pumped.

The alternative is to continue to store crude oil temporarily in the steel tanks until oil can be exported as part of the future Phase 1 South Lokichar Basin Development Project. The export of crude oil generated from the EWT will be covered in a separate EPR, or Environmental and Social Impact Assessment (ESIA).

5.4 Decommissioning

Tullow will, in the future, develop a full decommissioning plan in compliance with NEMA requirements. Under the relevant primary legislation, Tullow must submit the decommissioning plan for approval to NEMA in respect of the EWT works within 14 days of commencing the decommissioning of the EWT and appraisal activities.

5.5 EWT Personnel

Due to the short-term duration of the project and nature of EWT activities which requires skilled personnel no additional recruitment by Tullow’s contractors will be required. The estimated personnel numbers are presented in Table 5.

Table 5: Estimated EWT personnel requirements

Phase	Details	Additional number of people on site
Civil Works during site preparation	The existing civil contractors in the field will carry out the minor earth work modification within the site which will be completed before tank construction crews arrive on site.	None – as the 15 unskilled workers needed for civil works will already be on site as part of the existing Civil contractors in the field.
Tank Erecting/Manifolds (Essentially Construction)	This is a sequential task and overlaps with EWT flow / Injection activities.	2 crews of 8 skilled persons
Operations	Well testing activities	Approximately 10 day shift / 6 night shift skilled personnel (plus additional personnel for monitoring).

5.6 Camp Facilities

A series of mobile containers will be located within the well pad to provide office, workshop, laboratory and storage facilities. Additional personnel will be accommodated at the Kapese Integrated Support Base and subsequently, no additional camp facilities are required for the EWT.

5.7 Waste Management

5.7.1 Waste streams

Tullow has a framework agreement with ECCL (a NEMA licensed transporter) to collect, transport and dispose of non-hazardous and hazardous wastes generated by Tullow operations. ECCL has a waste incineration facility (licensed by NEMA) located in Stony Athi about 30km south-east of Nairobi. ECCL uses their fleet of 10-ton and 20-ton capacity trucks to transport wastes generated by Tullow related activities to their incineration facility in Stony Athi.

ECCL is trained on Tullow's stringent requirements for waste handling, transport and disposal; risk assessments have been undertaken and mitigation measures implemented to ensure the safe handling, transportation and disposal of wastes generated from Tullow related activities.

Waste will be managed in accordance with Tullow's existing procedures. The EWT project is estimated to generate the following types of waste streams:

- **Produced water** – All produced water will be reinjected.
- **Construction debris** – Minor volumes of packaging materials will be generated and transported by road to ECCL's existing waste handling facility in Stony Athi in accordance with Kenyan waste management regulations.
- **Wastewater** – All wastewater from washing/toilets will be transferred to existing cesspits/septic tanks.
- **Hazardous waste** – Hazardous waste generated will be transported by road to the ECCL incineration facility in Stony Athi.
- **Municipal waste from use of camps** – Municipal waste generated will be transported by road to ECCL's existing waste handling facility in Stony Athi for disposal in accordance with the waste management regulations in Kenya.

5.8 Water Requirements

A summary of the maximum amount of freshwater required is provided below:

- A maximum quantity of 9,540 m³ of water is required for the injectivity test. The amount of freshwater used will be reduced by mixing produced water generated by the EWT with the freshwater, so that the minimum volume of freshwater is used.
- An estimated volume of 100litres/day/person is assumed for the 16 personnel on site which will generate a total demand of 1,600 litres/day.

The makeup fresh water borehole that has been identified as a potential water source is the Nakukulas-10 (sometimes referred to as Ngamia-10). There is an underground pipe that transports water between Nakukulas-10 borehole and Ngamia-1 well pad. Fresh water for the injectivity test at the Ngamia-3 well pad will be transferred from the Ngamia-1 well pad using a flexible hose that will connect the two well pad sites.

Produced water from the Ngamia-D EWT will be stored in lined pits within the well pad site.. Prior to using it for the injectivity, the produced water will be treated with a demulsifier, scale inhibitor and oxygen scavenger.

5.9 Natural materials

No additional access roads or aggregate materials are required.

5.10 Transport

EWT equipment comprises a series of modular components that are transported on haulage trucks. Approximately 10 haulage trucks will be required to transport the EWT equipment between the Amosing-1 site and the Ngamia-D well site. The laydown and final assembly of heavy EWT components will be carried out within the existing well pad perimeter. No off-road transport will be required. No additional land is required for the laydown area.

5.11 Non-routine scenarios

Design features that have been accommodated into the Project to reduce environmental risk associated with non-routine scenarios include the following:

- EWT equipment - the wells to be tested are low pressure wells that require artificial lift to extract the oil from the hydrocarbon reservoir. An emergency well shutdown valve downstream of the well head will be linked to a shutdown system in the event of an emergency event.
- Storage of crude oil using tanks – all tanks will be positioned inside a secondary bund to prevent soil and groundwater contamination arising from a failure of primary containment.
- Gas release from the flare – A series of audible alarms will be installed to check for the presence of unignited gas. In addition, a site-specific Emergency Response Plan will be prepared which will describe actions to be taken in the event of a sudden surge in gas volume.

5.12 Security

The well pad perimeter features an existing security fence which will not need to be extended as part of the EWT. There is 24 hour security cover currently in place and this will continue for the duration of the EWT and thereafter, until the site is fully decommissioned.

5.13 EWT project cost

The project is currently in the preliminary design phase and subsequently accurate estimates of the EWT cost will be acquired in due course. However, on the basis of past experience with projects of a similar nature, it is estimated that the project cost will amount to US\$ as shown in Table 6

Table 6: Estimated EWT Project Cost (US\$)

Project component	Estimated cost (US\$)
Mobile EWT Plant and Equipment	3,520,000
Design, Fabrication, Construction and Commissioning of mobile crude storage, water storage and double skin insulated crude transfer tanks plus all manifolds and associated pipework for connection with wellhead and Package 1 EWT plant and equipment.	2,233,000
Civils work scope	950,000
Support Services: Camp, Plant Hire, Security Services, Data Communications, EHS/Life Support, Road Transport	2,158,000
Supervision: including Site Based Supervision/EHS support supervision, Travel	1,798,000
TOTAL ESTIMATED PROJECT COST (US\$)	10,659,000

Tullow paid NEMA KShs 1,026,019 on October 21st, 2014 for two EWT sites namely Amosing-1 and Ngamia; the Amosing EIA License Fees was KShs 577,877 while that of Ngamia was KShs 448,142.

Based on the above estimated project cost for the Ngamia-D EWT and using an exchange rate of KShs 92 to the US Dollar, the EIA License Fees amounts to KShs 980,628. As Tullow already paid NEMA KShs 448,142, the balance payable to NEMA for the Ngamia-D EWT EIA License is KShs 532,486.

Subsequently attached to this EPR study report is a wire transfer confirmation slip of (KShs 532,486) as the remaining EIA License fee.

Copies of the wire transfer and letter written by Tullow are attached to this report as Appendix 3 and 4 respectively.

6 Methodology

6.1 Baseline characterisation

Existing environmental and social data was gathered from previous ESIAs and fieldwork to inform the baseline chapter of this report.

6.1.1 Area of Influence

The project AoI is illustrated in Figure 3 and was informed by the following factors:

- **Environmental characteristics:** 2 km radial distance from the central point of the well pad:
 - **Air Quality:** the results of air dispersion modelling concluded that ambient air quality would return to background conditions within 300 m from the central area of the well pad.
 - **Noise:** the results of noise modelling calculated that noise levels would return to ambient conditions within 1.7 km from the central point of the well pad during night time periods, and 1.1km during day time periods.
 - **Water Quality:** the risk from seasonal flooding and potential contamination of seasonal water courses was mitigated during the construction of the original well pad by locating the well to avoid major luggas and minor surface drainage features.

Location of freshwater borehole: a radial distance of 2km from the central point of the well pad that includes the location of 1 borehole that may be used to obtain additional water for the injectivity test, namely Nakukulas-10. There are no community water points within 1 km of the well site.

Biodiversity features are not relevant to defining the AoI as the EWT project does not involve any additional land take and no impacts to biodiversity are therefore anticipated.

- **Social and Economic:** 10 km from the central point of the well pad. The rationale being as follows:
 - **Location of freshwater borehole:** based on a GIS review of the AoI, a radial distance of 6 km from the central point of the well pad that includes the location of one borehole that may be used to obtain additional water for the injectivity test and are used by the local communities, namely Nakukulas-10; this borehole is located approximately 6.5km east of Ngamia-D well site.
 - **Presence of nearby communities and pastoralist groups:** as of September 2014 there are no permanently occupied settlements within 2 km of the Ngamia-D well site, the nearest village being Nakukulas which

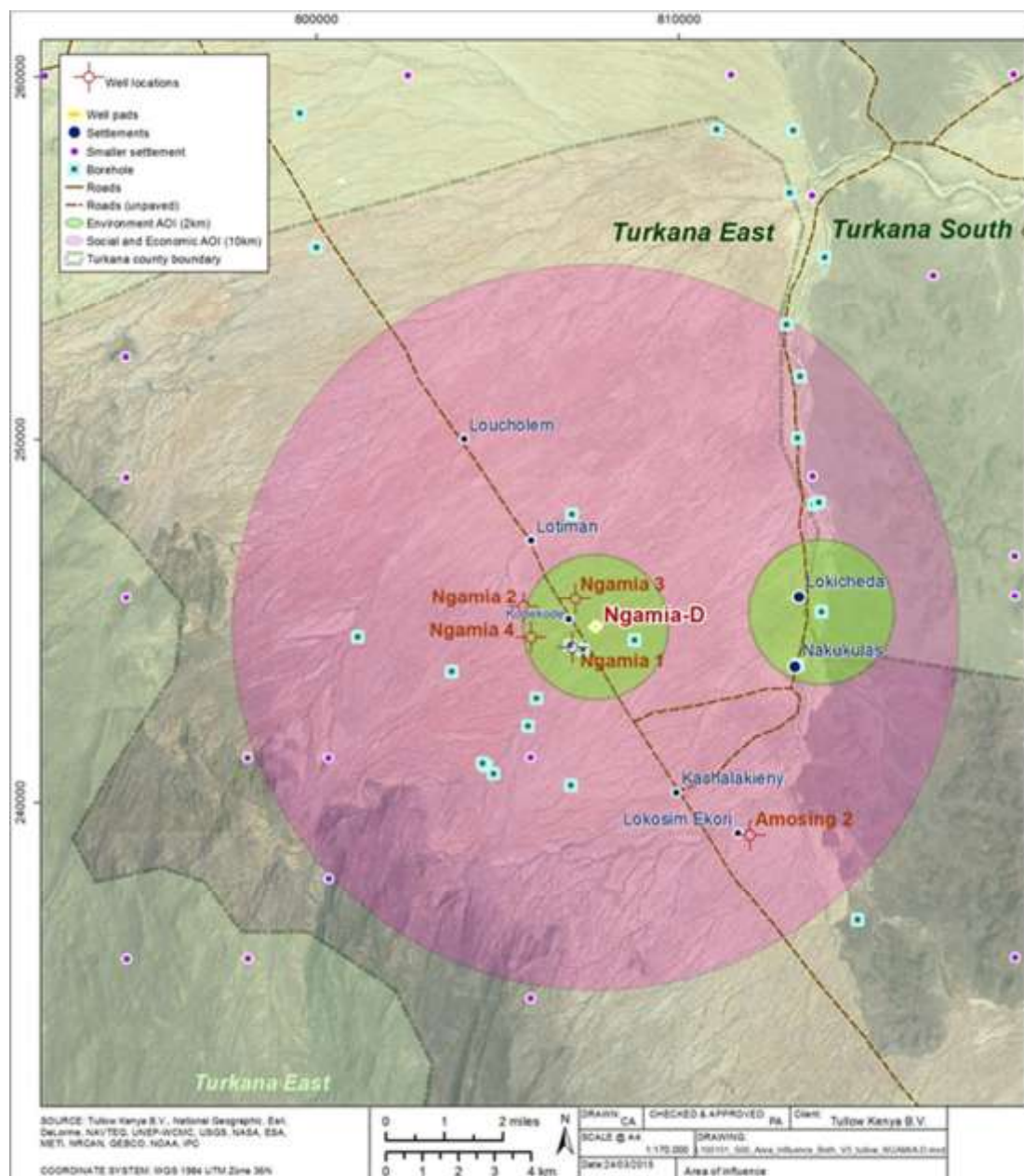
lies 7 km to the NE. The presence of uninhabited small seasonal *manyatta* and animal shelters within 2 km suggests that members of the wider community use surrounding land for pastoralist livelihoods.

- **Cultural:** there are no known cultural sites within 2 km of the well pad.

Employment issues are not relevant as due to the very short timeframe and technical nature of the EWT there will be no temporary positions available to nearby communities.

Land-related issues are also not important, as there will no additional land used by the Project.

Figure 3: Boundaries of the environmental Aol (2km) and socio-economic Aol (10km)



6.2 Impact Assessment Methodology

The impact assessment method adopted for the EWT Project uses a risk-based approach that considers the likelihood and consequence of environmental and social risks from occurring during the EWT Project. The likelihood of a risk occurring was assigned a factor which ranges from 1 to 5 using the descriptions given in Table 7.

Table 7: Description of likelihood factors used

Description	Projects	General	Factor
Very unlikely	Has not occurred in similar studies or projects, but could. Conceivable in extreme circumstances.	Freak combination of factors would be required for incident to occur.	1
Unlikely	Known to happen, but only rarely.	Rare combination of factors would be required for the incident to occur.	2
Possible	Incurred in a minority of similar studies or projects.	Incident could occur if a number of additional factors are present.	3
Likely	Could easily be incurred and has generally occurred in similar studies or projects.	Not certain but incident could occur with one normally occurring additional factor.	4
Very likely	Could be expected to occur more than once during the study or project delivery.	Almost inevitable that incident could occur.	5

The severity factor for each risk was subsequently considered using the descriptions described in Table 8. The severity reflects the expected degree of harm, injury or loss, assuming the effectiveness of existing mitigation measures in place. Where more than one affect was possible, the highest severity factor was used for the assessment.

Table 8: Description of severity factors used

Impact Types					Severity Factor
Injury and disease	Environmental effects	Social / cultural heritage	Community / Government / Media / Reputation	Financial Impact	
Low level short term subjective inconvenience or symptoms. No measureable physical effects. No medical treatment. No absence from work. May require first aid.	No lasting effect. Low-level impacts on biological or physical environment. Limited damage to minimal area of low significance.	Low level social or cultural impacts. Low-level repairable damage to commonplace.	Public concern restricted to local complaints. Ongoing scrutiny/attention from regulator.	< £10k	1
Objective but reversible disability/impairment and/or medical treatment injuries requiring hospitalisation.	Minor effects on biological or physical environment. Minor short-medium term damage to small area of limited significance.	Minor medium term social impacts on local population. Minor damage to structures/items of some significance. Minor infringement of cultural heritage. Mostly repairable.	Minor, adverse local public or media attention and complaints. Significant hardship from regulator. Reputation is adversely affected with a small number of site focused people.	£10k - £100k	2
Moderate reversible disability or impairment (<30%) to one or more persons (LTIs).	Moderate effects on biological or physical environment but not effecting ecosystem function. Moderate short-medium term widespread impacts (e.g. oil spill causing impacts on shoreline)	Ongoing social issues. Permanent damage to structures/items of cultural significance, or significant infringement of cultural heritage / sacred locations.	Attention from media and/or heightened concern by local community. Criticism by NGOs. Significant difficulties in gaining approvals. Environment credentials moderately affected.	£100k - £1m	3

Impact Types					Severity Factor
Injury and disease	Environmental effects	Social / cultural heritage	Community / Government / Media / Reputation	Financial Impact	
Single fatality and/or severe irreversible disability or impairment (>30%) to one or more persons.	Serious environmental effects with some impairment of ecosystem function (e.g. displacement of species). Relatively widespread medium-long term impacts.	On-going serious social issues. Significant damage to structures/items of cultural significance, or significant infringement and disregard of cultural heritage.	Significant adverse national media/public/NGO attention. May lose licence to operate or not gain approval. Environment/management credentials are significantly tarnished.	£1m - £10m	4
Short or long term health effects leading to multiple fatalities, or significant irreversible human health effects to >50 persons.	Very serious environmental effects with impairment of ecosystem function. Long term, widespread effects on significant environment (e.g. unique habitat, National Park)	Very serious widespread social impacts. Irreparable damage to highly valued structures/items/locations of cultural significance. Highly offensive infringements of cultural heritage.	Serious public or media outcry (international coverage). Damaging NGO campaign. Licence to operate threatened. Reputation severely tarnished. Share price may be affected.	> £10m	5

After the likelihood and severity factor had been identified, these were combined (refer to Figure 4) to identify overall impact significance. The categories of impact significance used were the following: Severe, Major, Moderate, Minor or Negligible, where: risk = likelihood factor x severity factor.

Figure 4: Risk assessment matrix combining likelihood and severity

Likelihood factor	Severity factor				
	5	4	3	2	1
5	Severe (25)	Severe (20)	Major (15)	Moderate (10)	Minor (5)
4	Severe (20)	Major (16)	Major (12)	Moderate (8)	Minor (4)
3	Major (15)	Major (12)	Moderate (9)	Minor (6)	Negligible (3)
2	Moderate (10)	Moderate (8)	Minor (6)	Minor (4)	Negligible (2)
1	Minor (5)	Minor (4)	Negligible (3)	Negligible (2)	Negligible (1)

Impact significance was evaluated to determine if additional mitigation measures were required. Where additional mitigation measures were required, these were added to the impact assessment table and the significance of the residual impact was subsequently determined.

7 Analysis of Alternatives

This section of the EPR considers feasible alternatives including the “no development” option. As the EWT project is to be undertaken on an existing well site, there are no alternatives associated with the project’s location. The relevant alternatives to the project are as follows:

- Appraisal well selection or ‘no development’; and
- Disposal options for the crude.

7.1 Appraisal well selection or no development

As with the exploration phase, well site selection is based on many complex factors (e.g. surface and subsurface geology, oil chemistry, oil reserve potential, topography, communications, technical and economic cost benefit analysis, and environmental and social sensitivities). These factors were taken into consideration by Tullow when identifying which exploration well to appraise. Based upon the information available to date, Tullow identified that Amosing-1 was the most viable well site to progress to appraisal based upon results from the existing exploration campaign of Block 10BB and 13T.

The EWT is required to clarify the economic viability of oil reserves within the South Lokichar Basin and is essential to the success of the wider development project. Consequently, the ‘no development’ option is not feasible as the Government of Kenya wish to continue the development of an oil industry.

7.2 Disposal of Crude

A total of four different options associated with the disposal of crude were evaluated, namely:

- **Option 1: Flaring of the crude** – eliminated on environmental and social grounds as flaring of the crude would generate potentially significant quantities of air emissions that are harmful to human health and the surrounding quality of the environment;
- **Option 2: Immediate sale to market: either through at-gate sales or at point-of-use sales dependent on customer and destination** – eliminated as there is currently no infrastructure present, such as a crude oil pipeline for example, that will allow the crude oil to reach markets;

- **Option 3: Temporary storage of crude until a market has been identified** - crude will be stored in large tanks within the existing well site and then transferred into a future oil export pipeline. This option may be used and has been included in this EPR; and
- **Option 4: Reinjection on completion of the EWT** – this is Tullow's preferred option to reinject the crude using the Ngamia-D well.

In summary, options 3 and 4 will be taken forward for future discussions with the Ministry of Energy and Petroleum.

8 Environmental and Social Baseline

8.1 Physical Environment

8.1.1 Seasonality and Climate Change

Seasonality and rainfall

The region is characterised by harsh climatic conditions and a bi-modal climate with two dry season (June-September, December-March) and two rain-seasons (March - May, October – November). Rainfall can be sporadic and unpredictable, occurring outside the rain-seasons (Republic of Kenya, 2002).

Official meteorological data is lacking for much of the region; long-term rain records however exist for Lodwar (which is some 100 km to the north of the project area) and Turkwel Gorge (which is 60 km southwest at a much higher altitude). Data collected at Lodwar between 1999 and 2013 indicates that rainfall is extremely variable; for example, in that period annual rainfall ranged from 75.9 mm to 417.3 mm (Kenya Meteorological Department, 2013).

Sporadic rainfall also leads to the potential for high rainfall intensities (>30 mm/ hr) to fall in brief violent storms (15 to 20 minutes) resulting in flash floods, particularly in the northern sector (Republic of Kenya, 2002). The wettest 24-hour period recorded at Lodwar occurred on 2nd September 2011, when 166.6 mm of rain fell; this supports the risk of flash-flooding / flooding associated with extreme rainfall events (Kenya Meteorological Department, 2013).

Monthly rainfall also varies considerably with every month of the year experiencing zero rainfall on at least one occasion, with exception of April which had a minimum rainfall of 1.4 mm in 2009. On average, April is the wettest month and February and June, the driest (Kenya Meteorological Department, 2013). Table 9 shows the monthly totals recorded at the Lodwar meteorological station between January 2011 and June 2012.

Table 9: Monthly rainfall totals recorded in Lodwar in 2011 and 2012

Mon.	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
2011	0.0	0.0	58.3	16.5	0.3	3.5	19.3	0.0	134.9	50.5	96.8	1.5
2012	0.0	0.0	0.5	79.9	81.6	0.0	-	-	-	-	-	-

Source: IGAD Climate Prediction and Application Centre (2012)

Temperature

The Study Area has an average temperature range of 24 – 38 °C. During the dry seasons, temperatures vary between 26 – 40°C, and during the rainy season the range is 20 – 25 °C. The lowest temperatures are generally experienced in the months of November and December, and the highest in the months of January, March and August, and may exceed 37 °C (Republic of Kenya, 2002).

Data collected at Lodwar station between 2008 and 2013 showed that daily maximum temperatures ranged from 21.2 °C (recorded in November) to 39.9 °C (in February). Minimum daily temperature ranged from 16.5 °C (also in February) to 31.3 °C (in May) (Republic of Kenya, 2002).

Sunshine hours

Daily sunshine hours are high at 9.8 hours/day and solar radiation averages 500 cal / cm² per day (RSK, 2014).

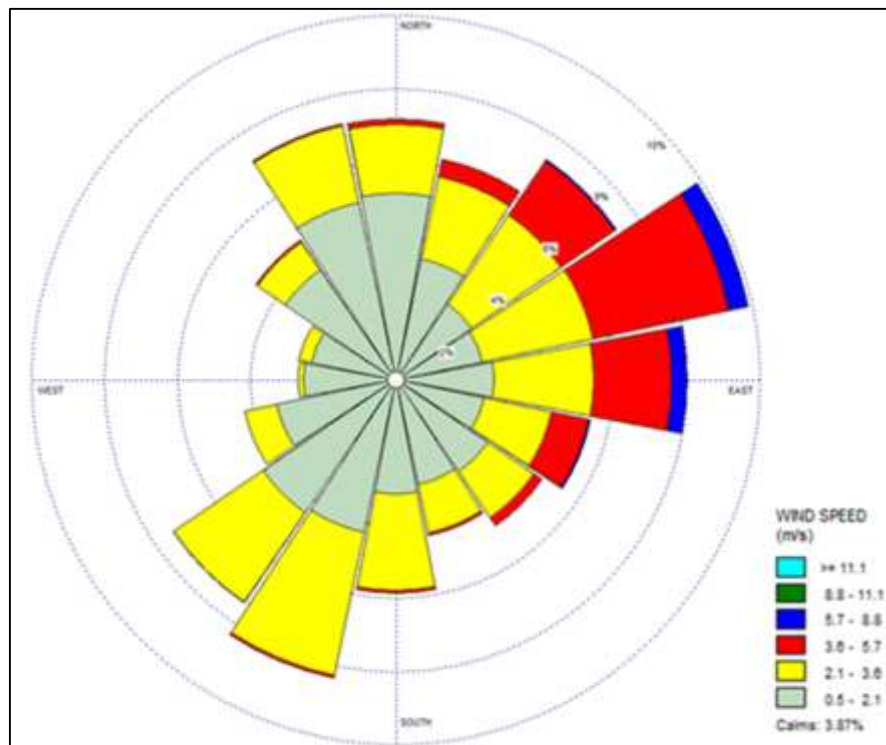
Evaporation

Strong winds and high temperatures lead to high levels of evaporation. Annual evaporation at Turkwel Gorge ranges from 2,700mm - 3,100mm, but is slightly lower at Amolem ranging from 2,100 - 2,800 mm per annum. Maximum monthly evaporation at Turkwel Gorge is 246 mm and at Amolem 236 mm (Kenya Meteorological Department, 2013).

Wind

In the Study Area, wind predominantly blows in an east to south-easterly direction (UK Met Office, 2014) (See Figure 5). From 2008-2013, the Kenya Meteorological Department at Lodwar measured maximum wind speed of 7.7 m/s and mean wind speed of 3 m/s.

Figure 5 : Wind rose for the Lokichar area



Extreme and localised high winds are also known to occur within the region, often generating dust storms (Republic of Kenya, 2002).

8.1.2 Agro-ecological zoning

Kenya is divided into seven agro-ecological climatic zones using a moisture index based on annual rainfall expressed as a percentage of potential evapotranspiration (FAO, 2002). Turkana County falls into Kenya's Agro-Ecological Zones V, VI, and VII. The Lokichar-Lokori area straddles the boundary between Zone VI and VII², with an agro-ecological index of 25%, which defines it as 'arid'. It is characterized by low rainfall, high temperatures and high rates of evaporation (FAO, 2002).

8.1.3 Geomorphology and Landscape

The AoI is typical of the wider South Turkana context and Turkana ASAL; which does not lie within an area of protected landscape or landscape designated in relation to landscape value/quality (RSK, 2014).

² Areas with an index greater than 50% have high potential for cropping, and are designated zones I, II, and III; semi-humid to arid regions (zones IV, V, VI, and VII) have indexes of less than 50% and a mean annual rainfall of less than 1100 mm.

The landscape within the region is predominantly flat and low lying but with isolated steep-sided hills and ridges associated with Rift Valley geomorphology, and Rift faulting and volcanism (RSK, 2014). The altitude is about 900 m above sea level (asl) at the foot of the escarpment marking the Uganda border to the west, and then falls to 370 m asl at Lake Turkana in the east. The altitude of the mountains varies between 1,500 - 1800 m asl in the east, reaching a peak at Loima where they form undulating hills. The mountains are mainly located in central Turkana with plains around Lodwar and more specifically the Lotikipi plains in the north. In the south-east, the Suguta valley follows a tectonic trough bordering the Samburu uplands (Wood and Guth, 2014; cited RSK, 2014).

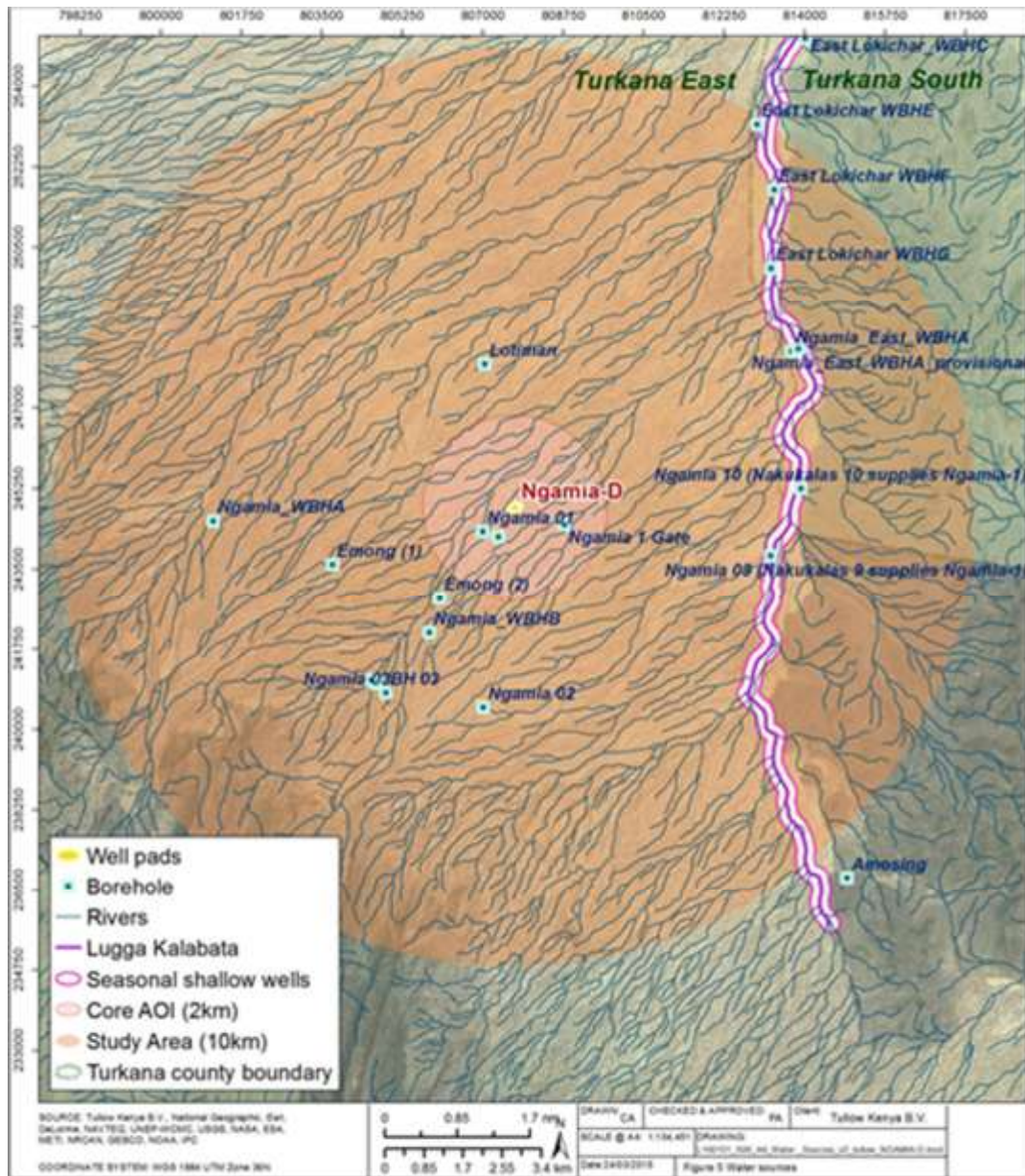
There is a large number of luggas (ephemeral riverbeds) which are prone to flash floods/ heavy water flow rates for only a few hours or days following heavy rains, and are dry the rest of the time. Often these include gullies with high banks when they flow through land that is slightly more elevated than the surrounding area. Ngamia-D is upstream within the catchment area of a large lugga, Lugga Kalapata, which flows north towards Lake Turkana (see Figure 6 below).

There is limited land use and vegetation cover, sufficient in some areas to support nomadic grazing.

Habitation is largely confined to scattered settlements (some only used intermittently) and the accommodation camp for oil exploration workers. Oil exploration activities might be described as a locally significant element of the landscape but are of a scale which is dwarfed by the overall landscape. Much of the landscape in the AoI is essentially natural; characterised by pristine, rugged scenery with extensive plains, shrub-lands, luggas and hills. Small dunes (<1m) are stabilised by *Indigofera spinosa* dwarf shrubs and grass species.

- The AoI around the Ngamia-D well site consists of a plain forming part of the wider Lokichar Basin. The local topography is almost level, with slight undulation. The project site is estimated to be 720 – 740 m asl (Google Earth, 2014). The Ngamia-D well pad is a generally flat area of fine sandy ground, with slight undulation and a gentle slope from south-west to north-east. The nearest lugga called Kodekode is about 30 m to the SE of the Ngamia-D boundary fence and flows in a north-northeast direction eventually flowing into the Nakukulas lugga. The site is in close proximity to several ephemeral water courses which channel surface water run-off from seasonal rainfall to the Nakukulas lugga (Tullow, 2012 – Scouting Report). The proposed well site at Ngamia-D is flat and has been sited to avoid luggas (Tullow, 2014).

Figure 6: Hydrological map of project area



8.1.4 Geology

Geologically, Turkana is characterised by elongated mountain/ hill ranges with a general north-south alignment, and intervening areas covered by superficial deposits, which obscure the underlying formations. The regional geological succession, from most recent to oldest, is as follows:

- **Recent superficial deposits** such as limestone, occurring at various localities as a heavy admixture of soils and sand but more often as almost pure limestone, and lacustrine deposit platforms along the present day Lake Turkana shoreline.

- **Tertiary volcanics** make up most of the mountain ranges which are composed of a series of erupted lavas and intercalated pyroclastics.
- **Turkana grits** are a sedimentary series in NW Kenya deposited on basement rocks and lacustrine basin. Exposures of Turkana Grits are confined to eastern Turkana as conglomerates, quartzites, sandstone, minor shales and limestone.
- **Basement system rocks** are metamorphosed rocks, mainly sediments of Precambrian age, which outcrop along much of the Uganda escarpment, the eastern part of Lapur Hills, and in scattered outcrops in the southern part of Turkana County.

The Aol is underlain by Tertiary volcanic rocks, Turkana grits and sandy deposits. The Tertiary volcanic rocks are exposed on the ranges trending in a south-north orientation (RSK, 2014).

8.1.5 Soils

Soils within the region either originate from the geology of the tectonically active Rift Valley environment or the alluvial flood plains of the major rivers and stream systems and in proximity to lakes (RSK, 2014). The general lack of vegetation cover and the hot, arid climate has led to the development of soils typically associated with desert-like environments, which are: moderately well drained, generally nutrient-poor, high pH, low in organic matter and clay content (except for the alluvial soils), saline and strongly sodic³. The region is prone to rapid soil erosion by wind and water resulting in dust storms, especially just prior to the seasonal rains (RSK, 2014).

In the Lokichar Basin soils are characterised as Agro-Ecological Zones Lower Midlands 5 (LM5), which is 'suitable for pastoral activities/ livestock and millet agriculture' (FAO, 1981; Maingi, 2008).

The soil within the Aol is poor in organic matter and shallow, stony and rocky; as such most of the area is not well suited for arable agriculture. The surface consists of sealed and crusted sandy clay loam to sandy clay textured soils with low soil organic matter content, overlain by surface pebbles. Trampling by grazing animals contributes to degradation of the soils, and the condition of the soil is considered fragile (Earthview Geoconsultants, 2012).

Soil erosion continues to be a major pressure on soil resources in the Aol and site observation confirm that this is being exacerbated by localised increases in off-track motoring, which compact the soil and exposes it to erosion by wind and runoff when it rains. Visual inspections of soil during site visits confirmed that the soil resource within the Aol is sandy, dry, weakly cemented, generally degraded, unproductive and easily eroded with low agricultural potential. It was also evident at both well sites that the area has been extensively overgrazed. No soil sampling

³ Definition of sodic: 'disproportionately high concentration of sodium (Na) – often characterised by poor structure and drainage'.

or analysis was undertaken as the EWT activities will involve no additional land take.

8.1.6 Water Resources (surface water and groundwater)

8.1.6.1 Surface water

Turkana County has two major rivers: the Turkwel and the Kerio. The water in both rivers originates outside the County in the southern hills that receive more rainfall. Amosing-1 location is located in the plains between rivers Turkwel and Kerio and are within the catchment area of the River Kerio, which flows in a general south-north direction (RSK, 2014).

Local surface waters within the Aol mostly consist of ephemeral streams that flow only during and shortly after the rains and in an easterly direction. The plains within the Study Area are intersected by numerous dry riverbeds, including inter alia the Nakukulas, Kakachot, Naparipari, Kaipeton, Lokichar and Nattohe Luggas that feed into the River Kerio. Storms are however known to produce ephemeral floods in luggas and across open ground; during which time water flows commonly overtop lugga channels (Cardno, 2012).

The Ngamia-D EWT location is close to a small lugga called Kodekode that flows eastwards towards the Nakukulas Lugga, which flows north to the Kalapata Lugga. However, there is no consistently available surface water supply near the proposed EWT site.

Groundwater

Groundwater is the most available source of water in the Aol. There are three groundwater categories:

Shallow alluvial aquifers - Located at a depth range of surface to 80 m have a high-potential of aquifer occurrence (95% potential). With a conservative assumption of an average thickness of 5 m cumulated aquifer and a minimum porosity of 10%, this category of aquifer has a total storage capacity of 1,620 million cubic meters (MCM), which represents an average of 0.5 MCM per 1 km² (Radar Technologies International (RTI), 2013). Drilling boreholes in/ adjacent to luggas has the potential to yield high quality water; various organisations have drilled community boreholes that supply potable water (e.g. at Kangirisae, Nakaalei, Loperot, Nakukulas, Lokichar, Kimabur and Lochwa) and/or provided hand pumps for use in shallow wells (e.g. at Lopii).

Deep-seated aquifers – Located within specialised rock formations between 80 m to 600 m. This aquifer type represents a total groundwater potential of 50 MCM per km², 100 times more than the shallow alluvial aquifers (RTI, 2013). Deep groundwater aquifers are often a function of long transport and slow movement. Intense chemical weathering exacerbated by temperatures creates soluble salts and minerals that can percolate into groundwater aquifers affecting water quality; hence deep aquifers can be very old and may often be brackish (Earthview Geoconsultants, 2010).

Conductive fractures - Fissures and fractures in the rock formations can store and convey significant volumes of water. The fractures in this part of Turkana convey significant groundwater quantities both horizontally and vertically underground, and discharge from deep aquifers towards the surface (RTI, 2013). Yields in excess of 5 m³/ hr can be achieved from boreholes located in "open" faults and fissure zones. Evidence from borehole logs confirm that most groundwater resource in the Study Area is tapped from fractured aquifers developed within the basalts (Earthview Geoconsultants., 2010).

Aquifer recharge

The most important sources of groundwater recharge for shallow aquifers are associated with the seasonal luggas. Water percolates into the sandy beds where thin horizontally layers significantly reduce the percolation rate. Some of the catchments areas extend widely, receiving substantially more water over a longer period than surface waters; flood flows are also important for the recharging shallow aquifers (RSK, 2010).

The deep aquifers were found by RTI (2013) to have an annual recharge capacity of 1.35 BMC/ year. Taking into consideration the total potential recharge rates of both high-potential shallow aquifers and the five deep aquifer structures, RTI estimates the total renewable groundwater resources of northern-central Turkana to be 3.447 BCM per year, which represents only 1.38% of the total storage volume (250 BCM)(RTI, 2013).

Drainage patterns give an indication of the permeability of the ground and likelihood of infiltration of rainfall. The permeability is likely to be lower where there are more drainage routes. Due to the geology and climate the majority of seasonal rainfall runs off and evaporates. There is little evidence of infiltration at the EWT sites outside of the luggas which retain water in their sands and sediments.

Water Resource Extraction

Shallow aquifer groundwater is extracted from shallow hand-dug wells in the luggas for domestic and pastoral use by the local population. Shallow wells in the channels and banks represent one of the primary sources of water for people and livestock, often influencing the siting of communities and *manyattas*. A number of techniques are used to enhance water retention and availability, including subsurface dams (artificial subsurface barriers to trap water) and sand dams (barriers to hold sand and sediments and water in larger storage areas). The water stored in the riverbed sediments also sustains small trees and riparian vegetation, otherwise absent in the desert areas.

Tullow has drilled a number of boreholes into deep aquifer resources to serve the needs of the communities and its own on-going activities. The boreholes that will be used as water sources for the EWT is N-10. The borehole N-10 is approximately 6.25 km to the direct East of Ngamia-D and has nominal yields of approximately 15 m³ / hour.

8.1.7 Natural hazards

The principal natural hazards are:

Seismic hazards

In terms of overall seismic risk, the presence of part of the East African Rift, which runs through the west of Kenya and the Davie fracture just south of the Mombasa, means that Kenya is vulnerable to seismic activity and related natural disasters including earthquakes, volcanic eruption and tsunamis (Rao, 2013).

Evidence suggests that there was a 5.2 earthquake in the middle of the Lake Turkana in 2012 (USGS National Earthquake Information Center, 2012). Prior to that the 'Turkana region' experienced an earthquake in 1913 with an estimated surface wave magnitude of 6.0. Despite considerable 'low level' seismic activity, the Lokichar basin is identified as being a Medium risk area with a Peak Ground Acceleration of 0.8 – 2.4 m/s (WHO, 2010).

The most recent volcanic eruption was associated with the Central Island volcano of Lake Turkana in Kenya, in 1975. Although classed as 'dormant', there remains inherent risk from this hazard for any infrastructure placed in close proximity to the Ngamia-D site.

Climate hazards

Flooding and flash flooding are potentially significant hazards. Most of the watercourses throughout the area are dry until after the seasonal rains, at which point flooding onto the associated flood plains or luggas is a common occurrence across the region with often significant ponding remaining following recession of the main floodwaters (RSK, 2014).

The generally sandy and weakly consolidated nature of the area's soils together with the lack of ground covering vegetation and a predominantly arid climate, make the soils prone to wind blow and wind erosion.

Since the 1970s, the severity, frequency and impacts of drought, have increased and the areas affected by drought and desertification are expanding (Shitarek, 2012). The failure of three successive rain seasons in 2010 and 2011 was exacerbated by high fuel and food prices on the international market, poor governance, conflict and lack of political commitment leading to under- in the ASALs, among other factors" (IGAD report for OXFAM, 2012). This subject is an important consideration in terms of the ecosystem services associated with access to water (see Section 8.4.1 below).

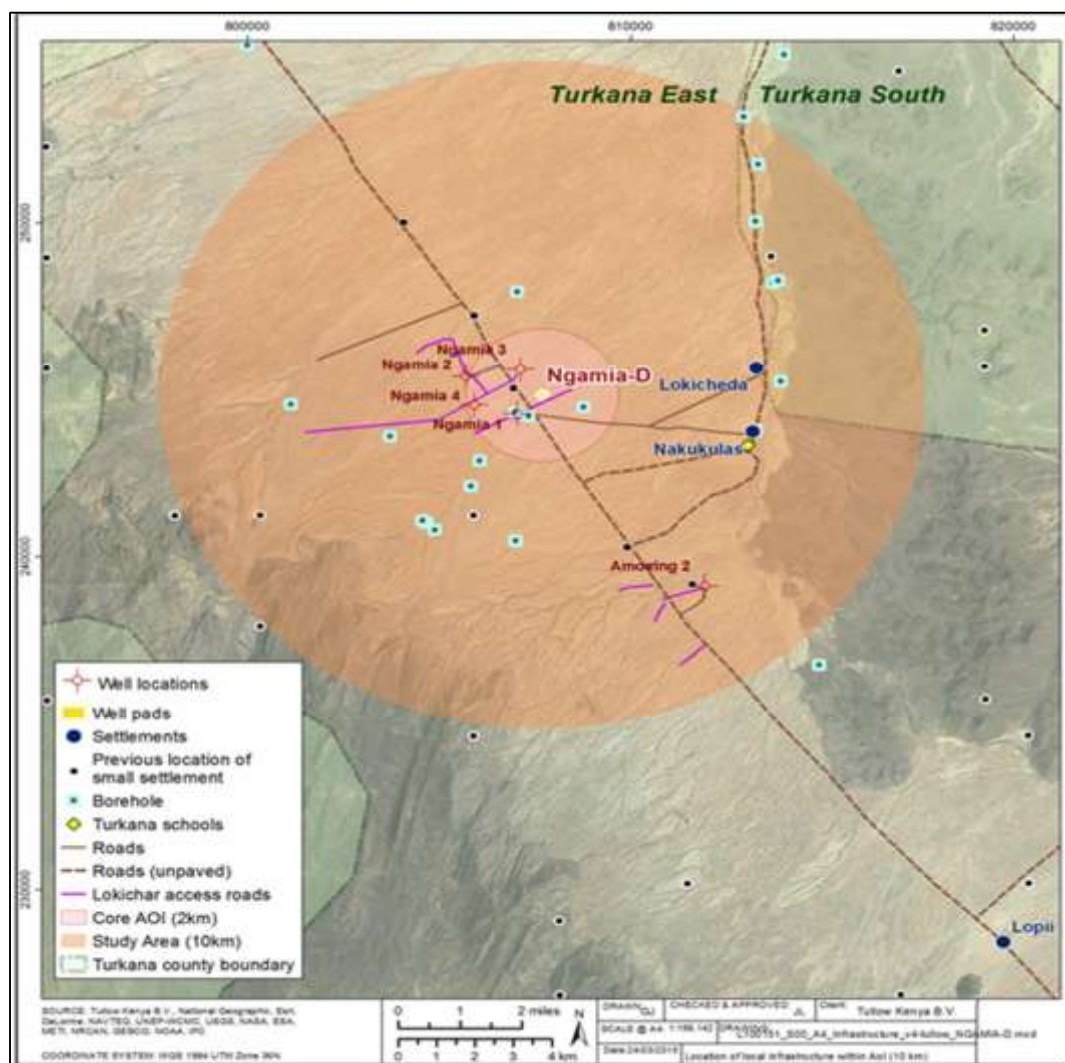
8.2 Environmental Quality

8.2.1 Air quality

The ambient air quality is low in anthropogenic pollutants as the area is rural, sparsely populated, generally undeveloped and far removed from major towns, cities, agricultural and industrial centres that are major contributors to air pollution. There is some natural pollution related to windblown dust as the sometimes strong easterly winds blow across the sparsely vegetated surface. Sources of existing anthropogenic air pollution include exhaust fumes and dust released by the vehicles traversing the survey area, and dust raised by herds of grazing animals (see Figure 7 which shows the road network and existing infrastructure within the provisional Aol).

The site visit confirmed that air quality levels are good and anthropogenic pollutant sources are negligible.

Figure 7: Road infrastructure



8.2.2 Noise and vibration

Baseline ambient daytime noise levels across the AoI will generally be low due to the largely rural setting where there is neither industrial development nor significant traffic (Earthview Geo-consultants, 2010). Ambient noise levels during the night will be characterised by insect noise.

The site visit confirmed that daytime noise levels would be within the environmental noise limits stipulated in Legal Notice No. 61 titled Environment Management and Coordination (Noise and Vibration Pollution Control) Regulations, 2009.

8.2.3 Water Quality (surface water and groundwater)

Surface water

Water sampling was carried out from selected locations in the study area for the purpose of water quality analysis for the Exploration ESIA for Block 10BB. The quality analysis results showed that the surface water within the Study Area is slightly acidic to slightly alkaline (6.75-9.02) and turbidity of the water is highly variable ranging from low to high turbidity (15 – 307 N.T.U). The water is often coloured (40-255 mgPt/l) and has high content of iron (2.23-5.7 mg/l) and magnesium (6.8-37.9 mg/l), and low to high fluoride content (0.68-3.5 mg/l). Such water may require treatment before it can be used for domestic purposes. The other chemical characteristics are, however, satisfactory (Cardno, 2012).

Groundwater

The physical and chemical properties of groundwater from the operational boreholes in Turkana South County can be summarised as shown in Table 10: Operational borehole data – Turkana South County.

Table 10: Operational borehole data – Turkana South County

Parameter Attributes	Parameter Attributes
Colour (mgPt/ l)	Colour clear (<5 mgPt /l); however, groundwater from Lugga shallow well is coloured (75 mgPt/ l)
Total Dissolved Solids (TDS)	Total Dissolved Solids (TDS) ranges from 305.7 to 4787 mg/ l
Taste	Taste Good
Turbidity	Turbidity ranges from 0 to 865 N.T.U
Odour	Odour None
Hardness	Hardness moderate to very low but highly variable depending on aquifer formation

Parameter Attributes	Parameter Attributes
Iron	Iron ranges from 0.017 to 2.62 mg/ l
Magnesium	Magnesium ranges from 6.82 to 51.99 mg/ l
Fluoride	Ranges from 0.19 to 7.6 mg/ l
Manganese	Ranges from < 0.01 to 16 mg/ l
pH	Slightly acidic to slightly alkaline (6.68 to 8.67)

Sourced from ESIA for 10BB (Cardno, 2012).

A water chemical analysis carried out by Tullow on the N-10 borehole, which is one of the two boreholes expected to provide water for the proposed project activities, concluded that the water quality is good and fit for human consumption (see Table 11: Groundwater quality for details).

Table 11: Water chemical analysis of Tullow borehole N-10

Parameter	Results mg/l (ppm)	Max Guideline Value mg/ l (ppm)
Total Alkalinity as (CaCO₃)	305	500
Chloride (Cl)	39	250
Sulphate (SO₄)	57	250
Nitrite (NO₂)	0.1	3.0
Fluoride (F)	0.8	1.5
Sodium (Na)	115	200
Iron (Total)(Fe)	0.28	0.3
Manganese (Mn)	0.4	0.5
Total Hardness as (CaCO₃)	190	500
Oxygen absorbed. 4 hr. at 27 °C (P.V)	0.4	1.0
Total Dissolved Solids, residue dried at 180°C	344	1000
Total Alkalinity as CaCO₃	305	500

In summary, N-10 has been characterised as being alkaline, hard; fairly well mineralised water; and chemically fit for human consumption.

8.3 Biodiversity and Protected Areas

8.3.1 Habitats

The Aol lies in an area characterised by the Deserts and Xeric Shrublands Ecoregion. This ecoregion is characterised by deciduous trees and shrubs (commonly *Acacia* spp. and *Commiphora* spp.), with closed woodland around the margins of watercourses; concentrations of arid-adapted large grazing and browsing mammals, known for their regular migrations in response to rainfall patterns. The ecoregion also supports a variety of endemic and restricted range species of various taxa including less well-studied groups such as invertebrates and herpetofauna (RSK, 2014).

Lack of water and pasture is a serious deterrent to the presence of mammals, whilst loss and degradation of habitat is also a major factor in the distribution of birds, reptiles, invertebrates and other animals in the County.

There are several heterogeneous and highly variable habitats within the Aol:

Near barren, where there is a significant amount of bare ground with little or no herbaceous cover and woody vegetation contributes less than 2 % of ground cover, being mostly concentrated in the interfluves;

Grassed shrubland, where grasses provide the dominant vegetation cover interspersed with herbaceous and woody plants;

Dwarf shrubland, which occurs on shallow soils and dominated by woody plants less than 1 m in height;

Shrubland, which consists of woody plants that are less than 8 m in height and usually with multiple many stems emanating at or near the base; and

Riverine / lugga courses, where the presence of water and silt, supports more pronounced vegetation with some trees extending above 8 m in height.

All habitats in the Aol have been subject to varying degrees of disturbance by human activities including over-grazing, deforestation, hunting and harvesting which have resulted in changes to primary ecological functions and/or species composition (e.g. the disappearance of mega fauna).

There is no habitat of significant importance to IUCN Critically Endangered and/or Endangered species. For example, species like the black rhinoceros range widely across disjointed areas of Kenya but are not confirmed as present within the Project area. Consequently, the habitat in the Aol cannot be considered as a “discrete management unit” for that species. Any loss of habitat would be marginal to the extent of available land and therefore unlikely to potentially impact the species’ long-term survivability. Some habitats, such as luggas and river courses, are considered to be locally sensitive due to their functions in regards to water resources, diversity of tree and other plants.

8.3.2 Vegetation

Turkana County has a wide variety of vegetation types ranging from annual grassland to upland forests. Rainfall and elevation determines variations of vegetation. Most parts of the County have dwarf shrubs, annual grassland, bushed and wooded grassland with annual and perennial grasses. The western boundary of the County has abundant bushland and shrubland. Woodland is widespread occurring in small patches while forest in small patches is limited to major drainage and mountain tops. Dwarf shrub and grasslands are found in the eastern part of the County and they provide nutrition forage for livestock during and shortly after the rainfall periods. Southern parts of the County have considerable greater vegetation production potential with perennial plants which are generally capable of maintaining photosynthetic activity into the dry season. The cover is dense in the low lying areas and along the river basins (RSK, 2014).

The vegetation is mainly sparse and characterised with dwarf shrub-land to shrub-land types of vegetation. Acacia thorn scrub with large acacia trees are found everywhere in the investigated area, especially along the luggas, accompanied by xerophytes succulent on the lava outcrops. Thick bushes and scrubs with little undergrowth are found scattered in the plains, scattered bushes are found in some areas.

As identified during the field reconnaissance site visit, dominant trees within the Study Area are Acacia and Commiphora shrubs with scattered taller trees of *Delonix elata*, *Acacia tortilis* and *Adansonia digitata*. Others include *Juniperus procera*, *Euphorbia Nyikaye*, *Indigofers spinosa*, *Heliotrpium steudleri*, *Camophora africana*, *Seddera hirsuda* and *Balanites aegyptia*. Important grasses include *Aristida adoensis* and *Stipagrostis hirtigluma*. These occur as annual or perennial grass types (mainly *Solamam coagulunus*). Other grasses include *Aristida mutabilis*, *Chrysopogon aucheri*, *Tetrapogon spp*, *Enneapogon cenchroides*, and *Chloris roxburghiana*.

Some succulents were also in evidence and annual *Aristida* grasses (at the start of the rainy season). The entire area is typically undergrazed (Tullow, 2012a – Amosing-1 Scouting report). To date, no examples of invasive alien plant species (e.g. *prosopsis* (*Juliflora prosopsis*)) have been detected within the Aol and none were identified during the field reconnaissance visit.

8.3.3 Animals

Mammal species identified within the Study Area include the: ground squirrel (*Xerus erythropus*), dwarf mongoose (*Mungos mungo*), black-backed jackal (*Canis mesomelas*), cape hare (*Lepus capensis*) and dik-dik (*Madoqua guentheri*). Mammal sightings are scarce.

Reptiles such as snakes (e.g. green mamba (*Dendroaspis angusticeps*) and puff adder (*Bitis arietans*)), skinks and other lizards are also present. Little information is available on the importance of the invertebrate fauna of the region.

During site scouting visits, no large terrestrial fauna was observed, and locally obtained information confirms that these have been largely eradicated by subsistence hunting and/or displaced by livestock pressure on available grazing.

8.3.4 Birds

The Rift Valley is an important region for migratory birds, and the Lake Turkana region is crossed by the East Africa/East Asia flyway. Large numbers of birds use this route between their Palaearctic breeding grounds in Eurasia and their wintering sites in Africa, typically arriving in late August and September and returning north again in spring. Parts of the region are designated at various levels in recognition of their importance for biodiversity conservation. There are no such designations within 10 km of the core AoI of either site.

Birds that are typically found within the Study Area include: chestnut-bellied sand grouse (*Pterocles exustus*), red billed hornbill (*Tockus* spp.), white browed sparrow weaver (*Plocepasser mahali*), black-headed plover (*Vanellus tectus*), white bellied go-away bird (*Corythaixoides leucogaster*), hoopoe (*Upupa epops*), eastern chanting goshawk (*Melierax poliopterus*), white headed buffalo weaver (*Dinemellia dinemelli*), superb starling (*Lamprotornis superbus*), fork-tailed drongo (*Dicrurus adsimilis*), brown-necked raven (*Corvus ruficollis*), red and yellow barbet (*Trachyphonus erythrocephalus*), Abyssinian roller (*Coracias abyssinicus*), white-throated bee-eater (*Merops albicollis*), white-headed mousebird (*Colius leucocephalus*) and sparrow-lark (*Eremopterix* spp.) (Earthview Geoconsultants, 2012).

8.3.5 High conservation value species

In order to improve the information on species of conservation interest, a list of national and global species was collated from the Kenyan Red List (as published in the Wildlife and Conservation Management Bill, 2013) and the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (published and updated on-line at: <http://www.iucnredlist.org/>). There is no indication that any red listed species inhabit the study area.

8.3.6 Protected areas / Areas of International Conservation Interest

No protected areas are located within the EWT Study Area or core AoI.

8.4 Ecosystem services

8.4.1 Overview

Ecosystem Services can be simply defined as “*the benefits people derive from ecosystems*” (Millennium Ecosystem Assessment, 2014). Water, soils, habitats and biodiversity provide a broad array of provisioning services within the region. Of particular importance are water resources, livestock grazing, arable crop growing and fishing, whilst trees provide wood for construction timber and charcoal making. There are a number of key cultural services related to socio-economic benefits, such as tourism at Lake Turkana and its National Parks.

The association between ecosystem resources and social conflict is widely recognised and is embodied in the Kenya Vision 2030 (Government of Kenya’s development aspirations for the country). This conflict is evident in violent disputes involving pastoralists in the north eastern regions of Kenya, which are caused, in part, by resource competition, in particular for land and water, and livestock raiding.

Furthermore, physical boundaries cutting across traditional migratory routes increase problems in accessing traditional grazing resources. Where there is disruption of normal migratory patterns, this can lead to unsustainable utilisation of natural resources, as livestock tend to be concentrated in secure areas resulting in environmental degradation. It is generally recognised that the following services are of local importance within the Aol:

Access to water: The availability of water is arguably the most important ecosystem service (a provisioning service) within the Study Area (RSK, 2014). Local people within the Study Area access water either through water infrastructure within the larger settlements of Nakukulas and Lopii (on the periphery of the Study Area), at water points connected to water boreholes and/ or mobile bowsers replenished at the new water points. Outside of villages access water is predominantly through shallow hand-dug wells located in luggas. This water is used for both domestic and livestock use.

Indicative information suggests that water accessibility has increased as all permanent sources (traditional wells, boreholes, springs, and shallow wells) are sufficiently utilised within the region; with distances to water points reducing from normal (6 to 8 km) during the dry season to 3km for livestock use; and to 1 to 2 km for water for human consumption (Ministry of Planning and National Development, 2012; cited in Cardno., 2012).

Pastoralism: Pastoralism is the main land use and source of livelihoods in the Aol; therefore pasture is a key ecosystem service. Animal shelters and herd animals present at the Ngamia-D site during site specific assessments clearly indicate grazing areas for pastoralists’ livestock.

Wild foods / plants: Vegetation in Turkana County has different primary production potentials and capacities to support both livestock and people. Indigenous fruits/foods can be important sources of food especially during prolonged dry periods, with most Turkana ‘pastoralists’ depending significantly on wild foods as a food source including a variety of roots, fruits, seeds and leaves (. It was estimated that up to 60% of the population received around a third of their calories from wild foods (Levine & Crosskey, 2006; cited in Cardno, 2012). The thorns are used for making compound fences and livestock fences while some tree roots are used as traditional medicines. The inhabitants also use trees for building manyattas and as firewood for heating and cooking.

Cultural significance: Certain natural features such as trees (Ekwar) may have strong cultural significance to local individuals and communities; this significance may be considered an ecosystem service. The significance of these features is discussed further in Section 6.6 below.

8.5 Communities and Demographics

8.5.1 Demographics

The Rift Valley is a sparsely populated area. According to the projected National Population Census of 2009, the population of Turkana County for 2012 was estimated as being 939,080 with 488,609 males (52 %) and 450,471 females (48 %); The average household size in Turkana is 6.9, 1.6 higher than the national household size of 4.4 (CRA, 2011).

The well site is located in Lokicheda village, Kochodin ward, Kochodin Division, Turkana East Sub-County of Turkana East County.

Kochodin covers about 771 km² and has a population of 2,039 living within 246 households, giving a population density of 3 per km². This demographic is fairly dispersed with village clusters sparsely scattered within the county (KNBS, 2009).

8.5.2 Communities

The population within Turkana County are increasingly adopting a sedentary lifestyle, a change supported by GoK and NGOs (Earthview Geoconsultants, 2012). Villages cited as being (previously) located within the Study Area include: Kaepedru, Lopuruto, Lokosim Ekor, Kachalangikieni, Nakukulas, Naukotarengan Kodekode and Lokicheda. It is however understood that due to insecurity in the Aol that most people have recently evacuated to larger villages within the area, namely: Lokicheda, Nakukulas and Lopii. This temporary (or permanent) evacuation was confirmed during the field visit; when uninhabited manyattas were identified along the access route to the Ngamia-D well site. Livestock herding (high numbers of goats and sheep) was however still evident within the core Aol suggesting although the area is not currently habited, it is still used for grazing and movement routes by pastoralists.

Due to external factors such as deteriorating security, lack of pasture and water among others, the smaller scattered settlements have relocated to form larger settlements, namely Nakukulas and Lokicheda which are situated along the course of the Lugga Nakukulas. Lokicheda is situated about 3 km to the north-east of Nakukulas which in turn is located about 10 km from the Ngamia-D well site.

8.5.3 Health

Kenya has a gender index of 0.25 % for 2012, and a Human Development Index score of 0.509 for 2011, placing it at 143 out of 187 countries (SIGI, 2012). The Ministry of Health has published a number of indicators for health in Turkana County covering the years of 2011 and 2012 and providing a comparison with the corresponding indicators for Kenya in 2012 (MHS, 2013). Table 12 presents a selected sample of that information.

Nakukulas village has one dispensary located within the village, with 1 qualified nurse, 1 community health worker, 1 patient attendant, 1 subordinate staff and 1 watch man. The most commonly reported diseases are Malaria, Respiratory truck infections, bites, diarrhoea and skin infections.

The villagers access medical services in Nakukulas dispensary and Lokichar health centres which are about 7 kms to 20 kms respectively. The most prevalent condition in the region is however malnutrition (RSK, 2014). The Famine Early Warning System Network estimates that more than 34 % of children under five are at risk of malnutrition in parts of Turkana⁴ with up to 75% of food input comprises food aid (RSK, 2014).

The infant mortality rate in Turkana is 6 in every 1000 and 12 in every 1000 under five (CRA 2011). In Turkana South the same health indicators are 66 per 1000 and 220 in every 1000 under five (Cardno, 2012).

8.5.4 Nutrition and diet

The annual food needs/ diet of pastoralists within Turkana vary depending on the wealth of the households. Rather than the expected livestock, there were three main sources of food available to most pastoral households, which were of roughly equal importance:

- The main staple was maize, much of which is purchased through barter of goats since there is no local cultivation;
- The second major source of maize was from food aid; and
- The third source of food was from gathering wild foods.

⁴ (<http://www.fews.net/east-africa/kenia/food-security-outlook-update/tue-2014-03-18>)

Poor households⁵ get 5-10 % of their food needs from animal products; depending significantly on wild foods including a variety of roots, fruits, seeds and leaves. It was estimated that up to 60 % of the population received around a third of their calories from wild foods (Levine & Crosskey, 2006; cited in Cardno, 2012). For owners of larger herds, wild foods are substituted by milk, and to a lesser degree meat. The better off live largely from their animals. Around 60 % of food comes from meat or milk (blood contributes very little); most of the rest is from maize, traded for goats, and a small supplement is from wild fruits and from aid (mainly from school feeding programmes) (Levine & Crosskey, 2006; cited in Cardno, 2012).

As a result of poor general healthcare provision, many people still resort to traditional treatment using herbs collected directly from the bush or provided by medicine men. No data is available on the uptake of traditional medicines.

8.5.5 HIV / AIDS

A 2007 study carried out by the National AIDS and STI Control Program (NASCO) and the National AIDS Control Council (NACC) determined that HIV prevalence among the rural Turkana population was 8 % in urban centres and 4.1 % in rural areas (NASCO/NACC, 2007). Also in 2007, data from the District AIDS and Sexually Transmitted Infections Coordinator (DASCO) in Turkana Central indicated an overall prevalence rate of 6.7 %, with some peaks of up to 14 % in some urban centres. Data from the 2009 Turkana Central District Ministry of Public Health and Sanitation (MPHS) puts the HIV prevalence rate at 7 %, close to the prevalence rates the IRC found during testing in the region (MPHS, 2009). It is important to note that HIV/AIDS data on Turkana East is not available but these statistics of Turkana Central have been included since they are believed to reflect similar conditions in Turkana East

8.5.6 Illness and disease

There is limited data available regarding human health in the project area. Malaria, diarrhoea, pneumonia, snake/scorpion bites, typhoid, respiratory tract infections and fever are the conditions commonly noted by health professionals in the area. Malaria and respiratory tract infections account for over 60 % of medical interventions in Turkana County. Flood events and contaminated water may also trigger epidemics of diseases like cholera. There is no data available on the frequency and severity of psychological illness (Earthview Geoconsultants (2012).

⁵ Classed as having very small herds (25-40 goats/shoats)(Levine & Crosskey, 2006; cited in Cardno., 2012).

8.5.7 Health care provision

The Kenyan health sector is run by the GoK in collaboration with NGOs, faith based organisations and Aid Agencies; private healthcare is not well established.

Health care provision is generally poor in comparison to the rest of Kenya; for example:

- 37.5 % of Kenyan mothers deliver their babies in health institutions, whereas the rate is only 6.9 % in Turkana County; and
- Only 17.8 % of people in Turkana have access to sanitation facilities as compared to an average of 87.8 % in Kenya.

The lack of health care provision in Turkana is partly due to the prevailing factors of low population densities, poor communications and the unpredictable movements of nomads, which impact treatment costs and therefore the ability to deliver services. Healthcare budgets are also depressed compared to national levels – for example, in 2011 preventive services were budgeted at KES 401 per capita and curative services at KES 132 per capita compared to the corresponding national values of KES 669 and 408 respectively.

Healthcare in the Turkana is also hampered by:

- Lack of trained personnel (Ministry of Health Indicators showed that there were 16 nurses, 1 doctor 3 clinical officers and per 100,000 people in comparison to national levels of 49, 7 and 8 respectively);
- Lack of facilities such as operating theatres, wards, ambulances, medical supplies and laboratories (the Ministry of Health reported 65 public, 1 NGO, 41 Faith-based and 21 private health facilities in Turkana in 2012); and
- Lack of finances to organise transport to villages (many patients are unable to travel due to lack of transport).

8.5.8 Education and Skills

Formal education levels are extremely low in the region. As many as 82 % of Turkana County residents have had no formal education, 15 % have only had primary level education, and just 3 % of have gone on to a secondary level of education or above (KNBS/SID, 2013). Literacy within Turkana East is 33 % in males and 22 % in females (Ministry of Planning and National Development, 2008; cited in Cardno, 2012). The formal education system is hampered by low enrolment levels (due to early marriages for girls and boys occupied with herding duties), lack of teachers and school books leading to increased school dropout. However, Earthview Geoconsultants (2012) reported an increased emphasis on early childhood education; an initiative is spearheaded by the government in collaboration with NGOs.

Table 12 shows the enrolment statistics associated with early childhood development (ECD) and primary schools in Turkana South and Turkana East constituencies respectively. The Gross Enrolment Rate to Primary Education in Turkana County is 60% compared to the national average of 95%. The drop-out rates for children joining primary school is 46 % while the transition rate from primary to secondary is 40 % compared to the national average of 70 % (Ministry of Education, 2009).

Table 12: Enrolment in early childhood and primary schools in Turkana South and Turkana East subcounties

Description	South	East	Total
Number of ECD Schools	84	55	139
Boys	7987	3248	11235
Girls	6672	2498	9170
Total children in ECDs	14,659	5,746	20,405
Primary Schools (No.)	51	24	75
Boys	9,574	4,066	13,640
Girls	8,068	3,599	11,667

Table 13: Enrolment in secondary schools in Turkana South and Turkana East subcounties

Description	South	East	Total
Secondary Schools (No.)	4	3	7
Boys	1,166	309	1,475
Girls	298	299	597
Total students in secondary schools	1,464	608	2,072
Teachers	41	22 (F 5)	683
Shortfall of teachers⁶	42	18	60
Mobile Schools (No)	2	4	6
Boys	111	286	397

⁶ The staffing for secondary schools is based on the combination of subjects taught by particular teachers

Girls	82	181	263
Total children in mobile schools	193	467	660
Teachers	2	4	6

8.6 Socio-cultural Characteristics

8.6.1 Ethnicity

The Turkana tribe is one of the Nilotic tribes having originally come from the Karamojong region of north-eastern Uganda. The Turkana tribe is a nomadic pastoralist people and constitutes the second largest pastoralist community in Kenya after the Maasai. Due to the remote area and harsh conditions, there was little interaction between the British and the Turkana, who successfully resisted colonial rule (Lamphear J., 1993).

All Turkana belong to one of two groups, Ngirisai (Leopard) or Ngimor (Stone or Mountain) and there are approximately 20 clans (ategerin). Each clan has a distinctive brand for their livestock and there are complicated "grazing" rights across geographical areas. The Ng'isonyoka clan predominates in the core Aol, whilst other clans identified as potentially present within the Study Area include the Ngitab, Ngikelesos, Ngibocho, Ngissiger, Ngiliroto and Ngimorok (Lopii Chief, pers. comm.).

The traditional way of life is currently subject to a number of pressures (including increasing movement to settlements as a result of widespread insecurity), although the majority of Turkana still adhere to traditional African religious beliefs, customs, language and dress (RSK, 2014).

8.6.2 Governance

The Turkana County is bounded by Ethiopia to the north, Marsabit County in the east, West Pokot County in the west, Samburu County in the east and south-east, Uganda and South Sudan in the north-west and Baringo County in the south. The county has 6 sub counties namely Turkana North, Turkana West, Turkana Central, Loima, Turkana South and Turkana East. The County is served by magistrates' courts based in Lodwar. Appeals to high court are handled by High court in Kitale. There are 2 local authorities; Municipal council of Lodwar and county council of Turkana. Lodwar town is the administrative unit (CRA 2011). The administrative divisions are:

County level: Turkana County, which is second tier of governance after the national government. The local authority in the area is therefore Turkana County Government.

Sub-county level: Turkana South Constituency has recently been divided into Turkana South and Turkana East. The administrative headquarters of the Turkana South Sub County are located in Lokichar, while that of Turkana East Sub County are centred in Lokori.

The traditional governance system is based upon spiritual leaders and the social unit's rules and beliefs (i.e. village, sub-clan or clan). At the individual community level, affairs such as security, control of traditional grazing areas, migration patterns and relations with neighbouring communities are controlled by the council of elders (Pavitt, 1997). It is under the council of elders that issues that affect the entire community are discussed, solutions sought and overall direction given.

In rural areas, the context of intra-clan and inter-community relations define attitudes to each other and influence the choice of elected representative or support for leaders in modern administrative units. Modern governance units and systems are however stronger in towns like Lokichar and Lodwar; however, they still exhibit traditional influence of intra-clan and clan rivalries. For example, town security is influenced by both the traditional and modern administrative leaders with competing objectives.

8.6.3 Land and Natural Resource Ownership

Land in Kenya is classified as public, communal (customary) or private (freehold). The land tenure system, as with most other ASAL areas, is communal. There is no public owned land and there are no individual free holdings (RSK, 2014).

'Communal' land systems are characteristic of pastoral communities who require a large area and flexibility for grazing to enable them to cope with climatic variability. Although 'communal' land cannot be purchased, many governments enable such land to be leased (for varying time periods) for other land uses (for example, from grazing to intensive irrigated agriculture). As such, most land is collectively owned by the residents of the area and is managed, on behalf of the community by the Turkana County Government as trustees. When land-take is requested, the Turkana County Government determine, whether access to the land is granted and what conditions may apply (e.g. the routing of livestock movement corridors)(RSK, 2014).

Irrespective of the land tenure system, traditional ownership rights to trees (*Ekwar*), groups of trees, or areas with specific resources such as ochra clay, are of significant cultural importance. The *Ekwar* system is a Turkana traditional system through which the riverine (Riparian) eco-systems have been protected for sustainability. Such trees can be considered to be sacred, and can be owned by individuals who are located many kilometres away from the project site.

Oil in its natural state within Kenya belongs to the government (RSK, 2014).

8.6.4 Pastoralism and Migration

A healthy Nomadic Pastoral System (NPS) is often determined by ability of the herders to move to where they want and when they need to do so. Even though

each pastoral household is usually independent, the movements involving large numbers of households is sanctioned by elders of the community in consultation with the seers in cognizance of various factors including:

- Condition of the pasture in home ranges *vis-à-vis* away ranges;
- Intensity and distribution of seasonal rainfall;
- Balance and health of livestock populations in both home and away ranges;
- Security considerations; and
- Herders (e.g. the ability of families to allocate members to different roles).

Each family unit takes full responsibility of ensuring maximum survival and overall good health of its herds. Livestock herds are divided and sub-divided according to species, gender and age. Herds that are for long range movements normally comprise a single species or combinations of stronger animals. The ‘away-range’ stock is mostly made up of cattle, donkeys, sheep and goats. Transhumance⁷ activities in the project area are seasonal and take one of two directions. During the dry season, herds move from the plains to the hills on the south around Kalapata River and its various tributaries. During the rainy season, the herd migrates in the opposite direction. The animals that are left behind are usually old and weak plus some lactating stock to cater for family needs; camels, being browsers, are usually left behind in the home ranges.

Migration may take place as a coordinated group of households or in single households or sections of the household. The nuclear family, which in most cases may be polygamous, may be organised into small nomadic units, each with its herds. These “property units” have to move frequently, sometimes more than three times a year, due to the harsh ecological situation (RSK, 2014).

Migration activities are seasonal and take the two directions, during the dry season from the plains to the hills to the south around Kalapata River and its various tributaries. During the rainy seasons, migration within the area goes in the opposite direction and mainly back to clan and sub-clan demarcated land areas and ancestral homes for the specific families. Reasons for migration and the locations targeted, as provided by the local communities during the stakeholder engagement in July 2014, are as follows:

Livestock disease(s) have been identified in the target area:

- The Local spiritual leader has forecast about a particular area, event or action which attracts migration to or away from an area;
- Potential conflicts and general or specific security concerns;

⁷ The seasonal movement of people with their livestock between fixed summer and winter pastures.

- Drought/famine situation and pasture capacity of the local land area; and
- Clan boundaries and the resource agreements or disagreements.

During drought and during the month of April animals from the village are driven to Kochodin and Kepeduru area 200km away in search of pasture and water. The older men and women are left behind in the village.

8.6.5 Security

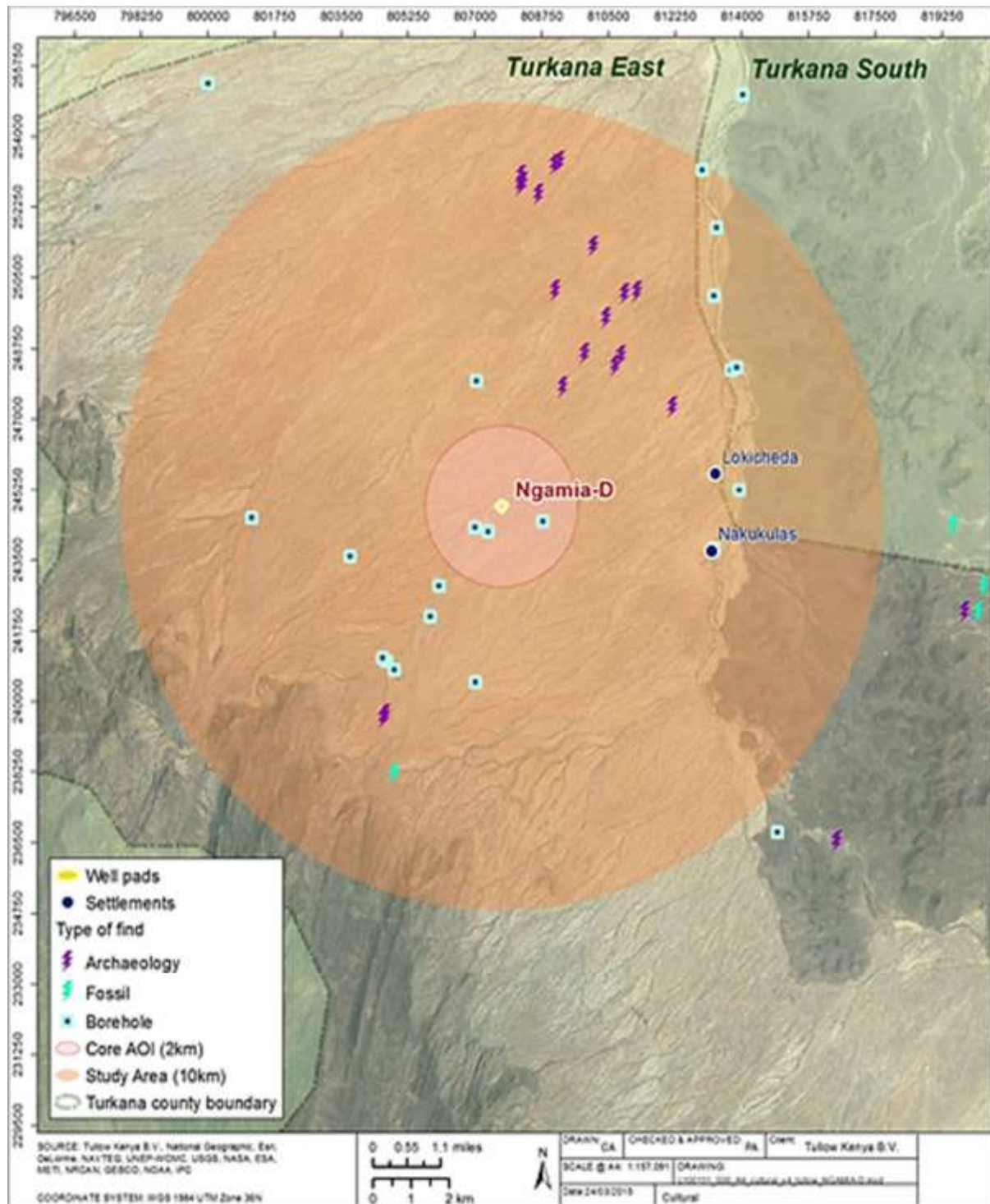
Conflict, often violent and based on ethnicity, resource ownership and livestock disputes, is a frequent occurrence in the region. Although many current conflicts may be classed as 'endemic' some conflicts are relatively new and in a state of flux due to shifting populations, population growth and periodic environmental events such as droughts (RSK, 2014).

The Aol has historically experienced inter-tribal conflict between Pokot and Turkana. Livestock rustling is endemic and small arms proliferation is considerable; coupled with the intent of Government agencies to pursue a disarmament program which has caused tensions, and these factors have resulted in a heightened security risk. A recent example of this status is the migration of local people from scattered smaller settlements into far larger settlements - Lopii, Lokwamosing, Lokicheda and Nakukulas - as a result of increased cattle rustling and associated security concerns.

8.6.6 Archaeology and Cultural Heritage

Over 50 years of intensive fieldwork by the National Museums of Kenya and the Turkana Basin Institute (TBI) has identified many of the visible locations of palaeo-fauna and hominid fossils in the Study Area. There are no gazetted archaeological sites in the Aol. Known archaeological and heritage features are presented in Figure 9 below.

Figure 8 : Map of archaeological / heritage sites



Other cultural heritage features with important aesthetic and existence values include present-day settlements and animal enclosures that represent the economy of the present-day occupants, their social interaction, and family and tribal associations. Maintaining such a way of life provides considerable value to international populations (RSK, 2014).

The Turkana have traditional / indigenous knowledge that helps the community to cope with and adapt to the harsh environment. Certain trees can be considered 'sacred' whilst some are owned by individuals who may be located away from their location. Traditional/clan ritual performance sites and ancestral worship shrines may also be present in the Study Area. Unauthorised interference with such sites or objects may provoke strong reactions from local communities.

The field visit and stakeholder consultation did not identify any community shrines, sites and other objects of local cultural importance in the Aol.

8.7 Socio-economic Environment

8.7.1 Employment

The most recent statistical data for Turkana County (2009) suggest an indicative workforce of circa 422,650 people, of whom 5.6% were in paid employment and 14.9% had no work. Family businesses accounted for 16.9% and family agricultural/pastoral undertakings employed 50.1%; the balance comprised 1.5 % interns/volunteers (NGOs and Aid Agencies), 4.0% full-time students, 6.5% retired/homemakers and 0.5% incapacitated (KNBS/SID, 2013).

The majority of the residents in Blocks 10BB area are involved in small scale or family business as a source of livelihood. Other sources of income include casual labour, civil service, teaching and farming, which are concentrated in centres like Lochwaa, Lokichar and Locheremoit.

In the Study Area, pastoralism (nomadic livestock husbandry), and its variants, constitutes the main economic activity; rural-based traders are very few in number (FAO, 2007). Pastoralism is however gradually dwindling due to changing socio-economic realities, climate shocks, loss of pastureland and livestock rustling (Cardno. 2012).

8.7.2 Economy

The percentage of people in Turkana County defined as being in absolute poverty is 94.3%, which is higher than the national rate of 45.9% and ranked 47/47 out of the counties in Kenya (CRA 2011). Such poverty is deep and structural and not a simple consequence of drought (Levine & Crosskey, 2006; cited in Cardno., 2012). Indicative total income per pastoralist household (main economic activity) within Northern Turkana is as follows (Levine & Crosskey, 2006; cited in Cardno., 2012):

- Wealthy: trade about 20-25 goats per year, giving a 'cash equivalent' income of around KSh 15,000 – 22,000;
- Middle income: a cash equivalent of KSh. 14 - 20,000; and
- Poor: a cash equivalent of KSh. 14 - 18,000 - which is insufficient to be able to depend on pastoralism for their livelihood.

Aid dependency is very high; an indicative annual estimate of the value of external aid (cash plus food)⁸ per household is > KSh. 20,000 - 25,000. Without aid, it is predicted that herds owned by poor households would have been sold off within 2 years. Migration would have been the only option in the longer run. Coping mechanisms, such as increasing charcoal sales, are not sufficient to compensate, since the market is so limited (Levine & Crosskey, 2006; cited in Cardno., 2012).

Livestock

The low productivity of the rangelands means only indigenous livestock is raised; livestock needs to be moved frequently to exploit available resources. Livestock is considered to be a source of wealth and a symbol of status (e.g. it is used in dowries) however, there is a general lack of veterinary services in Turkana to deal with routine diseases and epidemics / epizootics.

Discussions with GoK livestock officers during a field visit indicated that households have an average of 15 sheep and/ or goats, 2 camels and between 2 and 3 cattle.

Livestock is either sold to directly traders at the Lokwamosing, Kalemung'orok, Kakong'u, and Lokichar markets or through the Livestock Marketing Authority (LMA). The LMA raises funds for its operations by charges recovered from every animal sold; they also facilitate transportation of livestock to external markets at as far away as Nairobi.

Charcoal making

In recent years, there has been extensive burning of trees by charcoal burners. Target species include *Acacia tortilis*, *Acacia albida* and other valued species. The production and sale of charcoal was evident in the vicinity of Lokori

Retail / trade

Many residents in the area are involved in small scale businesses as a supplementary source of income. Businesses include shops, kiosks, bars, and entertainment establishments and such activities are concentrated in shopping centres like Lochwaa, Lokichar and Locheremoit or along roads / at junctions. Other economic activities include bee-keeping, production of traditional brews and working for NGOs, Aid Agencies or other employers. Another major household expenditure is the propensity to invest in livestock. Most (90%) of the earnings from

⁸ Relief food is provided by the respective central governments and WFP throughout the region.

the first harvest after the rain season will go towards re-stocking of the livestock herd.

8.8 Infrastructure

8.8.1 Housing

Habitation within Turkana East consists mainly of semi-permanent to temporary structures located within a common perimeter thorn fence. Temporary settlements are known as *manyattas* - defined as a group of huts forming a unit which serve as resting points for livestock herders in transit in search of water and pasture.

Larger semi-permanent settlements serve as administrative centres for the local communities, where essential social services like provision of potable water, schools and dispensaries are available (Earthview Geoconsultants, 2010). Within the perimeter fence each household has its own fenced area within which there is family kraal for small livestock. Camels are usually enclosed in a separate area within the perimeter fence while donkeys stay within the central area set aside for them. Security may be provided either by armed 'home guards' (GoK licensed weapon carriers) and/or directly by the residents. Each family aims at self-sufficiency, although sometimes a number of families may graze their animals collectively.

In Turkana, only 4 % of homes have either brick or stone walls. 27 % of homes have mud/wood or mud/cement walls, while 31 % have wood walls, 1 % has corrugated iron walls and 9% have tin or other walls. 28 % have grass/thatched walls. Grass and makuti roofs are installed in 72 % of homes, although less than 1 % have mud/dung roofs; approximately 12 % now have corrugated iron roofs. The majority of homes (91.4 %) have earthen floors and only 6.9 % use concrete. Similarly, very few households in Turkana have access to electricity. Firewood (87 %) and charcoal (11.4 %) are the main fuels used in cooking, whilst fuelwood (76.1 %) and lamps / lanterns (17.9 %) provide light (KNBS/SID, 2013). Lodwar town has the largest urban population in Turkana, taking 6 % of the county's population (CRA, 2011).

The construction material used for the permanent homesteads in the project area was bricks, cement, iron sheets, timber, gravel and sand. Semi-permanent homesteads are made up of iron sheets, timber. Temporary households are made of tree barks, rafters, animal hides and polythene sheets used to cover the house from rain.

The animal shelters in the village are called *Anok Angaadi* as shown in Figure 33 mainly made of grass and thorn bush branches while the main type of housing in the villages is the Kraal as shown in Figure 34.

8.8.2 Schools

There are 275 primary schools in Turkana County, with 71 of them providing boarding facilities to learners. The nomadic nature of many communities has not encouraged the establishment of early childhood education (ECD) facilities. In addition, Turkana has a total of 189 Adult Literacy Centres with the Government supporting 163 of them and the rest supported by Faith-based organizations.

Within Turkana South, there are 10 primary schools but no secondary school (Turkana South Education Officer, pers.comm.). Turkana East has 36 primary schools and 6 secondary schools; of which only half have attained the minimum standards to offer the Kenya Certificates of Primary or Secondary Education.

Nakukulas Primary School shown in Figure 23 located in the study area has ECD and class 1 to 8. The total number of students are 346 with; girls being 144 and boys being 202. ECD has 190 students, 105 boys and 85 girls with one teacher. Enrolment per class is shown in Table 15.

Table 14: Enrolment of boys and girls in primary school

Class	Boys	Girls	Total
1	53	42	95
2	35	29	64
3	29	27	56
4	26	16	42
5	20	11	31
6	15	5	20
7	12	10	22
8	12	4	16

Lokicheda Primary school shown in Figure 32 has two class rooms housing the ECD, Class 1 – 4. One of the classrooms serves as a store and classroom for class 1 and 2. The total number of pupils are 280, ECD (67), standard 1 (110), 2 (48), 3 (70) and 4 (14). The students are served with one meal through the school feeding programme. The school has 1 teacher provided by the government registered with the Teachers Service Commission and 3 volunteer teachers (teacher helper), that do not receive any.

After standard 4, the pupils join Nakukulas Primary School. The nearest secondary schools are in Lokori and Lokichar.

8.8.3 Transport

Roads

The murram roads and dirt tracks within the Study Area, unless under Tullow's road improvement programme, are generally not well maintained, if at all. They are not all-weather roads, and are, in many cases, completely impassable during the rainy seasons. River/ lugga crossings are subject to flash floods that may endanger road users. There are also very few or no user road support facilities such as petrol stations and garages along these roads for several tens and sometimes over a hundred kilometres (Cardno, 2012).

The EWT components will be hauled from the Amosing-1 well pad site to the Ngamia-D well pad. The one-way distance that will be travelled by the trucks transporting the EWT components between Amosing-1 and Ngamia-D well pads respectively is about 9.25km.

Airstrips

There are several airstrips in the general area. Many were constructed during the famine years of 1984 - 1985 to facilitate access to these remote areas and provide food aid assistance to the communities; however, most of these have since been abandoned.

The major airstrips in Turkana County are now under the control of the Kenya Airport Authority (KAA). These include Lokichar, Katilu, Kaputir and Lokori. Numerous other airstrips were cleared for use during the 1980s. A private airstrip has been constructed by Tullow at Kapese some 8 km southeast of Lokichar and is earmarked for expansion along with the development of the oil field.

8.8.4 Health facilities

The main local health facility in the Study Area is the Reformed Church Health Centre in Lokichar. This facility is supported by UNICEF, Merlin (a health-related NGO), Christian Association of Kenya, World Vision and the GoK. The Centre has an inpatient capacity of 26 beds, an operational laboratory with one laboratory technician, one ambulance and no operating theatre. There is no morgue and no regular doctor. The Centre handles a large number of out-patients estimated at between 150 to 200 on Mondays and Tuesdays and 50 per day the rest of the week. There is also a government run health centre at Lokichar, but it is ill-equipped in terms of personnel and facilities. Dispensaries are also located in Kanaodon, Lochwaa, Locheremoit and Kalemung'orok.

Nakukulas village has one dispensary as shown in Figure 21 that is located within the village, with 1 qualified nurse, 1 community health worker, 1 patient attendant, 1 subordinate staff and 1 watch man. The most commonly reported diseases are Malaria, Respiratory tract infections, bites, diarrhoea and skin infections.

8.8.5 Water infrastructure

The main source of water for the communities in the area is the Tullow watering point at the Lokicheda Primary School as shown in figure 30. Animals also drink from the various water points provided by Tullow as shown in **Error! Reference source not found.** and **Error! Reference source not found.** Appendix 8 respectively. Before this the village had water access 5 kilometers west where there are shallow wells. The Kode Kode Village has a watering point that is currently not in use because they have move from their village. Other sources of water for the Kode Kode Village include Kangikalalio and Amanikwel shallow wells.

Tullow has also established a water supply scheme for Lopii. Local people outside of these villages access water predominantly through shallow hand-dug wells located in luggas. Nakukulas village access water from the various sources including: one water hand pump installed by the Diocese of Lodwar in 1981, one water tank installed by Tullow for water delivery, one water BH by Tullow installed in 2010 and a shallow wells that are located within a radius of one kilometre maximum from Nakukulas village

8.8.6 Waste management

There are no designated landfills or waste management facilities in the Study Area; subsequently, bulk waste is either burnt in soil pits or transferred to town centres further afield like Lokichar for processing by NEMA approved waste management contractors. Liquid waste is normally managed through the use of pit latrines (local communities) or the use of septic tanks/cess pits (e.g. Tullow at existing exploration well sites).

8.8.7 Livelihood sources

The main source of livelihood is livestock rearing, sale of firewood, charcoal as shown in Figure 29 and casual employment at the Tullow operations

9 Stakeholder engagement

9.1 Introduction

This Section summarises the results of stakeholder engagement during preparation of the EPR Study. This section provides an overview of the consultation process, including stakeholders involved and consultation activities carried out to date. The section concludes with a summary of consultation findings.

9.2 Purpose

Stakeholder engagement refers to a process of sharing information and knowledge, seeking to understand the concerns of others and building relationships based on collaboration and partnership. It is a long-term process that requires the building of trust through open dialogue and the delivery of commitments. Stakeholder engagement is central to Tullow's vision. Tullow recognises that open and transparent communication is essential due to the importance of the wider exploration and production activities in which it is engaged and the impact on the local, regional and national economies and individuals.

9.3 Project stakeholders

Project stakeholders are identified in order to understand the individuals or organisations that will be affected by or may influence the Project or related activities either positively or negatively. Previous and on-going consultation carried out by Tullow in the Study Area to inform the Lokichar Basin exploration and production activities was used to inform the EPR. This wider consultation has included project, site specific and strategic assessments as part of the ESIA for the Exploratory Well Drilling in Block 10BB, October 2010; and the Tullow SEA for the wider Lake Turkana Development Programme (LTDP).

The list of stakeholders for the EWT is presented in Table 16 and engagement was completed during the two field visits. It is important also to note that the discussions were being undertaken as TKBV was in the process of rolling out the grievance mechanism and so the GM not discussed as part of the consultations

Table 15 : Stakeholder Map

Stakeholder Type	Location	Stakeholder Position	EWT Consultation Method			Justification
			Meeting	Round-table meeting	Letter	
Political Leadership	Nairobi	Turkana South MP	X		X	Elected political leader with responsibility to guide the community; Member of Turkana South County Advisory Committee (DAC) established to discuss development plans with Tullow.
	Nairobi	Women's Representative	X		X	Elected political leader and MP from southern Turkana, with responsibility to guide the local communities; a key member of a number of Parliamentary committees; and a member of the Turkana South DAC.
	Nairobi	Turkana East MP	X		X	Elected political leader with responsibility to guide the local communities; Member of Turkana South County Advisory Committee (DAC).
National Government	Nairobi	PS Min of Energy			X	Already consulted as part of wider Tullow communication plan so already aware of the E&P activities in the Lokichar Basin.
	Nairobi	NEMA	X		X	Environmental regulator.
	Nairobi	National Irrigation Board Managing Director			X	Given the scale of the EWT Project and existing knowledge of the wider Tullow E&P activities, a letter providing an update is most relevant.
	TBC	County Commissioner-Turkana County	X		X	Key government officer.
	Nairobi	National Museums of Kenya			X	Given the scale of the EWT Project and existing knowledge of the wider Tullow E&P activities and

Stakeholder Type	Location	Stakeholder Position	EWT Consultation Method			Justification
			Meeting	Round-table meeting	Letter	
						involvement, a letter providing an update is most relevant.
County Government	Lodwar	Governor		X	X	Government officials who will be commenting on the Environmental Project Report and establishing conditions for approval.
	Lodwar	Min for Lands		X	X	
	Lodwar	Min for Environment		X	X	
	Lodwar	Min for Culture		X	X	
	Lodwar	Turkana County Commissioner		X	X	
	Lodwar	NEMA		X	X	
	Lodwar	WRMA Manager Turkana		X	X	
	Lodwar	LOWASCO		X	X	Government regulatory officials
	Lodwar	County Director of Livestock		X	X	
	Lodwar	National Drought Management Authority		X	X	
	Lodwar	Turkana Rehabilitation Project- TRP		X	X	
	Lodwar	Minister for Energy	X		X	
	Lodwar	Sub-county administrators	X		X	
UN Agency	Lodwar	World Food Programme, Programme Officer			X	Given the small scale of the EWT Project and potential impacts, a letter providing an update and to notify them that the Environmental Project Report is being completed is underway is most appropriate.
NGOs	Lodwar	Secretary General of NGOs			X	Given the small scale of the EWT Project and potential impacts, a letter

Stakeholder Type	Location	Stakeholder Position	EWT Consultation Method			Justification
			Meeting	Round-table meeting	Letter	
						providing an update and to notify them that the Environmental Project Report is being completed is most appropriate.
	TBC	Friends of Lake Turkana	X		X	NGO with an active interest in the Aol.
	TBC	Turkana Basin Institute	X		X	NGO with an active interest in the Aol.
	TBC	Oxfam			X	Given the small scale of the EWT Project and potential impacts, a letter providing an update and to notify them that the Environmental Project Report is being completed is most appropriate.
	Turkana	Red Cross Turkana Office			X	Given the small scale of the EWT Project and potential impacts, a letter providing an update and to notify them that the Environmental Project Report is being completed is most appropriate.
County official (Turkana South County)	Lokichar	Sub-County Commissioner		X	X	Government officials who will be commenting on the Environmental Project Report and establishing conditions for approval. They are also members of the County Development Committee, which must approve activities within the county.
County official (Turkana South County)	Lokichar	Sub-County Water Officer		X	X	
County official (Turkana South County)	Lokichar	Sub-County Livestock Development Officer		X	X	

Stakeholder Type	Location	Stakeholder Position	EWT Consultation Method			Justification
			Meeting	Round-table meeting	Letter	
County official (Turkana South County)	Lokichar	Sub-County Council Representative		X	X	
County official (Turkana East County)	Lokori	Sub-County Commissioner		X	X	
County official (Turkana East County)	Lokori	Sub-County Water Officer		X	X	
County official (Turkana East County)	Lokori	Sub-County Livestock Development Officer		X	X	
County official (Turkana East County)	Lokori	Sub-County Council Representative		X	X	
National Irrigation Board (Katilu)	Katilu	Katilu Manager		X	X	
Settlements (within the EWT Study Area)	Nakukulas	Community group and/or representative (s)		X		Within the Soc Ec Aol (due to the difficulty in quantifying land use based on the number of 'home' range livestock and pastoralists that may potentially use the core Aol for grazing or temporary dwellings), also it is understood that people that may have had settlements within the core Aol may have relocated to Nakukulas.
	Lopii	Community group and/or representative (s)		X		Although outside of the SocEc Aol, it is understood that people that may have had settlements within the core Aol may have relocated to Lopii.

Stakeholder Type	Location	Stakeholder Position	EWT Consultation Method			Justification
			Meeting	Round-table meeting	Letter	
	Lokicheda	Community group and/or representative (s)		X		Within the SocEc Aol (due to the difficulty in quantifying land use based on the number of 'home' range livestock and pastoralists that may potentially use the core Aol for grazing or temporary dwellings), also it is understood that people that may have had settlements within the core Aol may have relocated to Lokicheda.

9.4 Consultation Findings

The findings of the stakeholder consultation are presented by impact in the following section. A summary of all the issues and responses given by Tullow are found in Appendix 5c, 6c and 6d respectively

9.4.1 Consultation feedback on Environmental Impacts

Site selection: several questions were raised on why the Ngamia-D well was selected for well testing yet other wells had been drilled before. The participants of one particular county assembly session wondered if the decision to progress the Ngamia-D well site first was due to “*some interest being kept away from the community?*” It was acknowledged that the EWT well pad has already been constructed and this construction was not part of the scope of this specific project.

Land take: many stakeholders wanted to confirm that there will not be a need for any additional land take for the EWT. This was confirmed.

Climate change: a number of stakeholders wanted to find out whether it was true that the changes in the rain (delayed rainy season earlier in the year) and general climate change in Turkana has resulted from activities related to oil exploration. One member of the Turkana East County Assembly enquired “*Would the planned EWT increase deterioration of climate as alleged?*”

Environmental quality: consultation on environmental quality issues associated with the project (including water and air quality and noise levels) did not generate many responses from stakeholders. Generally the perception of environmental issues by stakeholders has been secondary to the socioeconomic issues of concern and the perceived benefits that stakeholders believe Tullow may provide. The Study Area community stakeholders from a pastoralist perspective raised

concerns about environmental quality (air quality, noise). The political leadership forum stated that local communities would want to know about any buffer areas required to ensure residents and their livestock are safe from the oil drilling, pumping, processing and handling.

Air quality: Almost all of the stakeholders raised their concerns about potential air quality impacts, including potential for dust generation during construction and transport movements and decreasing air quality due to flaring.

Water quality of aquifers: the safety of the water aquifers from the oil drilling and pumping operations was questioned. A stakeholder requested details about the results of previous chemical analysis undertaken on nearby freshwater boreholes.

Water availability: the parliamentary members wanted reassurance that the abstraction of water during the well testing would not interfere with ground water availability and by extension impact the vegetative growth in the area.

Waste management: during the political leadership forum it was raised that the plans for waste management from the operations requires careful consideration given the lack of facilities in the area. Another member asked why it was necessary to dispose of waste generated from drilling and camp site in Kitale and, why it was not possible for NEMA to engage a local service provider to perform the waste disposal work.

Land restoration: many of the stakeholder groups requested reassurance that the land will be restored should the project become non-viable. Questions were also raised on whether it would be safe to use the affected land after planned activities are terminated.

9.4.2 Consultation feedback on Ecosystem services

Charcoal burning: one stakeholder indicated that illegal charcoal burning is a major environmental threat to the fragile environment and suggested that activities underway by Tullow could contribute to reducing the threat to trees in Turkana County.

9.4.3 Consultation feedback on Socio-cultural

Archaeological finds: the importance of avoiding interference with archaeological and cultural sensitive sites around the site was raised. It was advised that the Council of Elders be contacted to help identify any potential sites of archaeological interest.

Cultural awareness: there are no known cultural sites within the AoI. However, many people consulted asked that, “*local culture be respected, particularly sacred sites such as Ekwar*”. It was noted during consultation that failure to respect local culture, including cultural sites (particularly *Ekwar*) would represent a serious violation of the culture and could potentially cause serious problems.

Role of traditional authorities: Tullow was encouraged to establish regular courtesy visits to the traditional authorities to discuss plans for the area and seek advice since this would be welcomed by the local communities and demonstrate that the Project values their local culture. Furthermore it was observed that the traditional authority can be strengthened by being encouraged to play a role in promoting harmony within the community and encouraging peaceful co-existence.

Insecurity: the county assembly stated that experience internationally has shown that discovery and exploitation of oil reserves can result in problems such as increased demand for land and conflicts with neighbours. It was also felt that there are signs of increasing aggression from neighbours claiming that the exploration area belongs to them.

Local interests in relation to oil exploitation: the county assembly raised their concerns that when oil exploration and future production have been discussed in the past, the local interests in Turkana are not taken into consideration.

9.4.4 Consultation feedback on Socio-Economic environment

High expectations of potential employment opportunities: employment has been a dominant theme throughout stakeholder consultations, although this was linked to the wider ongoing exploration activities. The need for employment and training of local people continued to emerge as a key issue of concern for stakeholders, with over 80% of comments during the public meetings reinforcing the expectation of employment opportunities such as low-skilled housekeeping and security jobs.

Prioritisation of local communities for employment and business opportunities: local people from the communities within, or adjacent to, the Study Area made it clear that they wanted to be prioritised for work positions and had concerns that they did not possess sufficient skills to be able to compete for jobs. They felt that local communities should be prioritised for unskilled jobs. The country assembly requested that Tullow consider the possibility of hiring of cars from locals to provide transport services to the project and issuance of tender to local businesses for service provision in both construction and other phases. It was also questioned *“Who will benefit from tender to transport cargo from Mombasa to the project area for construction of crude container tanks?”* One local community member raised that: *“it is felt that most jobs available for the indigenous Turkana people are casual in nature and not permanent”,* that *“people outside of the Turkana region are given menial jobs such as housekeeping and the Turkana people can easily provide such unskilled labour”,* and that *“the Turkana people are side-lined for plum jobs due to the lack of education*

Land prices: the Country Assembly raised the point that since Tullow discovered oil, the price of land in the region has soared; numerous people from down-country have purchased land, especially in Lokichar; some are opening businesses. There is danger of the local community over-reacting negatively to this. It was confirmed that there will be no additional land required for the project and that this individual project of testing Ngamia-D is not expected to contribute to any ongoing change in land prices.

9.4.5 Consultation feedback on health

Air quality: many of those consulted were concerned about the potential for health issues/acute respiratory diseases linked to air pollution and dust *“our children will be affected later in life by the prolonged inhalation of the dust from an increased number of vehicles during the exploration and production phases”*. Several stakeholders expressed concern that the local population had been experiencing coughing and chest pains since Tullow commenced flaring in the area (at one of the other exploration well sites - Agate II) *“Is the smoke and gas hazardous to livestock and humans?”*, *“Livestock grazing around Ngamia-D would be adversely affected due to air emissions from the flaring activity”*. A recommendation to minimise dust generated by Project related transport was given, i.e. control speed on the roads or *“tar the road from Lokichar to Lokori to reduce challenges from dust generated by vehicular movement”*.

Noise and flaring: it was raised that the noise from the project activities and flaring may lead to miscarriages and loss of sleep, one community member was concerned that the flaring *“would have adverse impacts to pregnant women in their community which could result in miscarriages”*.

Road safety: Consultation on road safety issues associated with the project did not generated significant responses from stakeholders; although further information on measures put in place to ensure that haulage traffic does not result in road accidents was requested.

Health facilities: during consultation one recurring comment raised was the lack of medical structure and resources in the region and the poor quality of facilities and a lack of medication and insufficient numbers of beds for patients. Requests were made for the construction of dispensaries to provide the much needed health services to the community.

Emergencies: a female community member requested that Tullow to provide medical services within the vicinity to address emergency issues related to the EWT activities. She further felt that Tullow needed to do more for them with regards to offering assistance during emergencies even if they may not be as a result of the EWT activities.

9.5 Consultation Findings on the Project and the EPR Process

Engagement: on the whole the local communities expressed their pleasure at being involved in the preparation of the EPR. Different stakeholder groups expressed their appreciation that the Project is engaging them and also for Tullow's proactive steps to involve external stakeholders. One community member expressed that he *“was grateful that Tullow organised this meeting and he felt better informed about EWT activities and their potential environmental and social impacts”*. It was however also raised during a local community meeting that *“whenever public meetings are held, Tullow provides them with a biased positive opinion about the exploration activities and does not address the adverse impacts”*.

Overall support of the Project provided they receive benefits: the consultation process showed overall support of the project provided the local communities receive benefits (such as jobs, access to water and better health care facilities). The local community members consulted stated that the community will support the project providing that sufficient benefits are experienced in the local communities.

Grievance mechanism: a female local community member requested Tullow to consider providing an office closer to them or having a mobile office as the one at Lokichar is quite far for them to seek information or air their grievances.

Local community involvement: the political leader forum wanted reassurance that the local communities will be involved fully at the grass-roots in coordination with the leaders. The Area Chief expressed that prior to the community meeting held in Lokicheda he had collected the views of the community regarding the project. He said that there were misconceptions about the EWT activities prior to this public meeting which were resolved after the community understood what EWT entailed. He also went on to say that he was supportive of the EWT program as he understood what it entailed and was subsequently going to continue educating the community about it.

International knowledge and experience: the political leader forum rose that Kenya is new to Oil & Gas developments so they are keen to review experiences elsewhere in the world on the oil industry and social linkages and borrow appropriate solutions. The County Assembly also requested guidance on whether there were any relevant international laws that guide the process of environmental and ecology assessment issues associated with the Project.

Legal parameters: members of the County Assembly rose that if the Project is carried out in accordance with national laws, they exclude the county from contributing to the process taking place within their jurisdiction. Members of the Turkana South East government assembly stated that they would like NEMA to localise its presence so as to explain issues related to environment to the local community. They also felt that having access to local lawyers to explain the legal implication of the contracts and other engagement in oil business would be a great help to creating awareness among the community.

Youth: in order to ensure that locals are employable in the oil industry, stakeholders requested that Tullow provide facilities for young people to be suitably trained and capacity built to enable them to compete for jobs. *“How much has Tullow given for bursaries in the past three years?”* It was raised that more children should be allowed to benefit from bursaries therefore Tullow should consider increasing funds allocation. It was also felt by a female youth that *“the job opportunities tended to be skewed in favour of men and requested Tullow to provide equal opportunities for employment”*.

Vulnerable groups: the need to engage more with the physically challenged was raised. Some stakeholders felt that Tullow has not taken positive steps to engage with the physically challenged. Special engagement should be considered, including allowance including engaging sign language specialist to help those with hearing challenges to follow discussions and other verbal communication, or a stipend to the disabled, the orphaned children and the elderly from the local

community. It was also raised by a female member of the local community that “since Tullow operations commenced, some benefits to the community were stopped”. For example, the Government funded “help-age” project where the old people were given financial support ceased, the community perception being that the Government withdrew the support as they felt that Tullow operations in the area would generate the needed assistance through CSR programs and other income generating activities.

Environment committee: the members of parliament suggested formation of Environment Committee to monitor and report on the environment during construction and operation. They relayed that they expected Tullow to lead in the formation of such a committee.

On-going consultation: the parliamentary members requested a follow up meeting once the EPR had been completed.

Lack of prior information: the country assembly stated that they had been briefed of the issues to allow them raise appropriate issues and that the same should be undertaken at a community level. A summary of the stakeholder consultations is provided in Table 17.

Table 16: Summary of stakeholder consultations

Categories	Issues raised	Relevance to the EWT Project
Livelihoods	<ul style="list-style-type: none"> • Increase in dust from use of road network affecting vegetation quality and consumption by livestock. • Potential increased risk of livestock miscarriage due to flaring activities. 	<ul style="list-style-type: none"> • Dust will be generated from use of the public road network. The use of the road network by project-related vehicles will be evaluated in the impact assessment. • No crude oil will be flared. Gas will be flared into a ground pit. • Air dispersion and noise modelling to be undertaken as part of the impact assessment process.
Biodiversity	<ul style="list-style-type: none"> • Potential for impacts on birds from flaring. • Potential for increased soil contamination from oil spills and potential effects on wildlife and livestock. 	<ul style="list-style-type: none"> • Gas will be flared into a ground pit. • An emergency response plan will be used.
Waste management	<ul style="list-style-type: none"> • EWT will generate quantities of hazardous and non-hazardous waste. 	<ul style="list-style-type: none"> • All waste to be transported to Tullow's existing waste management facilities in the field. The treatment and

Categories		Issues raised	Relevance to the EWT Project
			disposal of waste is outside the scope of the EWT EPR
Climate change		<ul style="list-style-type: none"> EWT may contribute towards climate change. 	<ul style="list-style-type: none"> The project will generate small quantities of GHG.
Water availability & quality		<ul style="list-style-type: none"> Impacts to water quality through pollution and availability from abstraction. 	<ul style="list-style-type: none"> The EWT requires quantities freshwater and this will be evaluated as part of the impact assessment process.
Demographics/ social		<ul style="list-style-type: none"> Tullow needed to help reduce potential adverse socio-economic and socio-cultural impacts and potential for conflicts. Need to develop ways to meet the needs of local people in a manner that will bring benefits to the unemployed and their communities. Exacerbation of conflicts due to resource stress, changes in culture and lifestyles. Consider implementing benefit sharing opportunities. 	<ul style="list-style-type: none"> No additional land is required. No additional local employment is required for the project.
Health		<ul style="list-style-type: none"> Potential health issues/ acute respiratory diseases linked to air pollution and dust. Road safety from use of vehicles. 	<ul style="list-style-type: none"> No crude oil will be flared. Air dispersion modelling and noise to be undertaken as part of the impact assessment process. All road vehicles to be operated in accordance with Tullow's existing procedures.
Economic activity		<ul style="list-style-type: none"> Expectation for local job opportunities. Expectation for wider benefit sharing with local communities. 	<ul style="list-style-type: none"> No additional local employment is required for the project. Benefit sharing issue is outside the scope of the EWT Environmental Project Report.
Cultural heritage		<ul style="list-style-type: none"> Possible threats to valued cultural heritage or archaeological sites. 	<ul style="list-style-type: none"> No additional land is required.

Categories		Issues raised	Relevance to the EWT Project
			<ul style="list-style-type: none"> No trees or shrubs that may have intangible cultural heritage value will be removed.

9.6 Next Steps

9.6.1 On-going stakeholder engagement

Tullow will continue stakeholder engagements before, during and after the project so that key stakeholders are informed of the project's activities. The process of consultation and engagement will enable all stakeholders, local, regional and national, to provide feedback to Tullow with any complaints or comments throughout the project through the Tullow's grievance mechanism.

Commencing September 2014, Tullow began rolling out its Grievance Mechanism in their operational areas including the well sites surrounding Ngamia-D. This was done through (i) community outreach programs, (ii) road shows, and (iii) daily meetings in the affected villages. Grievances can be lodged via (a) a Tullow dedicated dedicated hotline and email address, (b) face to face with any Field Stakeholder Engagement Officers (FSEO) (c) by a community member telephoning any Tullow FSEO, (d) at the Tullow Lokichar or Tullow Lokori office.

10 Impact Assessment

This chapter provides an analysis of impacts, both positive and negative, that will result from the project using the methodology described in Section 4.

The anticipated environmental and social impacts are summarised in Table 18 for routine events and Table 19 summarises the environmental and social impacts for non-routine events.

Table 17: Findings of Impact Assessment

Aspect	Potential impact	Receptor	Existing control measures	Significance justification	Impact significance	Additional measures control	Residual impact significance
Routine events							
The generation of noise.	<ul style="list-style-type: none"> Creation of a nuisance to local communities. Disturbance of local fauna (NB where fauna is used in this table, it is also taken to include livestock). 	Local communities. Fauna.	<ul style="list-style-type: none"> Use of well testing rig that is designed and operated in accordance with Good International Industry Practice (GIIP). The rig and all other equipment to be maintained according to the manufacturer's specifications. Well testing rig to be located in the centre of the well pad to provide the maximum distance for noise attenuation to the site boundaries. Construction of an earth berm around perimeter of site to act as a noise barrier. 	Operations are not expected to attract local people moving in the regional area with animals towards the site.	Minor	<ul style="list-style-type: none"> Noise modelling results indicate that the radial area impacted by the generation of noise, in accordance with applicable Kenyan legislation, is 1.7km during the night, and 1.1km during the day. The nearest community (Nakukulas) is located approximately 7km from the site and so well testing operations are unlikely to cause a nuisance. Inform local communities of project activities 	Negligible

Aspect	Potential impact	Receptor	Existing control measures	Significance justification	Impact significance	Additional control measures	Residual impact significance
The generation of air emissions (GHG and non-GHG) from the use of equipment and road vehicles.	<ul style="list-style-type: none"> Deterioration to local air quality (non-GHG emissions). Contribution to global climate change (GHG emissions). 	Local air quality. Local communities. Global climate.	<ul style="list-style-type: none"> Use of well testing rig that is designed and operated in accordance with Good International Industry Practice (GIIP). The rig and all other equipment to be maintained according to the manufacturer's specifications. Separators to be designed to effectively separate oil from associated gas to ensure only gas is flared. Use of well maintained road vehicles. 	The nearest community (Nakukulas) is located approximately 7km from the site.	Minor	<ul style="list-style-type: none"> Air modelling results indicate that the radial area where higher concentration of pollutants are present, above the level suitable for a 24-hour exposure, comprises a 700m radius. Inform local communities of project activities 	Negligible
The generation of dust from the use of vehicles.	<ul style="list-style-type: none"> Deterioration to local air quality. Creation of a nuisance to local communities. Reduction in availability of vegetation used for animal grazing due to the settlement of dust on plant leaves. 	Local air quality. Local communities.	<ul style="list-style-type: none"> Existing road networks to only be used. All off-road driving prohibited without approval from the site supervisor. Drivers to adhere to Tullow vehicle management requirements, which include speed limits that reflect the specific type of road, driver behaviour and training. 	The overall quantity of vehicle traffic is expected to be moderate and the existing controls are expected to be effective. However, the generation of dust is extremely difficult to control in such a dry environment and the significance is	Moderate	<ul style="list-style-type: none"> Inform local communities of project activities, including use of vehicles on the road network. Use road marshals along frequently used road networks to warn local people of vehicle movements. 	Minor

Aspect	Potential impact	Receptor	Existing control measures	Significance justification	Impact significance	Additional control measures	Residual impact significance
				considered to be moderate.			
The generation of sewage from the presence of a workforce.	<ul style="list-style-type: none"> Soil and groundwater contamination. 	Soil. Groundwater.	<ul style="list-style-type: none"> Sewage treatment system to be adequately sized to reflect the expected number of workers present. System to be maintained according to the manufacturer's specifications and monitored closely during operation to ensure it is functioning correctly. 	There are no permanent surface water features in the vicinity of the site.	Minor	<ul style="list-style-type: none"> Tullow has extensive experience in the use of sewage treatment systems from Kenya and operates similar facilities in a variety of locations across Kenya. 	Negligible
The abstraction of groundwater from boreholes.	<ul style="list-style-type: none"> Reduction in the availability of local groundwater supplies. Groundwater over abstraction resulting in deeper saline water mixing of with upper freshwater horizons. 	Groundwater. Local communities.	<ul style="list-style-type: none"> All water abstraction to occur using existing boreholes that Tullow regularly uses for ongoing operations which have already been permitted by WRMA (Nakukulas 10). No new boreholes to be drilled. Boreholes to be monitored in accordance with the existing groundwater monitoring programme that periodically checks 	The project is located in a water-scarce region of Kenya. However, the total quantity of water required is relatively low and EWT activities have been designed to minimise the quantity of water required. On this basis, impact	Minor	<ul style="list-style-type: none"> No additional controls required but ongoing monitoring is necessary. 	Minor

Aspect	Potential impact	Receptor	Existing control measures	Significance justification	Impact significance	Additional measures control	Residual impact significance
			groundwater elevation and water quality.	significance is minor.			
Ground hose	<ul style="list-style-type: none"> • Livestock movement. • Produced water leak. • Unauthorised use of water within hose. 	Soil. Groundwater. Livestock. Local communities.	<ul style="list-style-type: none"> • Use of flexible, small diameter hose. • Hose clearly identifiable. One flexible hose will be laid along existing road between Ngamia-D and Ngamia-3 and another flexible hose will be laid from Ngamia-1 to Ngamia-3 	The project is located in a water scarce area and any water leaks or unauthorized use of water will place unnecessary strains on the N-10 borehole.	Minor	<ul style="list-style-type: none"> • Community messaging to explain that the water is not for consumption. • The hose between Ngamia-1 and Ngamia-3 will be sleeved through a conduit laid in a trench across the Lokichar – Lomut Road at an appropriate road crossing location. 	Negligible
The use of road vehicles on the public road network and a road traffic incident.	<ul style="list-style-type: none"> • Increased risk to community health and safety resulting in an injury/fatality, or damage to private property. • Loss of livestock resulting in economic loss. 	Local communities.	<ul style="list-style-type: none"> • Drivers to adhere to Tullow vehicle management requirements, which include speed limits that reflect the specific type of road, driver behaviour and training. • Existing road networks to only be used. • All off-road driving is prohibited unless authorised by the Site Supervisor. 	The overall quantity of vehicle traffic is expected to be moderate and the existing controls are expected to be effective. However, there remains a risk that a road traffic incident could still occur and this is considered to be of moderate significance.	Moderate	<ul style="list-style-type: none"> • Inform local communities of project activities, including use of vehicles on the road network. • Continue to use existing project road marshals along frequently used road networks to warn local people of vehicle movements. 	Moderate

Aspect	Potential impact	Receptor	Existing control measures	Significance justification	Impact significance	Additional measures control	Residual impact significance
The use of road vehicles to transport equipment, materials and workers.	<ul style="list-style-type: none"> Introduction of alien and invasive species affecting existing plant species, biodiversity and pastoralist livelihoods. 	Biodiversity. Local communities.	<ul style="list-style-type: none"> None. 	<ul style="list-style-type: none"> Kenyan vehicles only to be used. 	Minor	None.	Minor
The generation of hazardous and non-hazardous waste.	<ul style="list-style-type: none"> Soil and groundwater contamination. 	Soil. Groundwater. Biodiversity. Local community health.	<ul style="list-style-type: none"> All waste to be segregated and placed into receptacles that are appropriate based upon the type of waste in accordance with standard Tullow waste management procedures. Waste containers to be securely strapped to road vehicles during transit, to make sure content does not escape. All waste to be transported to ECCL waste management facility in Stony Athi in accordance with established Tullow waste management procedures. 	The quantity of waste to be generated from EWT activities is relatively low. All waste will be transferred using road vehicles and secure containers, to the existing ECCL waste management facility in Stony Athi. ECCL is a NEMA licensed transporter and the Stony Athi facility has a waste disposal license from NEMA. On this basis, impact	Minor	<ul style="list-style-type: none"> No additional controls required but ongoing monitoring of waste movements is necessary. 	Minor

Aspect	Potential impact	Receptor	Existing control measures	Significance justification	Impact significance	Additional measures control	Residual impact significance
			<ul style="list-style-type: none"> All wastes to be disposed in accordance with Kenyan waste management regulations. 	significance is minor.			
The presence of a security fence surrounding the site and interactions with wildlife.	<ul style="list-style-type: none"> Animal injury or mortality resulting from an interaction between fauna and the security fence/site. 	Fauna.	<ul style="list-style-type: none"> The existing security fence surrounding the site will prevent the entry of fauna. During site operations the security fence will be regularly inspected to check its integrity, overall condition and remove any climbing vegetation that could attract fauna. Any fauna that has managed to enter the site shall be immediately removed. 	There are no protected or endangered species that have been observed in the vicinity of the site. However small mammals, birds, reptiles and invertebrates may be present in small quantities and will be excluded from the site by the security fence.	Minor	<ul style="list-style-type: none"> Tullow Wildlife and Livestock Protection Guidelines are in place for rescue and recovery or wildlife. Biodiversity Management Plan already in place. 	Negligible
The physical presence of crude oil storage tanks within the site.	<ul style="list-style-type: none"> Local change in landscape character from the presence of unnatural structures/features. Negative visual impact including reflection of 	Landscape. Local communities.	<ul style="list-style-type: none"> All oil storage tanks and other equipment to be placed within the existing site. 	The nearest community (Nakukulas) is located approximately 7km from the site and lies outside of the area that will be affected by the visual change.	Minor	<ul style="list-style-type: none"> Local communities to be informed about EWT activities and presence of crude oil storage tanks. 	Negligible

Aspect	Potential impact	Receptor	Existing control measures	Significance justification	Impact significance	Additional measures control	Residual impact significance
	sunlight from structures/features.			There are no protected or endangered species that have been observed in the vicinity of the site.			
The generation of artificial light.	<ul style="list-style-type: none"> Creation of a nuisance to local communities. Disturbance of local fauna. 	Local communities. Fauna.	<ul style="list-style-type: none"> Artificial lighting will be positioned so that the extent of light emissions beyond the site boundary will be minimised to the extent possible. The use of artificial lighting will be minimised to the extent possible. 	The nearest community (Nakukulas) is located approximately 7km from the site and lies outside of the area that will be affected by any light spill beyond the site boundary. There are no protected or endangered species that have been observed in the vicinity of the site.	Minor	<ul style="list-style-type: none"> Local communities to be informed about EWT activities and the use of artificial lighting. 	Negligible

Table 18: Findings of Impact Assessment – Non-routine events

Aspect	Potential impact	Receptor	Existing control measures	Significance justification	Impact significance	Additional measures control	Residual impact significance
Non-routine events							
The storage of crude oil on site in tanks and loss of primary containment.	Soil and groundwater contamination.	Soil. Groundwater.	<ul style="list-style-type: none"> • All crude oil tanks to be fitted with impermeable bunding with a minimum capacity of 110% of total tank volume. • Site-specific Emergency Response Plan in place which will describe the actions to be taken in the event of loss of containment. 	The potential for a failure of primary containment is considered to be very low. Even if a leak occurred the rate of physical migration of crude oil (either horizontally or vertically) is expected to be very low due to high wax content of crude.	Negligible	None required.	Negligible
The storage of chemicals and diesel on site in tanks and loss of primary containment.	Soil and groundwater contamination.	Soil. Groundwater.	<ul style="list-style-type: none"> • All chemical and diesel tanks to be fitted with impermeable secondary bunding with a minimum capacity of 110% of total tank volume. • Spill kits to be available on site. • Site-specific Emergency Response Plan in place which will describe the 	The potential for a failure of primary containment is considered to be very low. Spill kits will be available on-site and immediately used to contain any spill	Minor	Regular inspection of all chemical and diesel storage tanks during the project.	Negligible

Aspect	Potential impact	Receptor	Existing control measures	Significance justification	Impact significance	Additional measures control	Residual impact significance
			actions to be taken in the event of loss of containment.	which is expected to be localised.			
The storage of produced water in a lined pit and loss of primary containment following a leak.	Soil and groundwater contamination.	Soil. Groundwater. Local communities.	<ul style="list-style-type: none"> • Before use the existing lined pit will be visually inspected to check the integrity of the liner. • Site-specific Emergency Response Plan in place which will describe the actions to be taken in the event of loss of containment. 	Oilfield pit liners are routinely used in the international oil and gas industry. As long as the integrity of the pit liner is checked before use, the potential for a leak during well testing is considered to be low. The pit is expected to be full of produced water for a period of 3-4 months only after which time it will be reinjected into the reservoir.	Minor	Regular inspection of the produced water pit during the project.	Negligible

11 Environmental and Social Management Plan

11.1 Introduction

This Section presents the Environmental and Social Management Plan (ESMP) for the EWT Project and consolidates all mitigation and control measures for the identified environmental and social risks and impacts. The objectives of the ESMP are to:

- Consolidate the mitigation and control measures into a concise summary that can be used during implementation of the project; and
- Define the associated roles and responsibilities.

11.2 Environmental and social monitoring during the project

The ESMP will be used during pre-mobilisation discussions with Tullow's EWT Project contractor(s) that will focus on environmental and social mitigation and control measures. During implementation of the project itself, Tullow will monitor the performance of the EWT contractor(s) to check that they are adhering to the requirements of the ESMP through a series of inspections and audits. All non-compliances will result in a formal corrective action request being sent to the contractor in addition to further checks by Tullow to ensure that the ESMP is being adequately implemented. Table 20 provides the ESMP for routine events while Table 21 presents the ESMP for non-routine events.

Table 19: Environmental and Social Management Plan – Routine events

Routine events					
Aspect	Potential impact	Receptor	Summary of mitigation and monitoring measures	Responsibility	Timing
The generation of noise.	<ul style="list-style-type: none"> • Creation of a nuisance to local communities. • Disturbance of local fauna. 	Local communities. <ul style="list-style-type: none"> • Fauna. 	<ul style="list-style-type: none"> • Use of well testing rig that is designed and operated in accordance with Good International Industry Practice (GIIP). • The rig and all other equipment to be maintained according to the manufacturer's specifications. • Well testing rig to be located in the centre of the well pad to provide the maximum distance for noise attenuation to the site boundaries. • Construction of an earth berm around perimeter of site to act as a noise barrier. 	<ul style="list-style-type: none"> • Tullow. • Contractor. • Contractor. • Contractor. 	<ul style="list-style-type: none"> • Before mobilisation. • During testing activities. • Well pad preparation. • Well pad preparation.
The generation of air emissions (GHG and non-GHG) from the use of equipment and road vehicles.	<ul style="list-style-type: none"> • Deterioration to local air quality (non-GHG emissions). • Contribution to global climate change (GHG emissions). 	Local air quality. Local communities. <ul style="list-style-type: none"> • Global climate. 	<ul style="list-style-type: none"> • Use of well testing rig that is designed and operated in accordance with Good International Industry Practice (GIIP). • The rig and all other equipment to be maintained according to the manufacturer's specifications. • Separators to be designed to effectively separate oil from associated gas to ensure only gas is flared. • Use of well-maintained road vehicles. 	<ul style="list-style-type: none"> • Tullow. • Contractor. • Contractor. • Contractor. 	<ul style="list-style-type: none"> • Before mobilisation. • During testing activities. • Before mobilisation and ongoing monitoring. • During entire project.
The generation of dust from the use of vehicles.	<ul style="list-style-type: none"> • Deterioration to local air quality. • Creation of a nuisance to local communities. 	Local air quality. <ul style="list-style-type: none"> • Local communities. 	<ul style="list-style-type: none"> • Existing road networks to only be used. • All off-road driving prohibited without approval from the site supervisor. 	<ul style="list-style-type: none"> • Contractor. • Contractor. • Contractor. 	<ul style="list-style-type: none"> • During entire project. • During entire project.

Routine events

Aspect	Potential impact	Receptor	Summary of mitigation and monitoring measures	Responsibility	Timing
	<ul style="list-style-type: none"> Reduction in availability of vegetation used for animal grazing due to the settlement of dust on plant leaves. 		<ul style="list-style-type: none"> Drivers to adhere to Tullow vehicle management requirements, which include speed limits that reflect the specific type of road, driver behaviour and training. Inform local communities of project activities, including use of vehicles on the road network. Use road marshals along frequently used road networks to warn local people of vehicle movements. 	<ul style="list-style-type: none"> Tullow. Tullow. 	<ul style="list-style-type: none"> Contractor. Before mobilisation. During entire project.
The generation of sewage from the presence of a workforce.	<ul style="list-style-type: none"> Soil and groundwater contamination. 	Soil. <ul style="list-style-type: none"> Groundwater. 	<ul style="list-style-type: none"> Sewage treatment system to be adequately sized to reflect the expected number of workers present. System to be maintained according to the manufacturer's specifications and monitored closely during operation to ensure it is functioning correctly. 	<ul style="list-style-type: none"> Tullow. Contractor. 	<ul style="list-style-type: none"> Before mobilisation. During entire project. .
The abstraction of groundwater from boreholes.	<ul style="list-style-type: none"> Reduction in the availability of local groundwater supplies. Groundwater over abstraction resulting in deeper saline water mixing of with upper freshwater horizons. 	Groundwater. <ul style="list-style-type: none"> Local communities. 	<ul style="list-style-type: none"> All water abstraction to occur using existing boreholes that Tullow regularly uses for ongoing operations which have already been permitted by WRMA (Nakukulas9 and 10). No new boreholes to be drilled. Boreholes to be monitored in accordance with the existing groundwater monitoring programme that periodically checks groundwater elevation and water quality. 	<ul style="list-style-type: none"> Tullow. Tullow. 	<ul style="list-style-type: none"> During entire project. Ongoing monitoring in accordance with wider monitoring programme.
The use of road vehicles on the public road network and a	<ul style="list-style-type: none"> Increased risk to community health and safety resulting in an injury/fatality, or 	<ul style="list-style-type: none"> Local communities. 	<ul style="list-style-type: none"> Drivers to adhere to Tullow vehicle management requirements, which include speed limits that reflect the specific type of road, driver behaviour and training. Existing road networks to only be used. 	<ul style="list-style-type: none"> Contractor. Contractor. Contractor. Tullow 	<ul style="list-style-type: none"> During entire project. During entire project.

Routine events

Aspect	Potential impact	Receptor	Summary of mitigation and monitoring measures	Responsibility	Timing
road traffic incident.	damage to private property. • Loss of livestock resulting in economic loss.		• All off-road driving is prohibited unless authorised by the Site Supervisor. • Inform local communities of project activities, including use of vehicles on the road network. • Use road marshals along frequently used road networks to warn local people of vehicle movements.	• Tullow	• During entire project. • Before mobilisation. • During entire project.
The use of road vehicles to transport equipment, materials and workers.	• Introduction of alien and invasive species affecting existing plant species, biodiversity and pastoralist livelihoods.	Biodiversity. • Local communities.	• Kenyan vehicles only to be used.	• Tullow and contractor. • Contractor.	• During entire project. • During entire project.
The generation of hazardous and non-hazardous waste.	• Soil and groundwater contamination.	Soil. Groundwater. Biodiversity. • Local community health.	• All waste to be segregated and placed into receptacles that are appropriate based upon the type of waste in accordance with standard Tullow waste management procedures. • Waste containers to be securely strapped to road vehicles during transit, to make sure content does not escape. • ECCL to complete JMPs for transfer of waste to their waste disposal site at Stony Athi • All waste to be transported via road to the ECCL waste management facility located in Stony Athi (30km south east of Nairobi) in accordance with established Tullow waste management procedures. • Ongoing monitoring of waste movements using Waste Transfer Notes.	• Contractor. • Contractor. • Contractor and Tullow. • Tullow.	• During entire project. • During entire project. • During entire project. • During entire project.

Routine events

Aspect	Potential impact	Receptor	Summary of mitigation and monitoring measures	Responsibility	Timing
			<ul style="list-style-type: none"> The waste will be disposed at the ECCL facility in Stony Athi which is licensed by NEMA as a waste disposal site 		
The presence of a security fence surrounding the site and interactions with wildlife.	<ul style="list-style-type: none"> Animal injury or mortality resulting from an interaction between fauna and the security fence/site. 	<ul style="list-style-type: none"> Fauna. 	<ul style="list-style-type: none"> The existing security fence surrounding the site will prevent the entry of fauna. During site operations the security fence will be regularly inspected to check its integrity, overall condition and remove any climbing vegetation that could attract fauna. Any fauna that has managed to enter the site shall be immediately removed. Tullow Wildlife and Livestock Protection Guidelines are in place for rescue and recovery or wildlife. 	<ul style="list-style-type: none"> Tullow. Tullow. Tullow. 	<ul style="list-style-type: none"> During entire project. During entire project. During entire project.
The physical presence of crude oil storage tanks within the site.	<ul style="list-style-type: none"> Local change in landscape character from the presence of unnatural structures/features. Negative visual impact including reflection of sunlight from structures/features. 	<ul style="list-style-type: none"> Landscape. Local communities. 	<ul style="list-style-type: none"> All oil storage tanks and other equipment to be placed within the existing site. Local communities to be informed about EWT activities and presence of crude oil storage tanks. 	<ul style="list-style-type: none"> Contractor. Tullow. 	<ul style="list-style-type: none"> Well pad preparation. Before mobilisation.
The physical presence of the flexible hose for produced water transfer	<ul style="list-style-type: none"> Disruption to livestock movement 	<ul style="list-style-type: none"> Livestock. 	<ul style="list-style-type: none"> Ongoing monitoring throughout the life of project Any observed leaks through regular inspection will be immediately reported to the Tullow Field EHS Monitor at the Ngamia-1 or Ngamia-D well site 	<ul style="list-style-type: none"> Tullow Contractor 	<ul style="list-style-type: none"> During transfer of water from Ngamia-1 to Ngamia-D

Routine events					
Aspect	Potential impact	Receptor	Summary of mitigation and monitoring measures	Responsibility	Timing
The generation of artificial light.	<ul style="list-style-type: none"> • Creation of a nuisance to local communities. • Disturbance of local fauna. 	Local communities. <ul style="list-style-type: none"> • Fauna. 	<ul style="list-style-type: none"> • Artificial lighting will be positioned so that the extent of light emissions beyond the site boundary will be minimised to the extent possible. • The use of artificial lighting will be minimised to the extent possible. • Local communities to be informed about EWT activities and the use of artificial lighting. 	<ul style="list-style-type: none"> • Contractor. • Contractor. • Tullow. 	<ul style="list-style-type: none"> • Well pad preparation. • During entire project. • Before mobilisation.

Table 20: Environment and Social Management Plan – Non-routine events

Non-routine events					
Aspect	Potential impact	Receptor	Summary of mitigation and monitoring measures	Responsibility	Timing
The storage of crude oil on site in tanks and loss of primary containment.	<ul style="list-style-type: none"> • Soil and groundwater contamination. 	Soil. <ul style="list-style-type: none"> • Groundwater. 	<ul style="list-style-type: none"> • All crude oil tanks to be fitted with impermeable bunding with a minimum capacity of 110% of total tank volume. 	<ul style="list-style-type: none"> • Tullow and contractor. 	<ul style="list-style-type: none"> • Well pad preparation.
The storage of chemicals and diesel on site in tanks and loss of primary containment.	<ul style="list-style-type: none"> • Soil and groundwater contamination. 	Soil. <ul style="list-style-type: none"> • Groundwater. 	<ul style="list-style-type: none"> • All chemical and diesel tanks to be fitted with impermeable secondary bunding with a minimum capacity of 110% of total tank volume. • Spill kits to be available on site. • Regular inspection of all chemical and diesel storage tanks during the project. 	<ul style="list-style-type: none"> • Tullow and contractor. • Contractor. • Tullow and contractor. 	<ul style="list-style-type: none"> • Well pad preparation. • Well pad preparation. • During entire project.
The storage of produced water in a lined pit and loss of primary containment following a leak.	<ul style="list-style-type: none"> • Soil and groundwater contamination. 	Soil. Groundwater. <ul style="list-style-type: none"> • Local communities. 	<ul style="list-style-type: none"> • Before use the existing lined pit will be visually inspected to check the integrity of the liner. • Regular inspection of the produced water pit during the project. 	<ul style="list-style-type: none"> • Contractor. • Contractor. 	<ul style="list-style-type: none"> • Well pad preparation. • During entire project.
The potential for a release of gas to occur due to a surge in gas volume during well testing.	<ul style="list-style-type: none"> • Deterioration to local air quality (non-GHG emissions). • Contribution to global climate change (GHG emissions). 	Local air quality. Local communities. <ul style="list-style-type: none"> • Global climate. 	<ul style="list-style-type: none"> • The testing rig to be continuously monitored. • Adherence to existing Tullow Well Monitoring Procedures. • Use of an emergency well shutdown valve downstream on the well head. • A series of audible alarms will be installed to check for the presence of unignited gas. 	<ul style="list-style-type: none"> • Contractor. • Contractor. • Contractor. • Contractor. 	<ul style="list-style-type: none"> • During entire project. • During entire project. • Well pad preparation.

Non-routine events					
Aspect	Potential impact	Receptor	Summary of mitigation and monitoring measures	Responsibility	Timing
			<ul style="list-style-type: none"> Site-specific Emergency Response Plan to be prepared which will describe the actions to be taken in the event of a sudden surge in gas volume. 		<ul style="list-style-type: none"> Before mobilisation.
The potential for fire/explosion to occur during well testing.	<ul style="list-style-type: none"> Soil and groundwater contamination. Deterioration to local air quality (non-GHG emissions). Contribution to global climate change (GHG emissions). Community health and safety. 	Soil. Groundwater. Local air quality. Local communities. <ul style="list-style-type: none"> Global climate. 	<ul style="list-style-type: none"> Site-specific Emergency Response Plan to be prepared which will describe the actions to be taken in the event of a fire/explosion. 	<ul style="list-style-type: none"> Contractor. 	<ul style="list-style-type: none"> Before mobilisation.

12 Conclusions

This Environmental Project Report has used existing baseline information that was supplemented by a field visit to gather additional information associated with environmental and social receptors present within the EWT project Aol. The results of fieldwork and the outcome of stakeholder engagement activities have been used to prepare the impact assessment presented in this EPR. The output from the impact assessment process has been used to develop an ESMP that captures all of the relevant mitigation and controls measures to be used throughout the EWT project.

Before Tullow's contractor(s) mobilise to the field, the content of the ESMP will be used so that Tullow's expectations from an environmental and social perspective, are clearly presented and roles and responsibilities are discussed and agreed. During the completion of the EWT project, Tullow will also undertake a series of audits and inspections. Any corrective actions identified will be immediately recorded and written notices will be issued to the relevant contractors, supplemented by additional checks.

Tullow will continue to engage local communities to inform the EWT activities and scope before the start. This process will be closely managed by the Social Performance team, using Field Stakeholder Engagement Officers (FSEO).

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14 Appendixes

14.1 Appendix 1: CVs of KTL Staff

Mr. Sanjay Gandhi

Proposed Position	:	ESIA Team Leader			
Name of Firm	:	Kurrent Technologies Ltd.			
Name of Staff	:	GANDHI, Sanjay			
Profession	:	Civil including Structural and Environment Engineer			
Date of Birth	:	May 10 th , 1968			
Years with the Firm	:	12	Nationality	:	Kenyan
Member in Professional Bodies to Practice:		<ul style="list-style-type: none">• Petroleum Institute of East Africa (PIEA)• International Association of Drilling Contractors – USA (IADC)• Energy Institute – U.K. (EI)• International Spill Control Organization – U.K. (ISCO)• Royal Society for the Prevention of Accidents – U.K. (RoSPA)• International Association of Impact Assessment – USA (IAIA)			
Registration with Licensing Bodies to Practice		<ul style="list-style-type: none">• National Environment Management Authority (NEMA)• Directorate of Occupational Safety and Health Services (DOSHS)			

Detailed Tasks Assigned: TBA

Key Qualifications

Sanjay Gandhi is an energy (oil & gas and power generation) sector expert in all aspects associated with environment and social impact assessment (ESIA), environment auditing (EA), safety and health (S&H) training and safety and health (S&H) auditing. He has over 22 years' experience working and consulting for the energy sector in sub-Saharan Africa. His core activities include leading multi-disciplinary teams for undertaking ESIA Studies of energy sector projects in Kenya. Sanjay has and continues to lead ESIA teams for public and private sector projects. He is familiar with the ESIA and public/stakeholder consultation requirements of international financing institutions such as the International Finance Corporation (IFC), World Bank Group (WBG) and the Equator Principles. He has received accolades from the World Bank for his EIA Studies for thermal power plants up to 90MW and through the World Bank's Environment and Social Management Framework (ESMF).

He is the author of Kenya's "Petroleum Sector Guidelines for EIA/EA in Kenya" and Kenya's "National Oil Spill Response Contingency Plan" both of which are working documents used by the oil and gas industry and regulators in the country. Gandhi is also the founder of the Oil Spill Mutual Aid Group (OSMAG) in Kenya and author of the Mutual Aid Agreement that binds the group. He authored the oil and gas industry "Highway Emergency Response Plan" (HERP) for major tank-truck and rail tank car accidents. He also developed Pollution Prevention Guidelines (PPGs) on behalf of the Energy Regulatory Commission in Kenya.

His other core activity is deployment of the TapRoot® Problem Solving System, developed by System Improvements Inc. of the USA. His work experience in this field spans a variety of companies in the oil and gas and mining and sectors respectively in Africa, Middle East, Asia and Europe. Through System Improvements Inc., Mr. Gandhi has facilitated a couple of fatality investigations in Southern Africa for mining companies.

Education:

From (Month and Year)	To (Month and Year)	GENERAL EDUCATION		
Sep 1986	May 1989	University College London		BSc. (Eng) Hons in Civil including Structural and Environmental Engineering
Jan 1980	Jan 1986	Upper Hill School		Kenya Advanced Certificate of Education (Form 1 – Form 6), 3 Principals and 1 General paper (Mathematics, Physics, Chemistry, GP)
				General Certificate of Education (GCE) London – “A” Level: (Mathematics, Physics, Chemistry)

EMPLOYMENT RECORD

2011 – to date	Kurrent Technologies Ltd. – Chief Operating Officer
	Reporting to the CEO, Mr. Gandhi is responsible for the coordination of technical aspects associated with engineering, project management health, safety and environment consultancies on behalf of the company.
2004 – 2010	Nutek Solutions Ltd. – Managing Director
	Responsible for overall coordination of Health, Safety and Environment (HSE) consultancies on behalf of the company
1990 – 2003	Chevron Kenya Ltd. – Regional HSE Manager, EA and the Indian Ocean Islands
	Responsible for coordinating and assisting to implement HSE policies and programs on behalf of the organization
1989 – 1990	Sir Alexander Gibb and Partners – Civil Engineer
	Responsible for design of civil engineering projects on behalf of the company in roads and dams section

Project and TapRoot® Training Experience – Countries

Abu Dhabi, Bahrain, Botswana, Chad, Equatorial Guinea, India, Indonesia, Kenya, Libya, Qatar, Rwanda, Scotland, South Africa, Spain, Uganda, Zimbabwe

Project Experience

2013	ESIA Study of 90MW Wind Power Project
	Sanjay is leading a multi-disciplinary team of specialists in conducting a full ESIA Study of a proposed 90MW wind power project and associated transmission line infrastructure on behalf of Electrawinds of Belgium. The study which will go on for about 12 months was awarded to Kurrent Technologies Ltd. in order to satisfy the IFC's requirements.
	BPEO Study for conversion of WBM to SBM
	Sanjay has been appointed by Tullow to conduct a Best Practicable Environmental Option (BPEO) Study for conversion from Water Based Mud (WBM) to Synthetic Based Mud (SBM). The BPEO Study will be used to

vary the EIA License issued by the Kenyan environmental regulator to allow for the use of SBM instead of WBM in Tullow's exploration program in Kenya.

Environmental audits of seismic and drilling operations, Turkana, Kenya

Sanjay is currently leading a team of HSE Advisors to conduct statutory environmental audits of Tullow's exploration activities. These activities include 2D seismic lines and associated camps, and well drilling sites in Turkana, Kenya.

Site Specific Assessment, 3D Seismic, Turkana, Kenya

Sanjay is leading a team of ecologists and sociologists in conducting a site specific assessment (SSA) for an area of interest (AOI) on behalf of Tullow Oil in order to collect baseline environmental and social information prior to commencement of 3D seismic activities

Site Specific Assessment, 2D Seismic, Turkana, Kenya

Kurrent Technologies is undertaking a site specific assessment (SSA) on behalf of Tullow Oil to collect comprehensive environmental and social data associated with 450km of 2D seismic in Block 10BB. The SSA will enable Tullow to undertake 2D seismic activities in an environmentally sustainable manner.

Crude oil concept study

Kurrent Technologies completed providing environmental, social, engineering, costs and tax inputs for a 1300km long proposed crude oil pipeline between Uganda and Kenya or Tanzania or Sudan.

ESIA Study for 17km long 220kV electrical transmission line Project, Kenya

Kurrent Technologies completed an ESIA Study of the proposed 17km long electrical transmission line from a 100MW wind farm sub-station to the national grid sub-station on behalf of Kipeto Energy Limited. Kipeto Energy Limited is a JV between GE Energy and Craftskills Wind International Ltd. The ESIA Study was undertaken in accordance with the January 2012 version of the IFC Performance Standards.

HSE Audits for multinational oil company assets, Kenya

Kurrent Technologies completed undertaking comprehensive statutory environmental audits, health & safety audits, and fire safety audits for the year 2012 on behalf of Vivo Energy Limited (formerly Kenya Shell Ltd.). The audits were carried out for 7 terminals and depots, and 109 petrol stations in Kenya in accordance with HSE related legislation in Kenya

Health and Safety Audits, pipeline company, Kenya

Kurrent Technologies completed statutory health and safety (H&S) audits of all pump stations, depots and terminals in Kenya on behalf of Kenya Pipeline Company Ltd. The audits were carried out in accordance with a Kenyan statutory code of practice on occupational and health auditing

2012 EIA Study for the proposed Line 1 Pipeline Replacement Project

Kurrent Technologies is undertaking an ESIA Study for the proposed Line 1 multi-products white oils petroleum pipeline on behalf of the Kenya Pipeline Company Limited. The project entails replacement of the existing 450km pipeline from Mombasa to Nairobi with a new one which will serve Kenya, East Africa and the Great Lakes Region to the year 2044.

EIA Study for VTTI Nairobi Depot including Strategic Storage Facility

Kurrent Technologies is undertaking an ESIA Study of the proposed VTTI Nairobi depot and Strategic Storage Facility in Kenya in accordance with the Environment Management and Coordination Act, 1999. The project comprises above ground storage tanks having a total estimated capacity of 384,000m³, a tank truck loading rack having 10 loading positions and a truck parking facility for 54 tank trucks.

Biodiversity survey of Aeolus Wind Power Project, Kinangop, Kenya

Kurrent Technologies Ltd. was contracted by Aeolus Wind Power to undertake a biodiversity survey for an 11km right-of-way transmission line from the wind farm to the nearest Kenya Power sub-station. Kurrent Technologies provided two ecologists for the study which was submitted to the IFC for review.

Avifauna Study for a 100MW Wind Power Project for General Electric in Kenya

As a continuation of the ESIA Study of the subject project in Kajiado, Kenya, Mr. Gandhi in collaboration with ornithologists undertook a baseline avifauna (bird and bats) study to predict the impacts of wind turbines on birds and bats during the construction and operational phases of the project.

EIA Study of proposed Total Trucking Site, Mombasa

Kurrent Technologies undertook an EIA Study of the proposed remodeling of the Total Petrol Station in Jomvu, Mombasa. The project involved expanding the forecourt to accommodate trucks, addition of new underground storage tanks, development of a Michelin tire changing facility, development of a fully-fledged convenience store and truck parking for about 30 trucks.

EIA Study of the NOCK Master plan, Nairobi, Kenya

Kurrent Technologies conducted the EIA Study of the proposed National Oil Corporation of Kenya (NOCK) master plan. The project includes construction of additional aboveground petroleum products storage, LPG storage and bottling plant, additional loading gantry, a lubricants store and an office block at their Nairobi Terminal.

2011 ESIA Study for Petroleum Depot in Konza including Strategic Storage in Kenya

Petrocity Energy (K) Ltd. awarded Kurrent Technologies Ltd. a contract to undertake an ESIA Study of bulk petroleum product receipt, storage and distribution depot having a total capacity of 120,000m³. This project includes the development of aboveground storage facilities, mechanical works, electrical works, civil and structural works and, instrumentation and control works respectively. The ESIA study also includes extensive public/stakeholder consultations. Mr. Gandhi is the ESIA Team Leader and is led a team of 6 specialists for undertaking various environmental baseline studies associated with the project. The ESIA Study will be submitted to NEMA for consideration.

ESIA Study for 100MW Wind Power Project in Kenya

General Electric of the USA awarded Kurrent Technologies Ltd. a contract to undertake an ESIA Study of a 200MW wind power farm in Kajiado, Kenya. The project manager is Galetech Energy Development (GED) from Ireland who is supervising the entire project while Mr. Gandhi is the ESIA Team Leader. Several specialist baseline studies are being undertaken in order to predict the environmental impacts associated with the project. Extensive public/stakeholder consultation meetings are being undertaken including household surveys. The ESIA study period is six months after which a report will be submitted to NEMA for consideration.

EIA Study for Addax Kenya Ltd.

Kurrent Technologies undertook an EIA Study for the proposed Addax Kenya LPG storage and distribution facility in Syokimau, Nairobi. The project involves fabrication and installation of LPG bullets having a capacity of 800 metric tons, LPG bottling facility construction of an office block, auxiliary building, pumps and compressor shed, workshop, fire-fighting system and a truck parking area.

2010 HSE Performance assessment of the downstream petroleum sub-sector in Kenya

The Energy Regulatory Commission (ERC) commissioned a study to assess the existing HSE performance of downstream facilities (refinery, bulk petroleum storage facilities, pipeline transport infrastructure, road and rail distribution facilities, coastal and lake oil receiving facilities, and service stations). The facilities included one refinery, fifteen bulk petroleum storage facilities, four pipeline transport pump stations, one railroad transport operator, fourteen road transport companies, four coastal and lake oil receipt jetties and thirty seven

service stations respectively in the major towns of Kenya. The scope of work included undertaking HSE audits, crisis management plan reviews, baseline environmental sampling and analysis, gaps in HSE legislative framework, developing pollution prevention guidance notes, international HSE best practices, etc.

HSE Management System development for large Steel Manufacturing Plant

The Athi River Steel Plant Ltd. (ARSPL) is funded by two Development Finance Institutions (Aureos Fund and Swedish Fund) whose environmental and social standards need to be complied with. Subsequently Nutek Solutions has been retained for a period of 3 years initially to develop, roll-out and implement a comprehensive HSE management system for the steel plant. The assignment commenced with a comprehensive HSE risk assessment which was approved by the DFIs in the last quarter of 2010 and is moving onto the next stage which is development of the policies, procedures, etc.

EA for 84MW MSD Thermal Power Plant for Rabai Power Ltd.

The power plant has been operational since October 2009. The environment audit involved reviewing the status of implementation of the environmental mitigation measures and environment management plan following the ESIA Study conducted in 2007. The assignment further included a review of the RAP status that had been implemented by the Kenya Power & Lighting Company Ltd.

EIA Study of proposed 84MW MSD Thermal Power Plant for Gulf Power Ltd.

The project involves the construction of a new power plant along the Nairobi – Mombasa Highway about 30 km south-east of Nairobi. The joint financiers for the project are Gulf Power, the IFC, IDA and Emerging Africa Fund. Subsequently the EIA Study was done to meet the requirements of the IFC and the Equator Principles.

Highway Emergency Response Plan (HERP)

As the Chairman of the Petroleum Sector Environment Committee (PSEC), Mr. Gandhi was charged with the responsibility of leading the oil industry in Kenya in the development of a HERP. This initiative which emanated from the Petroleum Institute of East Africa (PIEA) was in response to several petroleum tank truck rollovers that Kenya experienced recently some resulting in the loss of several lives. Mr. Gandhi has undertaken a risk assessment of the road and rail industry for the transportation of petroleum products and has authored a HERP which will be used by the road haulage contractors, oil marketing companies, Government lead agencies, NGOs and CBOs.

2009 EIA Study of proposed LPG distribution project for African Gas and Oil Limited.

The project involves the construction of East Africa's first bulk LPG distribution terminal and third party LPG bottling plant in Miritini, Mombasa. There will be four LPG truck loading bays initially and an LPG rail tank car loading rack. The project designers are from Scotland while the project management is Kenyan. The project is partially funded by the IFC and the EIA Study has to meet the stringent IFC health, safety and environmental requirements.

2008 EIA Study of LPG Sub-sea Marine Pipeline and Bulk Storage Facilities for African Gas and Oil Limited

The project which was partially funded by the IFC involved the laying of a new 300mm diameter sub-sea marine pipeline 4,500m long from a point 2 km south-west of the Kipevu Oil Terminal Jetty within the Mombasa harbor to a common user manifold (CUM) on shore in Miritini, Mombasa. The storage tanks included the construction of 28,000 metric tons of mounded LPG storage tanks. There were two EIA Studies for this project, one for the sub-sea marine pipeline and the other for the storage tanks.

EIA Study of proposed bulk petroleum strategic storage and distribution facilities for the Ministry of Energy in Botswana

The project involved construction of 3 new strategic storage facilities in Tshele Hills, Palapye and Francistown having a total capacity of about 286,000m³ and common user truck loading facilities in Tshele Hills and Palapye.

Environment Self Audit (ESA) of Kenya Pipeline Company Limited facilities and operations in Kenya for the year 2008 and environment site assessment of sludge disposal site in Sultan Hamud

The project involved undertaking a comprehensive environmental audit of 16 pump stations and depots owned by the Proponent countrywide in accordance with Kenyan environmental legislation. The project further involved undertaking a site assessment in accordance with ASTM standards of the Proponent's sludge disposal site situated in Sultan Hamud.

EIA Study of proposed extensions to existing godowns for Safepak Ltd., Kenya

The project involved construction of 3 new additional godowns for the Proponent's existing plastic bottles manufacturing plant located in Embakasi, Nairobi.

2007 EIA Study of proposed Kenya – Uganda Oil Pipeline Extension Project

The project involved the construction of 352km long multi-products white oil pipeline by Tamoil East Africa Limited (TEAL) including a common user truck loading terminal west of Kampala and intermediate booster stations. This project was the first transboundary oil pipeline project in East Africa which required approvals from both NEMA in Kenya and Uganda respectively. The project is jointly owned by TEAL, Government of Kenya and Government of Uganda.

Environment Self Audit (ESA) of Kenol Oil Company Ltd. Marketing Facilities in Kenya

The project involved undertaking an ESA of 55 petrol service stations and 3 bulk petroleum depots in accordance with the NEMA regulations. Baseline environmental surveys were undertaken to come up with a sound environment management plan (EMP).

2006 EIA Study of proposed Line 4 Capacity Enhancement Project for Kenya Pipeline Company Ltd.

The project involved construction of a 325km long multi-products white oil pipeline along the existing right-of-way (ROW) belonging to the Client. The project further included the construction of intermediate and booster pump stations along the way.

EIA Study of proposed Line 1 Capacity Enhancement Project for Kenya Pipeline Company Ltd.

The project involved construction of four new booster pump stations at Samburu, Manyani, Kibwezi and Konza in Kenya on behalf of the Client in order to boost the flow rate from 440m³/hr to 880m³/hr.

EIA Study of proposed bulk LPG Reception, Storage and Distribution Facility for Kenya Petroleum Refineries Ltd. (KPRL)

The project involved the construction of laying a 3km long LPG pipeline from the KOT to the refinery, construction of 7,000MT of bulk LPG mounded storage tanks, and a tank truck and rail car loading rack respectively.

EIA Study of proposed bulk Coal, Clinker and Petroleum Terminal for Mbaraki Bulk Terminal Ltd.

The project involved a reconstruction of the former East African Molasses plant for the bulk storage of Coal, Clinker and Petroleum.

2005 Environment Site Assessment (ESA) of Palm Oil Terminal for Masumin Holdings Ltd.

The project involved undertaking baseline environmental surveys in accordance with ASTM standards to delineate the lateral, vertical and spatial extent of suspected sub-surface soil contamination prior to takeover by the Proponent.

2004 EIA Study of proposed Common User Truck Loading Facility at PS15, Changamwe, Kenya for Kenya Pipeline Company Ltd.

The project involved construction of bulk petroleum storage tanks, steel pipework, tank truck loading racks, etc. similar to the Proponent's facilities in Nakuru, Eldoret and Kisumu. All relevant environmental baseline

studies were undertaken within the project site in order to come up with an environment management plan for the construction and operational phases respectively of the project.

Initial Environment Audit of Kenya Pipeline Company Ltd. facilities and operations

The project comprised undertaking a comprehensive initial environment audit of all KPC pump stations and depots around the country in accordance with the NEMA regulations.

Health, Safety and Environment (HSE) Training Experience

This section lists the TapRoot® problem solving courses conducted by Mr. Gandhi in different parts of the world.

TapRoot® 5-Day and 2-Day Problem Solving and Root Cause Analysis Courses

5-Day Courses		2-Day Courses	
Client and location	Course Date	Client and location	Course Date
Public course, South Africa	Aug 2013	Public course, South Africa	Sep 2013
Barrick Gold, Tanzania	Jul 2013	Murray & Roberts, South Africa	Sep 2013
Public course, South Africa	May 2013	ExxonMobil, Chad	Nov 2012
Public course, India	Apr 2013	Public course, Las Vegas, USA	Feb 2012
Public course, South Africa	Feb 2013	Public course, San Antonio, USA	Oct 2010
Public course, South Africa	Nov 2012	Murray & Roberts, South Africa	Jul 2010
Public course, Kenya	Oct 2012	Murray & Roberts, South Africa	Jun 2010
Public course, South Africa	Jul 2012	Rio Tinto Exploration, India	Oct 2009
Riversdale Mining, Mozambique	Jul 2012	Public Course, Nashville, USA	Oct 2009
Public course, India	June 2012	Rio Tinto, South Africa	Dec 2008
Riversdale Mining, Mozambique	May 2012	Rowan Drilling Co., Qatar	Sep 2008
Public course, South Africa	April 2012	ExxonMobil Qatar, Qatar	Sep 2008
Barrack Gold, Tanzania	Mar 2012	Public course, Las Vegas, USA	Jun 2008
Riversdale Mining, Mozambique	Feb 2012	Great Lakes Drilling, Bahrain	Oct 2007
Public course, South Africa	Jan 2012	HESS, Indonesia	May 2007
Public course, South Africa	Nov 2011	Palabora Mining, South Africa	Jul 2005
Public course, Kenya	Sep 2011	HESS, Equatorial Guinea	May 2005
Public course, India	Sep 2011		
Public course, South Africa	Jul 2011		
Public course, South Africa	May 2011		
Palabora Mining, South Africa	Apr 2011		
Public course, Kenya	Mar 2011		
Public course, India	Feb 2011		
Impala Platinum, South Africa	Feb 2011		
Public course, South Africa	Jan 2011		
Public course, South Africa	Aug 2010		

TapRoot® 5-Day and 2-Day Problem Solving and Root Cause Analysis Courses

5-Day Courses		2-Day Courses	
Client and location	Course Date	Client and location	Course Date
Murray & Roberts, South Africa	Jul 2010		
Murray & Roberts, South Africa	Jun 2010		
Public course, Kenya	May 2010		
Public course, South Africa	Apr 2010		
Public course, Kenya	Jan 2010		
Bamburi Cement, Kenya	Oct 2009		
Slovenske Elektrarne, Slovakia	July 2009		
Mimosa Mining, Zimbabwe	May 2009		
Mimosa Mining, Zimbabwe	Oct 2008		
Chevron South Africa	Jun 2008		
Slovenske Elektrarne, Slovakia	May 2008		
Zimbabwe Platinum Zimbabwe	May 2008		
Sasol South Africa	Apr 2008		
Sasol South Africa	Feb 2008		
KPO Kazakhstan	Dec 2007		
Impala Platinum South Africa	Nov 2007		
Chevron South Africa	Jul 2007		
Occidental Petroleum Libya	May 2007		
Fluor South Africa	Feb 2007		
HESS Indonesia	Jan 2007		
Public course in Kenya	Nov 2006		
Impala Platinum South Africa	Sep 2006		
Chevron South Africa	Jul 2006		
Fluor South Africa	Jul 2006		
Occidental Petroleum Qatar	Jun 2006		
Chevron South Africa	Mar 2006		
Dolphin Energy Abu Dhabi	Nov 2005		
Public course in Kenya	Oct 2005		
Palabora Mining South Africa	Jul 2005		
Dolphin Energy Qatar	Apr 2005		
PetroSA South Africa	Apr 2005		
Richards Bay Minerals S. Africa	Apr 2005		

Mr. Gandhi has been the Lead HSE Trainer for the Petroleum Institute of East Africa (PIEA). He has been called on consistently by the PIEA to lead some courses and participate in others as a resource person. Given below are the courses that Mr. Gandhi has conducted for the PIEA either as a Lead Trainer or as a resource person.

- Application of Petroleum Management Tools in the Petroleum Business – 2007
- Retail Service Station Design and Practices – 2007
- Introduction to Oil Industry – 2007
- Principles of HSE and Practical Applications of EIA and EA in the Petroleum Sector – 2007, 2008, 2009
- Environmental Auditing in the Petroleum Sector – 2007
- Introduction to Petroleum Operations – 2007
- Petroleum Legal and Regulatory Framework – 2007
- HSE Regulations in the Petroleum Sector – 2007, 2008, 2009
- HSE Management in the Petroleum Sector – 2007, 2008, 2009

Mr. Gandhi has been a Lead Trainer for conducting the Kenyan statutory 40-hour DOSHS Safety and Health Induction courses for various organizations in Kenya. He has also undertaken statutory S&H audits for a number of the companies listed below. Some of the organizations trained and audited between 2005 and 2009 are given below.

- | | |
|-------------------------------------|---|
| ✓ Kenya Shell Ltd. | ✓ Vitafoam Products Ltd. |
| ✓ English Press Ltd. | ✓ East African Seed Company Ltd. |
| ✓ Carton Manufacturers | ✓ D.L. Patel Press (Kenya) Ltd. |
| ✓ Safepak International Ltd. | ✓ Bag & Envelopes Paper Converters Ltd. |
| ✓ AIM Air | ✓ Ibrafrica Power (E.A.) Ltd. |
| ✓ MAF Aviation | ✓ Wood Products (K) Ltd. |
| ✓ Unga Limited | ✓ BOC Kenya Ltd. |
| ✓ Phoenix Aviation Ltd. | ✓ Wessex Pharmaceuticals |
| ✓ Pharma Specialties | ✓ Philips Pharmaceuticals |
| ✓ World Agroforestry Center (ICRAF) | |

Mr. Gandhi has participated in a number of conferences, seminars and workshops, and has written a number of publications in Kenya which are given below.

Las Vegas, NV, USA: TapRoot Summit 2008 Best Practice Presenter for:

- Transportation Networking and Best Practices
- Oil E&P Networking and Best Practice Sharing
- Refining, Petrochemical, Chemicals, Plastics, Pipelines Networking and Best Practices

Developed the Kenyan Petroleum Sector EIA/EA Guidelines in 2006 which was launched by the UNEP Executive Director – Dr. Achiem Steiner in 2007

TapRoot Summit 2007 Breakout Session Presenter for “Best Practices for Fast Analysis of Small Problems”

Author of Kenya’s National Oil Spill Response Contingency Plan

1989 – 1990 Sir Alexander Gibb and Partners – Civil Engineer

Worked as the assistant resident engineer during the construction of the Nginyo dam for Kakuzi Plantations in Makuyu, Kenya. On completion of this project, was transferred to the head office to work in the roads department. Subsequently, did the preliminary design of the proposed Emali – Oloitokitok road in Kenya and the Thaba Seka – Matebeng road in Lesotho.

1990 – 1994 Chevron Kenya Ltd. – Civil and Construction Engineer

Designed and built several new service stations and depots for Chevron Oil (Kenya) Ltd. as well as revamped various depots and service stations.

1994 – 1996 Chevron Services Corporation – Dallas, TX, USA – HSE Specialist

- Completed several HSE courses conducted by organizations such as Arthur D Little, ChevronTexaco, Dupont, Government Institutes of the USA, American Society of Safety Professionals, Rutgers University – New Jersey, etc.
- Visited a various ChevronTexaco refineries, terminals and service stations across the United States of America to learn and understand various types of HSE management systems employed.

1996 – 2003 Chevron Kenya Ltd. – Regional HSE Manager, East Africa and the Indian Ocean Islands

- Provided health, safety and environment (HSE) and other business support across multiple business units in Kenya, Uganda, Tanzania, Mauritius and Reunion.
- Responsible for development of risk based HSE guidelines for Chevron facilities (oil depots, terminals, service stations, and consumer installations) in the above countries
- Responsible for a team to coordinate a revised LPG strategy for Chevron Oil (Kenya) Ltd. using a ChevronTexaco patented project development and execution process. The work included identifying the opportunity for growth of the LPG market share, generating various alternatives, selecting one of the alternatives, implementing the selected alternative and monitoring the opportunity for success.
- Coordinated and participated in the qualitative fire risk assessment of the joint Chevron, Total and Kenol/Kobil terminal in Mombasa. The work involved conducting a preliminary hazard analysis (PHA) and subsequently recommending the design of a fire protection system.
- Responsible for the coordination of the fire risk assessment of the KOT/SOT fire protection upgrade project on behalf of the Kenya Ports Authority including coming up with risk based and cost effective fire suppression recommendations.
- Responsible for coordinating the design of the fire protection system upgrade for the Mombasa Joint Terminal (for Chevron, Total and Kenol/Kobil).
- Responsible for coordinating the fire protection study of Jinja LPG depot and Kampala depot and subsequently participating in the design of the fire protection upgrade for these depots.
- Responsible for developing a written scope of work for conducting Environmental Impact Assessments (EIAs) using the World Bank Guidelines for 5 new to industry Chevron service stations and 3 new depots/terminals in Kenya and Tanzania and supervising the works to completion including development of action plans for the respective Environment Management Plan (EMPs).
- Responsible for developing a written scope of work for conducting environmental site assessments (ESAs) for 20 Chevron service stations and 8 terminals/depots in Kenya and Uganda and supervising the works to completion in accordance with the internationally recognized ASTM E 1527-97 and ASTM E 1528-96 standards respectively.
- Initiated proactive HSE programs to support local business unit objectives such as wastewater management, waste management, soil and groundwater protection, LPG safety, Process Safety

Management (PSM), driver safety, hazard communication, incident investigation/root cause analysis, crisis management planning, etc.

Conducting LPG and HSE technical and safety reviews and performance reporting

- Facilitated the re-entry strategy Project of ChevronTexaco's LPG business in Kenya using the world class ChevronTexaco Project Development and Execution Process (CPDEP).
- Carried out 30 technical and safety audits of small, medium and large LPG installations in Kenya using a detailed audit protocol developed by ChevronTexaco, developing corrective action plans and monitoring the progress of the same to completion.
- Coordinated and conducted annual HSE reviews of terminals, depots, LPG plants and service stations in Kenya, Uganda, Tanzania, Mauritius and Reunion Island.
- Coordinated the on-time collection, collation and transmission of monthly HSE performance statistics from Kenya, Uganda, Tanzania, Mauritius and Reunion Island to the Corporate Chevron head office in Singapore.
- Participated in the Corporate (Level 1) HSE integrated audits of South Africa, Zimbabwe, Zambia, Uganda, Mauritius and Reunion Island.

Advocating support for Chevron's HSE positions

- Selected by the Oil Companies' CEOs in Kenya to the National Environment Council (the apex body created under the Environment Management and Coordination Act 1999).
- Founded the Oil Spill Mutual Aid Group (OSMAG) in Kenya and was until December 2003, the Secretary of the group.
- Appointed by the PS Ministry of Transport and Communications as a Board of Inquiry Member to investigate root causes of two railroad disasters in Kenya in August 2000
- Author of the National Marine Oil Spill Response Contingency Plan for Kenya which was used at the OPRC Workshop in Kenya in February 2003

Coordinated HSE training requirements for local Chevron operating and management employees as well as the oil industry

- Conducted several HSE courses for Chevron and the Oil Industry including HSE orientation for new employees, behavior based safety, oil spill response preparedness, LPG Safety, accident investigation, environmental protection, hazard communication, etc.

Executed the local and corporate emergency response plans

- Developed the Country Crisis Management Plan (CCMP) for Kenya, Uganda, Tanzania, Mauritius and Reunion respectively.
- Conducted successful CCMP exercises in Kenya, Uganda, Mauritius and Reunion.
- Coordinated and conducted successful joint oil industry/Government tier 2 oil spill response drills in Mombasa in 1999 and 2002 by mobilizing Kenya Government and oil industry human resources, oil spill response equipment and response vessels.

Monitor and communicate local industry practices, legislative and regulatory initiatives

- Participated as one of two oil industry professionals on the special task force to draft the proposed Kenya Petroleum Bill 2000. Drafted the HSE section of the bill as well as the section on construction guidelines for petroleum dispensing sites

- Chairman of the oil industry used oil committee in Kenya
- IMO Consultant in Tanzania for workshop on ratification and implementation of MARPOL 73/78 Convention (October 2002)
- IMO Consultant for final workshop on implementation of OPRC90 in Kenya (February 2003)

LANGUAGE SKILLS

Language	Reading	Speaking	Writing
English	Fluent	Fluent	Fluent
Swahili	Good	Fluent	Good
Punjabi	Basic	Fluent	Basic
Hindi	Basic	Fluent	Basic

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.



Date: April 29, 2015

[Signature of Staff member]



Date April 29, 2015

[Signature of authorized representative of the firm]

Full Name of staff member: SANJAY GANDHI

Full name of authorized representative: ENG. JAMES N. MWANGI

Gideon Owaga

Proposed Position:	Sociologist
Name of Consultant:	Kurrent Technologies Ltd.
Name of Staff:	Gideon Omondi Owaga.
Profession:	Sociologist.
Nationality:	Kenyan
Date of Birth:	13 th April 1983.
Years of work with firm :	2
Membership in Professional Societies:	Kenya Institute of Social Work
Detailed Tasks Assigned:	Undertake Socio-Economic Impact Assessments for Projects

Key Qualifications:

Gideon Owaga is a trained Sociologist/ Environment, Health and Safety Advisor having completed a Master of Arts degree in Rural Sociology and Community Development and Bachelor's Degree in Sociology and Public Administration. He is also trained in Basic Occupational Health and Safety.

He has experience in organizing and conducting Public Stakeholder Consultation, household surveys, Socio-Economic Impact Studies, data analysis using SPSS, and Environmental Impact Studies for clients mainly in the petroleum Industry. He is familiar with World Bank (WB) /International Finance Corporation (IFC) and NEMA Environmental Standards and Regulations, IFC Policies on Resettlement of Project Affected Persons, and Kenyan Occupational Environmental, Health and Safety legislations.

Education

From (Month and Year)	To (Month and Year)	GENERAL EDUCATION	
Feb 2009	Dec 2012	University of Nairobi	Master of Arts Rural Sociology and Community Development
Feb 2003	Nov 2007	University of Nairobi	Bachelor of Arts Sociology and Public Administration
Feb 1998	Nov 2001	Aga Khan High School	Kenya Certificate of Secondary Education (Form 1- Form 4)

Short Courses

2014	Predictive Analytical Resources Limited
	Statistical Product and Service Solutions (SPSS) Training, Training on how to use the IBM SPSS Statistical Software
	RSK environmental Consultants Training on International Financial Corporation (IFC), Performance Standards 1-8, Strategic Environmental Assessment (SEA) and Environmental and Social Impact Assessment (ESIA) for the Lake Turkana Development Project (LTDP)
2013	ESRI GIS (geographic information systems)
	Juno Trimble Training Training on how to use ArcGIS software and Trimble GPS device to perform deep analysis and gain a greater understanding of data to help in aking More informed decisions

Employment Record:

Sociologist/Assistant Health, Safety & Environment Advisor

March 2013 to date	Kurrent Technologies Limited-Sociologist
	<ul style="list-style-type: none"> Develop social and economic context of a project and development of appropriate data gathering tools, Conducting effective public/stakeholder consultation meetings in the field and formally recording the views of stakeholders arising from meetings, Collecting and analyzing socio-economic data, Co-ordinating socio-economic activities associated with projects together with other HSE specialists working on EIA and EA studies respectively, Drafting socio-economic reports as part of the EIA and EA Studies
Jan 2013 to Feb 2013	African Population Health and Research Centre (APHRC)- Research Assistant

	Collecting and analysis of Qualitative Data in the slum areas by conducting In-depth interviews and focused group discussions among adolescence aged 15-19 years
Oct 2011 to July 2012	Population Council of Kenya- Research Assistant/Data Entry Clerk Data file preparation Using SPSS and Epi Data, Data entry and Validation for the various tools i.e. service provider knowledge tool, client exit interview tool, client provider interaction tool and facility inventory tool, Translation of PNC Mobile screening questions from English to Swahili and vice versa
Oct 2010 to July 2010	National Council for Population and Development (NCPD Sampling and collecting Data for the various projects within the country
Feb 2008 to Aug 2008	PROVIDE International KENYA (NGO)- Project Assistant Researching and documentation on the viability of various development projects/programmes, Designing and following up of project proposals submitted to potential donors, Fundraising by sourcing for donors for identified projects, Managing projects workers based in the slums areas

Project Experience:

2015	Conducting a Socio-Economic Impact Assessment Study for the Proposed Amu Coal Project at Lamu County, Kenya The task involves conducting a full ESIA study which includes conducting a household survey and Resettlement Action Plan (RAP) for the proposed develop a coal-fired power plant with net output of 981.5 MW in Manda Bay Area of Lamu County, Kenya.
2014	Conducting a Socio-Economic Impact Assessment Study for the proposed Nithi Hydropower Project (Frontier Investment Management), Tharaka Nithi County The task involves conducting a full ESIA study for the proposed Run-of-the river mini hydro power plant in accordance with EIA regulations and IFC performance standards on environment and social sustainability. The projects is on-going and involves construction of a weir, water pipeline, fore bay tank, power chambers and power evacuation structures along River Nithi in Tharaka Nithi County. Conducting a Socio-Economic Impact Assessment Study for the Extended Well Testing Turkana County, Kenya The purpose of the project is to appraise the hydrocarbon reservoir using the existing oil well to obtain more information on reservoir characteristics, and assist in identifying the optimum method that can be used to recover the oil. Conducting a Socio-Economic Impact Assessment Study for the proposed Kapese Integrated Operating base at Turkana County, Kenya The Project will take place in 2 phases and phase 1 Involves construction of 400 man camp site, contractor material and work area with Bake Hughes work area holding a mud plan and explosive area, Tullow warehouse/laydown area and central waste treatment area. Phase 2 involves construction of the master plan. This will include: 800 man central camp, Air terminal, Field office facility for 60 staff, 100 man long term security camp, field training centre work

areas, waste treatment and management facilities, central power generation and fuel facility, site road and street lighting.

- 2013
- Conducting a Socio-Economic Impact Assessment Study for the proposed Total Kenya Eastern By-Pass Service Station to be based at Kiambu
- The Project Involves construction of a new service station along the Eastern Bypass in Ruiru, Kiambu County, additionally, it involves construction of a restaurant, Bonjour shop, a cafeteria and ATM space, station offices, washroom and change areas, car wash bays and service bays, a Tyre center, restaurant and car parking for their customers.
- Conducting a Socio-Economic Impact Assessment Study for the proposed National Oil Corporation Service Station to be based at Mtito Andei
- The project involved construction of a residential complex that will have three-20 levels residential blocks, a 17 levels office block, mosque, recreational facilities and a club house. The project is based in Mbaraki area of Mombasa County.
- Conducting a Socio-Economic Impact Assessment Study for the proposed Jaffery Complex to be based at Mombasa
- The project involved construction of a residential complex that will have three-20 levels residential blocks, a 17 levels office block, mosque, recreational facilities and a club house. The project is based in Mbaraki area of Mombasa County.
- Conducting a Socio-Economic Impact Assessment Study for the proposed Nyali Bazaar to be based at Mombasa
- The project involved construction of a market Bazaar to include office blocks, 250 business stalls, 300 open air boxes and a car park on a 1.3 Ha of land in Nyali area of Mombasa County

Languages:

Language	Reading	Speaking	Writing
English	Fluent	Fluent	Fluent
Swahili	Fluent	Fluent	Fluent
Luo	Good	Good	Good

CERTIFICATION:

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describes me, my qualifications and my experience.



Signature of staff Member

Date: April 29, 2015



Signature of authorized representative of the firm

Date: April 29, 2015

Full Name of staff member


Gideon Owaga

Full name of authorized representative

Eng. James N. Mwangi

14.2 Appendix 2a: KTL NEMA Practicing License – 2015

FORM 7 (r.15(2))




NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/1222
 Application Reference No: NEMA/EIA/EL/2279

M/S **Kurrent Technologies Ltd**
 (individual or firm) of address
 P.O. Box 16989 - 00620 Nairobi

is licensed to practice in the
 capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts**
 registration number **0191**
 in accordance with the provision of the Environmental Management and Coordination Act, 1999.

Issued Date: **1/27/2015** Expiry Date: **12/31/2015**

Signature..... 


(Seal)
 **Director General**
The National Environment Management Authority

P. T. O.

 ISO 9001 : 2008 Certified

14.3 Appendix 2b: Lead Expert Practicing License – 2015

FORM 7 (r.15(2))



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/1230
 Application Reference No: NEMA/EIA/EL/2282

M/S **Sanjay Gandhi**
 (individual or firm) of address
 P.O. Box 43630 - 00100 Nairobi

is licensed to practice in the
 capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
 registration number **0119**
 in accordance with the provision of the Environmental Management and Coordination Act, 1999.

Issued Date: 1/27/2015 Expiry Date: 12/31/2015

Signature..... 

(Seal)
 **Director General**
The National Environment Management
Authority

P. T. O.

 ISO 9001 : 2008 Certified

14.4 Appendix 3: Wire transfer for the EIA licensing fee

Straight2Bank PAYEE ADVICE

Standard Chartered 

SCB Ref : KE00798Q0016469

Customer Ref : NEMA

Date : 21/10/2014

To: NATIONAL ENVIRONMENT MANAGEMENT

Invoice Total 1,026,019.00

- Benef. Charge 0.00

UTR Reference SE07801410210497

Dear Sir / Madam (s),

We have on 21/10/2014 made a payment to your account xxxxxx8158 at Kenya Commercial Bank Ltd for KES 1,026,019.00 as instructed by TULLOW KENYA B.V.

Should you not receive the payment in time, please contact TULLOW KENYA B.V for further investigations.

Remittance Advice

This section includes details as supplied by TULLOW KENYA B.V

Payment Details : INV NO. KENYA GAZETTE PG 4776

Reference	Date	Description	Amount (KES)
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14.5 Appendix 4: Letter to NEMA

Tullow Kenya B.V.

West End Towers, 7th Floor, Off Waiyaki Way | P.O. Box: 63298-00619 | Nairobi | Kenya
Main office: 254 (0) 428 6000 | Fax: +254 703 036 171



TKE-LET-0016-NEMA-14

3rd November, 2014

The Director General
National Environment Management Authority
P.O. Box 67839-00200
Popo Road
NAIROBI

Attention: Zephania Ouma – Director, Compliance and Enforcement

Dear Mr. Ouma,

Re: Extended Well Testing – Amosing 1 Environment Project Report Study

Please find enclosed the above Project Report for your review.

We would also like to inform you that the NEMA fees paid of Ksh 1,026,019.00 (or USD 11,528.30) was initially based on a project for two sites, Amosing-1 and Ngamia. Having already made the 0.1% payment to NEMA the project was subsequently scaled down to focus on just Amosing-1 with Ngamia to be done in the not too distant future.

The total project cost for Amosing-1 is USD 6,493,000 and on this basis the 0.1% NEMA fee should have been Ksh 577,877.00 (or USD 6,493) and not Ksh 1,026,019.00 (or USD 11,528.30). Therefore the difference of Ksh 448,142 (or USD 5,035.30) will be factored into the 0.1% NEMA fee for the Ngamia Extended Well Testing Environmental Project Report once we embark on it.

Thank you for your understanding and we look forward to working with your office on this project.


Respectfully,



Martin Mbogo
COUNTRY MANAGER
RS/AM/EHS

Registered with the Chamber of Commerce in The Hague, The Netherlands under number 50459732.

14.6 Appendix 5a: Registration sheets-Lokicheda



ATTENDANCE LIST

Activity: LOKICHEDA VILLAGE BARAZA (NAWUKULAS) Date: 2/9/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Akua Eunice		
2.	Nahoni Eregae		
3.	Nawa Ehai		
4.	Nakura Eba.		
5.	Nakura Ekwam.		
6.	Nakura longer.		
7.	lokane lopwcho		
8.	Akua Blue		
9.	Akua Emyeres		
10.	lokura Eartele.		

ATTENDANCE LIST

 Activity: HOKICHEDA VILLAGE BARAZA (NAKUKULAS) Date: 2/9/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	NAASHIAO LONGOR		
2.	ERLON LONGOR		
3.	LOKOTAW LOKOPOR		
4.	EDUNG LOKOPOR		
5.	NAKENTIT LOKORE		
6.	NACHAZATIKO		
7.	AKUSAM LOKOPA		
8.	AKUSAM AICET		
9.	KALE LOKUNO		
10.	ACHURUR LOKOPOR		

ATTENDANCE LIST

 Activity: LOKICHEDA VILLAGE BARAZA (NAKUKULAS) Date: 2/9/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Ngiparu Echeta		
2.	Ngiparu Logiron		
3.	Amata Nakulane		
4.	Akaliban Amalar		
5.	Nepur Mager		
6.	Ekanisara Loumri		
7.	Nakuray Napenti		
8.	Ekapu Mager		
9.	Nakuray Eutale		
10.	Ikuray Eutale		

ATTENDANCE LIST

 Activity: WOKICHEDA VILLAGE BARAZA (NAKUKULAS) Date: 2/9/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Lokoren Edest.		
2.	Aunio Eepia		
3.	Nakon Esipura		
4.	Esipura Imakway.		
5.	Lopomay Lokar		
6.	Ngiketetic Lokina		
7.	Aunio Erey		
8.	Alor Lokar.		
9.	Nakoya Eporu		
10.	Ichorait Eporu		

ATTENDANCE LIST

 Activity: LEKICHEDA VILLAGE BARAZA (NAKUKULAS) Date: 2/9/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Awasit BATILIA		
2.	Lokitar Emmanuel		
3.	Yora Ebei		
4.	Nawapa Ndaka		
5.	IPem Nakuwa		
6.	Nikeden Achodee		
7.	Peter Eturue		
8.	Kafika Loungia		
9.	Lokora Ndanga		
10.	Emake Eogite		

ATTENDANCE LIST

 Activity: LOKICHEDA VILLAGE BARAZA (NAKUKUMAS) Date: 2/9/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Emma Ekwan		
2.	Kotol Elin		
3.	Nayane lopurua		
4.	Ekon lopurua		
5.	Ekon longor		
6.	Atitais kalungu		
7.	Awar Euse		
8.	Longor Elogita		
9.	Nayanzora Elogita		
10.	Logisa ngawosa		

ATTENDANCE LIST

 Activity: LOKICHEDA VILLAGE BARAZA (NAKUKULAS) Date: 2/9/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	LOWARE LOCHIYO		
2.	ANJOSI IRE		
3.	NAPERI LOWOIO		
4.	NAMBI EOTAPAN		
5.	LOKIPON (OZAKI)		
6.	LOKOL NACAMINE		
7.	LOCHIYO ECHYEMES		
8.	LOCHUAKAAN TALAMOE		
9.	EDUMAN LOKOPON		
10.	ENJON EREWON		

ATTENDANCE LIST

 Activity: LOKICHEDA VILLAGE BARAZA (NAKUKULAS) Date: 2/9/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Amarer Bartelo.		
2.	Lorrien Lokipomere.		
3.	Atiu Kasoi		
4.	Lokolonyoi Lokure.		
5.	Loripus Lokale.		
6.	Nakale Lokuro.		
7.	Namua Lokua.		
8.	Egialan Lokore.		
9.	Ngipendi Ekuir.		
10.	Lorrien Lokore.		

ATTENDANCE LIST

Activity: LOKICHEDA VILLAGE BARAZA (NAKUKULAS) Date: 2/9/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	NAKINGO LONGOR		
2.	ERIN LONGOR		
3.	LOKOTAN LOKOPOR		
4.	EDUNG LOKOPOR		
5.	NAKEMIT LONGOR		
6.	NACHAKA TINKO		
7.	AKUWAN LOKOPA		
8.	AKUWAN AILET		
9.	KALE LOKINGA		
10.	ACHUKU LOKOPOR		

ATTENDANCE LIST

Activity: LOKICHEDA VILLAGE BARAZA (NAHVUKULAS) Date: 2/9/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Alfred Eregae	9526150	0716794426
2.	John Longokit	9526769	0729494411
3.	Aidet Lotokoi	21360231	0715036883
4.	Nakoel Ekepatan	8593366	0705 457447
5.	Esipingu Loisonvug		
6.	Ekan Kaita		
7.	APES (SMURIA)	24912895	0708 468893
8.	LOCHAEAL NAKABIO	24917389	
9.	LOKAPELA AROCHONUMBE		
10.	Ekan Whikoro		

ATTENDANCE LIST

 Activity: HOXICHEDA VILLAGE BARAZA (NAKUKULAS) Date: 2/7/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Ngiparu Echeta		
2.	Ngipuye logiran		
3.	Amita Nakimane		
4.	Akalibau Amalar		
5.	Nepur Maga		
6.	Evanginae (omvi)		
7.	Nakany Napent		
8.	Erapan Maga		
9.	Nakosi Eutela		
10.	Ikwel Eutela		

14.7 Appendix 5b: Stakeholder Engagement Log No. 01-Lokicheda Community Meeting

2nd September 2014

Date of engagement	Name of stakeholder(s)	Position of stakeholder(s)	Type of engagement	Tullow/KTL participants
Sep 2 nd , 2014 10:30am – 12:30pm	There were 47 men and 43 women that attended the meeting NB: The above number is a good estimate as not all persons registered	Lokicheda village	Scoping and detailed ESIA Meeting	1. Maurice (Tullow) 2. Samuel Apele (Tullow) 3. Paul Lopur Longeem (Tullow) 4. Sanjay Gandhi (KTL) 5. Gideon Owaga (KTL)
Objectives of engagement				
<ul style="list-style-type: none"> Present key characteristics of the EWT activities and the ESIA methodology Scope issues of concern to the community arising from Tullow's EWT activities at Ngamia-5 and Amosing-1 Solicit comments about the potential environmental and social impacts of the proposed EWT activities 				
Key discussion points				
The scope of EWT activities (details of proposed activities)				
<ul style="list-style-type: none"> The Tullow Social Performance team engaged the community by informing them of the objectives for the public meeting. The Tullow and KTL team was introduced to the community and subsequently, KTL was requested to lead the meeting. KTL described the aspects of EWT giving an explanation of typical activities and infrastructure required, the ESIA core area of interest (Aol), the ESIA methodology to be used and, the potential environmental and social impacts associated with EWT. 				
Issues and responses:				
<ul style="list-style-type: none"> The Area Chief said that prior to the meeting he had collected the views of the community regarding the EWT program. He said that there were misconceptions about the EWT activities prior to this public meeting which were resolved after the community understood what EWT entailed. An issues and response report was developed for the meeting which is attached as an annex to this log. While they raised some issues about the EWT activities and its potential environmental and social impacts, the community wanted Tullow to resolve general issues such as provision of health centers, teachers for schools, etc. and benefits arising from production related activities. 				

Commitments

- The community committed to supporting Tullow in the EWT program for Ngamia-5 and Amosing-1
- The Area Chief said that he was supportive of the EWT program as he understood what it entailed and was subsequently going to continue educating the community about it.

Other notes

- The Area Chief reassured the community that the Kenya Government was the owner of the natural resource in Turkana and consequently would not allow adverse environmental and social impacts to occur while Tullow continues its activities in the region.

Suggestions

- The community requested Tullow to enhance communications about EWT activities.
- KTL suggested that the community should endeavor to visit the Tullow office in Lokichar to receive additional information regarding the EWT activities

Next steps

- ESIA Study for the EWT will be submitted to NEMA for consideration;
- Once submitted, the community will have full access to the ESIA Study through various communication channels and is welcome to provide comments directly to NEMA


14.8 Appendix 5c: Issues and Response Report – Lokicheda Community Meeting September 2nd, 2014 (10:30am – 12:30pm)

Issue	Response
<p>Mark Eprui – community member</p> <ul style="list-style-type: none"> • He felt that most jobs available for the indigenous Turkana people are casual in nature and not permanent. • He felt that people outside of the Turkana region are given menial jobs such as housekeeping and the Turkana people can easily provide such unskilled labor. • He further felt that the Turkana people are sidelined for plum jobs due to the lack of education. • He felt that whenever public meetings are held, Tullow provides them with a biased positive opinion about the exploration activities and does not address the adverse impacts • He believes that livestock grazing around Ngamia-5 and Amosing-1 would be adversely affected due to air emissions from the flaring activity • In his view, the noise associated with flaring would have adverse impacts to pregnant women in their community which could result in miscarriages • He requested that monies be set aside by Tullow for medical emergencies that could arise from environmental health impacts associated with Tullow's EWT and other exploration and appraisal activities in South Lokichar • He requested Tullow to provide the community with a large health center as they lack one currently 	<p>KTL/Tullow response</p> <ul style="list-style-type: none"> • Sanjay Gandhi (SG) advised Mark Eprui (ME) to visit the Tullow office in Lokori to understand the types of jobs available and the requirements for such jobs. All jobs including those required by Tullow contractors are posted on the notice board at the Tullow Lokori office. SG advised ME that Tullow does not know the clans from which applicants come from and therefore would like to employ Turkana people in general. • SG advised ME that Tullow has a documented Grievance Mechanism (GM) which is available at their office in Lokori and encouraged him to visit and raise his grievances through the Tullow GM. • As ME felt that their community was only getting casual jobs, SG enquired whether the community might have a database of skilled and semi-skilled workers that could be shared with Tullow. SG further advised ME that Tullow continues to implement their Local Content Policy in the various blocks that they operate. • On Tullow's biased positive reporting to communities, SG informed ME that Tullow is a multinational oil company that believes in transparency. Subsequently the fact that the subject public meeting occurred where potential environmental and social impacts of the EWT activities were outlined is an indication of Tullow's openness to share information with the communities for better management of such impacts. • On the potential impacts of harmful air emissions arising from the EWT activities, SG said that air quality modeling had

Issue	Response
	<p>been conducted and that the airshed will not be degraded by the limited EWT activities to be undertaken for about 60 days at the Amosing-1 well site and 90 days at Ngamia-5.</p> <ul style="list-style-type: none"> • SG informed ME that EWT activities will not necessarily be performed on all discovery wells but a select few. • On funds for medical emergencies, SG advised ME that Tullow has a documented emergency response plan which would be activated in the event of an emergency as defined in the plan. Subsequently, if a community member is adversely affected by a Tullow related emergency, Tullow will take necessary mitigation measures. • On the health center, SG advised ME that Tullow is in the process of evaluating whether or not it can construct a health center near Kapese village for the community. Tullow would like to be assured that the County Government will staff and maintain the health center once commissioned.
<p>Moses Lolei – Community Member</p> <ul style="list-style-type: none"> • He was grateful that Tullow organized this meeting and he felt better informed about EWT activities and their potential environmental and social impacts. • He was grateful that Tullow had supported construction of schools such as the Lokicheda Primary School directly opposite the Nakukulas village. He enquired if Tullow could support the community by providing teachers. • He enquired if Tullow had any measures to take care of the needs of the elderly persons from the community as they cannot fend for themselves e.g. with respect to jobs. • He wanted to know what benefits the community will get from exploration and 	<p>KTL/Tullow response</p> <ul style="list-style-type: none"> • On the provision of teachers to the Lokicheda Primary School, Sanjay Gandhi (SG) informed Moses Lelei (ML) that Tullow supports infrastructure development but the County Government should provide teachers and teaching materials to the students. • On taking care of the needs of the elderly people, SG informed ML that there is a benefits sharing mechanism which is proposed in the Draft Energy Bill 2013 which states that 5% of the profit oil shall be given to the community. The elderly could be taken care of through this type of benefit sharing mechanism. • On benefits to the community, SG informed ML that the draft Energy Bill 2013 provides for monies amounting to

Issue	Response
production activities over the lifetime of these activities.	5% of profit oil to be given to the local community.

14.9 Appendix 6a: Registration sheets-Nakukulas



Activity: Nakukulas village Baraza ATTENDANCE LIST Date: 07/01/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Kosia LoTabis	501 21577	
2.	Alimlin Esekun	212 31122	
3.	Imam Imwslim Eriks	501 22091	
4.	Prenson Apaleyo	212 61200	
5.	William Iodung	501 29 60	
6.	Petr Akade	212 41941	
7.	Jackson Erimlin	516 34134	
8.	Kozli Epir	512 61200	
9.	Eseko OSeke	709 21244	
10.	Lochi Kwee -	571 41622	

ATTENDANCE LIST

Activity: NAKUKUBAS Village BarazaDate: 02/09/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Nakukubas Muli	24756781	
2.	Mulyfine Losini	23148402	
3.	Losmas Lopod	30098099	
4.	Mateni Aleni	22567680	
5.	Kasuni Zikoni	54234579	
6.	Kareken Arupi	32572672	
7.	Akabet Aseyeni	43092302	
8.	Akitola Lajito	67892072	
9.	Aseani Ewari	76562940	
10.	Nipala Lajito	72094390	

ATTENDANCE LIST

Activity: Nakukula Village BarazaDate: 03/09/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Lolweni Lokipi	03892655	
2.	Kisiki Lothana	474216378	
3.	Ayani Amiri	56785678	
4.	Aradali Nabura	63467879	
5.	Amasi Okeko	56742824	
6.	Silwa Lokala	63467879	
7.	Kibera Lokutai	4567890	
8.	Chodo Lokuria	4567890	
9.	Namuya Sime	23456780	
10.	Ekaru Apopo	47988442	

ATTENDANCE LIST

Activity: Nakukules Village Baraza Date: 03/09/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Patrick Ewai	624 39422	
2.	Lokale Lotir	412 623 91	
3.	Eregae Lomung	561 204 36	
4.	Eriz Homelu	412 62247	
5.	Peterson Ekaran	644 105 24	
6.	Wilmington Ngai	712 926 74	
7.	Wilson Epur	812 612 67	
8.	Collins Ekano	141 234 66	
9.	Kayo Eliir	412 316298	
10.	Auan Lokusi	436 789 124	

ATTENDANCE LIST

Activity: Nakurus Village BarazaDate: 03/07/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Mia Naregi	30922567	
2.	Eraro Nakikal	143767998	
3.	Melvin Atabo	56729107	
4.	Lokai Lokano	19672974	
5.	Lokamedo Lotun	72487402	
6.	Mucia Longuro	30924256	
7.	Lokuno Napulan	27291047	
8.	Ameri Nanyavisaal	12872093	
9.	Ekal Charles	57021082	
10.	Ekidor Xdaan	02467750	

ATTENDANCE LIST

Activity: Ngakukul's Village BarazaDate: 03/09/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Ewoi Lemu	241 284 22	
2.	Kula howei	232 967 90	
3.	Epero Akinei	506 789 33	
4.	Xgiron Amuton	234 2436	
5.	Longlenger Aweskin	343 2348	
6.	Lotesro James	677 244 34	
7.	E Suro Amegur	767 241 89	
8.	Longorox Saimon	2683 23866	
9.	Etolon Charles	920 95641	
10.	Eltan Kariwo	102 706 92	

ATTENDANCE LIST

Activity: Nakukelas Village BarazaDate: 03/09/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Naperit Awoton	222 34672	
2.	Nakibo Sungura	450 234 22	
3.	James KAOO	567 920 22	
4.	Philp Namuton	2150 223 22	
5.	Erika Kimick	842 672 92	
6.	Matumbo Franck	124 672 12	
7.	Lorungui James	942 672 945	
8.	Eulan Jackline	870 622 22	
9.	James Kikeli	1425 223 498	
10.	Etir Lokibo	942 672 23	

ATTENDANCE LIST

Activity: Nakukulas Village BarazaDate: 27/09/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Lemugo Lokusi	421 26789	
2.	Samuel Estee	80927043	
3.	Losingen Ikao	743 44579	
4.	Noyanao logiron	392 94552	
5.	Loriba Lokusi.	434 6729	SP
6.	Eschen lodio.	612 232 94	
7.	Elipao Karenga.	423 45760	
8.	Lokwatepus Lokumia.	622 97099	
9.	Amrodole Malekoni	723 493 93	
10.	Ipasi Napulan.	624 672 91	

ATTENDANCE LIST

Activity: Dakumbas Village BarazaDate: 03/09/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Eseko Paul	424 672 24	
2.	Benjamin Limagur	842 672 44	
3.	Bonsface Erap	672 729 41	
4.	John Alelu	541 236 74	
5.	Stellah Kochodo	672 729 23	
6.	Achodo James	541 212 46	
7.	Joseph Etabo	671 2142 52	
8.	Festus Egenyo	724 672 22	
9.	Festus Ekei	672 2423 94	
10.	Ekinga Desmon	212 434 22	

ATTENDANCE LIST

Activity: Nakukutes BarazaDate: 03/09/2014

(Please fill name in Capital Letters)

	Name	I.D. Number	Contact
1.	Josphab Lokusi	234 672 46	
2.	Amos Lowai	430 678 26	
3.	Denis Lophu	567 241 99	
4.	Pascal Lemuyg	414 310 22	
5.	Ewar Samson	612 412 31	
6.	Auilo Ewar	672 992 11	
7.	Edung Etiir	412 291 22	
8.	Lawrence Ekalele	492 982 31	
9.	Ekeno Cogney	567 291 623	
10.	Gideon Ekaraa.	219 912 95	

14.10 Appendix 6b: Stakeholder Engagement Log No. 02-Nakukulas

Date of engagement	Name of stakeholder(s)	Position of stakeholder(s)	Type of engagement	Tullow/KTL participants
Sep 3 rd , 2014 10:40am – 12:40pm	There were about 118 people who showed up at the meeting; 42 were men and 76 were women. NB: Not all persons completed the registration sheet	Nakukulas village	Scoping and detailed ESIA Meeting	1. Paul Lopur Longeem (Tullow) 2. Samuel Apele (Tullow) 3. Maurice (Tullow) 4. Sanjay Gandhi (KTL) 5. Gideon Owaga (KTL)
Objectives of engagement				
<ul style="list-style-type: none"> Present key characteristics of the EWT activities and the ESIA methodology Scope issues of concern to the community arising from Tullow's EWT activities at Ngamia-5 and Amosing-1 Solicit comments about the potential environmental and social impacts of the proposed EWT activities 				
Key discussion points				
The scope of EWT activities (details of proposed activities)				
<ul style="list-style-type: none"> Prior to this meeting, it was agreed that two Focus Group Discussions (FGD) would be held with the community, one with the male members and the other with female members. This would enable both genders to articulate their views about the EWT activities and raise their environmental and social concerns. For ease of communications and to "connect" to the community, KTL conducted the meeting in the Swahili language while the Tullow Social Performance (SP) team translated this in the Turkana language. The Tullow SP team lead by Paul Lopur commenced the meeting by explaining to the community that Kurrent Technologies Ltd. (KTL) will lead the discussion about the proposed EWT activities including the core Area of Interest (Aoi). He further informed the community that as part of the public/stakeholder consultation process, KTL would undertake registration of the participants and pictures of the meeting. The Tullow Social Performance team then handed over the meeting to KTL. Sanjay Gandhi (SG) started by explaining the legislative framework that guides the ESIA process including public consultation. This included an explanation of the public participation requirements provided for under the Constitution of Kenya 2010 and the Environment Management and Coordination Act, 1999 (EMCA). SG then elaborated on the activities associated with EWT and how it fits into the wider exploration and production activities. For the community to get a visual understanding, SG sketched on the ground a typical well pad footprint and the infrastructure required for EWT activities. He explained 				

to the community that EWT activities would last approximately 60 days at Amosing-1 and 90 days at Ngamia-5. Using the sketch, the community felt reassured that Tullow would not need any additional land take for the EWT activities which would be confined to the existing well pad footprints.

- SG then described the potential environmental and social aspects and impacts associated with the EWT and stated that these would be of a short term nature and limited to the approximate time frames indicated in the previous bullet. After making his presentation, SG requested whether or not the community had a better understanding of the EWT activities to and the community replied in the affirmative. SG then requested the community to consent to two Focus Group Discussions (FGDs) to enable the male and female genders to separately raise their views and concerns about the EWT activities.
- KTL mentioned that Tullow had implemented a Grievance Mechanism (GM) and requested those present to advise whether or not they were aware of it. The community said they were unaware of it and subsequently, SG requested the Tullow SP to explain the GM. Samuel Apele took time to articulate the Tullow GM and the community felt reassured that they had a communication mechanism available to them in the event that they wanted to raise any grievances with Tullow.
- On completion of the meeting, the community was elated and was grateful that Tullow had organized an informative meeting in which they learnt several new things about Tullow's EWT program. They said that prior to the meeting, they had misconceptions about Tullow's activities due to inconsistent engagement with them; they requested that Tullow visit them frequently to engage them about progress associated with operational activities.

Issues and responses:

- An issues and response report was developed for the male and female FGD and each report is attached as an annex to this log. While they raised some issues about the EWT activities and its potential environmental and social impacts, the community wanted Tullow to resolve general issues such as provision of health centers, teachers for schools, etc. and benefits arising from production related activities.

Commitments

- Based on the information shared with them at the meeting, the community was supportive of Tullow's activities in general and the EWT program for Ngamia-5 and Amosing-1.

Other notes

- None.

Suggestions

- The community requested Tullow to have regular engagement meetings regarding operational activities.
- KTL suggested that the community should endeavor to visit the Tullow office in Lokichar to receive additional information regarding the EWT activities and to raise any grievances. The women FGD suggested that Tullow consider locating an office closer to them as the existing Lokichar office was far away for them to get information or raise a grievance.

Next steps

- ESIA Study for the EWT will be submitted to NEMA for consideration;
- Once submitted, the community will have full access to the ESIA Study through various communication channels and is welcome to provide comments directly to NEMA. As part of the continuing stakeholder engagement process, SG said that can come back and explain the contents of the ESIA Study report, specifically the issues raised by the community.

14.11 Appendix 6c: Issues and Response Report – Nakukulas FGD (Men)

September 3rd, 2014 (10:40am – 12:40pm)

Item	Issue	Response
1.	<p>Mr. Ameri Nakwakaal (AN) – talking as a member of the youth</p> <ul style="list-style-type: none"> He was unhappy with Tullow for not employing people from Nakukulas community. He pointed out that KK Security which provides security services at the camps and operational facilities was recruiting Form 4 (O-Level) school leavers instead of people with a lower level of academic education. Consequently, he felt that the Turkana people were not pursuing further studies as the community was taking up semi-skilled labor. Still on employment, he said that unskilled labor such as housekeeping staff should be recruited purely from the Turkana community. He felt that the Turkana community is offered predominantly casual employment instead of permanent or long-term contract employment. He complained that the community water points installed by Tullow adjacent to the well site and camp access roads often run out of water. He suggested that Tullow should install a water pipe from their borehole(s) and connect it to the various community water point tanks. This will allow the community to have a consistent supply of water for them and their livestock. He suggested that all vehicles that are not hired from the indigenous Turkana community should pay a “tax” which should go to the elders of the community for their upkeep. 	<p>KTL/Tullow response</p> <ul style="list-style-type: none"> On the issue of KK Security employing Form 4 (O-Level) leavers, Sanjay Gandhi (SG) said that the Tullow Social Performance (SP) team was present at the meeting and should take up the issue as it is not related to the EWT ESIA Study. On the issue of unskilled labor, SG said that the issue was not directly linked to the EWT ESIA Study and that the Tullow SP team should communicate with the community on the percentage of indigenous Turkana people employed at Tullow’s camps and other operational facilities. On the percentage of temporary and permanent jobs, SG referred Ameri Nakwakaal (AN) to the Tullow SP for further direction. On the supply of water to the community, SG said that Tullow had contracted an indigenous Turkana company to supply water to the water points. While there were no immediate plans to pipe water to the community water points, this would be taken as a suggestion and forwarded to Tullow. On the issue of rendering a “tax” for vehicles not hired directly from indigenous Turkana community, SG said the suggestion was noted.
2.	<p>John Lengiro – Area Chief</p> <ul style="list-style-type: none"> One of the area chiefs who was present the previous day at the Lokicheda public meeting explained the EWT activities 	<p>KTL/Tullow response</p> <ul style="list-style-type: none"> No response needed

Item	Issue	Response
	and requested the community to focus their issues on the EWT ESIA issues	
3.	Mr. Birika Atukomo – Community member (middle aged) <ul style="list-style-type: none"> He said that he had heard that during the production phase, the Turkana community would be relocated and subsequently wanted to know the true position He was further concerned about the air emissions arising from the production activities He wanted to know how the adverse impacts arising from production activities would be mitigated 	KTL/Tullow response <ul style="list-style-type: none"> On relocation, SG informed Birika Atukomo (BA) that there was no plan to relocate the Turkana community without their consent. However, if there were any such plans, SG said that Tullow would follow Kenyan laws and regulations, Tullow corporate policies and international guidelines on resettlement. On air emissions, SG informed BA that Tullow would carry out appropriate studies to model the amount of air emissions and based on these would develop and implement mitigation measures including monitoring such emissions. On mitigation of adverse environmental and social impacts, SG said that Tullow undertakes Environmental and Social Impact Assessment studies for its projects to identify positive and adverse impacts and for the adverse ones, develops and implement appropriate mitigation measures
4.	⁹ Mzee Amadole Kolekheri – community member (old man) <ul style="list-style-type: none"> He commented that the Turkana community only has their land as a resource and their approval to allow that land to be used for exploration and production will either bring socio-economic benefits or “eliminate” them. He further commented that he has no problem with the EWT activities and their environmental and social impacts 	KTL/Tullow response <ul style="list-style-type: none"> SG informed Mzee Amadole Kolekheri (AM) that the EWT activities at Amosing-1 and Ngamia-5 are of a short-term nature and environmental and social mitigation measures will be implemented to eliminate or reduce the impacts.
5.	Mzee Joseph Lopus – Community member (old man) <ul style="list-style-type: none"> He said that they granted Tullow the approval to prospect for oil. He said that Tullow had provided their community with jobs at the borehole sites and as Road Marshals. He was particularly concerned with KK Security employing 	KTL/Tullow response <ul style="list-style-type: none"> With respect to employment of less educated staff as security personnel, SG said that he would convey the community’s request to Tullow. On the lack of transparency by the DAC, SG said that he will communicate the

⁹ Mzee: Swahili word to describe an old man and used as a prefix when addressing an elderly person with respect

Item	Issue	Response
	<p>Form 4 (O-Level) school leavers and paying them meagre salaries. He would like Tullow to impress upon KK Security to employ less educated people from the Turkana community for security guard jobs.</p> <ul style="list-style-type: none"> • He felt that the District Advisory Committee (DAC) (which is an intermediary between Tullow and the community) could do a better job of relaying the impacts of Tullow's operations to the community. His perception is that the DAC is inconsistent and conceals information from the community about Tullow's operations. • Specifically on the EWT activities, he said that the ESIA Study should contain mitigation measures for the flaring that will occur. Additionally, he recommended that truck driver opportunities for transporting EWT materials from Mombasa to the well sites be given to the Turkana community 	<p>community's concern to Tullow for action as they deem appropriate.</p> <ul style="list-style-type: none"> • On mitigation measures for air emissions associated with flaring SG confirmed that mitigation measures will be included in the ESIA Study.
6.	<p>Mzee Joseph Lopus – Community member (old man)</p> <ul style="list-style-type: none"> • He was grateful for the meeting and said that he was more aware about Tullow's activities including EWT than before the meeting. • He said that since exploration activities began, his impression was that Tullow uses force to get their work done but subsequent to this meeting, his view changed for the better. • He requested Tullow to consider building a health center for the community 	<p>KTL/Tullow response</p> <ul style="list-style-type: none"> • On the first two bullet points, SG thanked the elder for his words of encouragement. • On the health center, SG said that Tullow will consider the request of constructing a health center.

14.12 Appendix 6d: Issues and Response Report-Nakukulas FGD (Women)

September 3rd, 2014 (11:50 am – 12:30pm)

Item	Issue	Response
7.	Selina Lokale – middle aged woman <ul style="list-style-type: none"> She was concerned about the air emissions arising from the flaring process during EWT activities. She requested Tullow to provide medical services within the vicinity to address emergency issues related to the EWT activities. She further felt that Tullow needed to do more for them with regards to offering assistance during emergencies even if they may not be as a result of the EWT activities. For example, she said that they commonly face venomous snake bites leading to death due to poor medical emergency response. She requested Tullow to consider providing an office closer to them or having a mobile office as the one at Lokichar is quite far for them to seek information or air their grievance(s). 	KTL/Tullow response <ul style="list-style-type: none"> On the issue of air emissions arising during the flaring process, Gideon Owaga (GO) advised Selina Lokale (SL) that air dispersion modeling had been conducted which indicated that the air emissions will be tolerable and limited to the core area of Interest (AoI). The flaring will only occur during the initial clean-up of the wells. On potential emergencies associated with the EWT, GO advised SL that Tullow has in place an emergency response plan that can be activated in the event that it is required. Tullow is also considering the construction of a health center near Kapese village for the community On bringing an office closer to the community or having a mobile office, GO advised SL that her request will be forwarded to Tullow for consideration but in the meanwhile the community members can also channel their issues through Tullow's social performance (SP) team.
8.	Paulina Reik – Youthful member of the community <ul style="list-style-type: none"> She felt that the job opportunities tended to be skewed in favor of men and requested Tullow to provide equal opportunities for employment. She appreciated the work that Tullow has continued to do and hoped that they will soon start to get the benefits as a result of the EWT and other Tullow activities. However she felt that since Tullow operations commenced, some benefits to the community were stopped. For example, the Government funded "help-age" project where the old people were given financial support ceased. Her perception was that the Government withdrew the support as they felt that 	KTL/Tullow response <ul style="list-style-type: none"> On the issue of discrimination with regards to job opportunities, GO pointed out to Paulina Reik (PR) that Tullow has implemented an equal opportunity policy against discrimination on the basis of gender, marital status, race, ethnic origin, colour, nationality, disability, religion, sexuality or age and encourages diversity among the workforce. He further advised PR that if she has any evidence, she should report the grievance at the Tullow office in Lokichar for further handling. With regards to the government benefits to the community, GO pointed out that Tullow does not interfere with Government projects but rather aims to

Item	Issue	Response
	Tullow operations in the area would generate the needed assistance through CSR programs and other income generating activities	support and build strong and sustainable relationships that promote development
9.	Emily Namoe – middle aged female <ul style="list-style-type: none"> She felt that if there were no negative impacts associated with the project, Tullow should just have gone ahead and commenced the work. But the reason why the consultations are taking place is to try and mask the negative impacts that will result from the EWT activities and thus they are just being 'prepared' for that. She felt that the Tullow's consultation methods should also be tailored for people with special needs such as the blind and deaf. 	KTL/Tullow response <ul style="list-style-type: none"> GO advised Emily Namoe (EN) that public consultation was a constitutional and Environment Act requirement. He further said that the ESIA process requires collection of positive and adverse comments and recommending mitigation measures for the adverse ones. On the issue of consultation methods for the blind and deaf, GO said that the request would be forwarded to Tullow for appropriate action.
10.	Akwon Asike – Middle aged female <ul style="list-style-type: none"> She expressed appreciation for the manner in which the project activities were elaborated and requested that the community be engaged and updated regularly with regards to the EWT and other exploration activities She felt that their children will be affected later in life by the prolonged inhalation of the dust from an increased number of vehicles during the exploration and production phases 	KTL/Tullow response <ul style="list-style-type: none"> With respect to the issue of regularly updating the community on the progress of exploration and production, GO said that Tullow will be encouraged to develop and implement their communication plan With regards to the issue of dust and smoke emissions, GO said that air dispersion modeling had been carried out and the emissions of the EWT project will be minimal and limited to the core area of Interest (Aoi).
11.	Kasuke Lokare – Middle aged female <ul style="list-style-type: none"> She was concerned about the existing poor security situation in the area as most of the Kenya Police Reservists (KPRs) who offered security, have taken up jobs at the Tullow camps She noted with concern that most of the FSFOs are men 	KTL/Tullow response <ul style="list-style-type: none"> On security, GO said that it is the Government's responsibility to provide security for its citizens. On the issue of FSFOs being male, GO said that Tullow employs male and female FSFOs. Tullow is an equal opportunity employer and does not discriminate with any gender. He further informed Kasuke Lokare that Tullow has implemented a documented grievance mechanism for use by the community.
12.	Chodo Lorukia – Middle aged female	KTL/Tullow response <ul style="list-style-type: none"> On the issue of miscarriages, GO said that noise generated by gas flaring will

Item	Issue	Response
	<ul style="list-style-type: none"> In her view, noise associated with EWT activities will result in miscarriages and other diseases She sought to know what arrangements will be put in place during the EWT for employment 	<p>be limited and subsequently there is no scientific connection between noise produced by EWT activities and miscarriages.</p> <ul style="list-style-type: none"> On the issue of jobs during the EWT activities, GO said that due to the nature of EWT activities, job opportunities will be temporary and will require skilled professionals having experience in that field.
13.	<p>Emily Namoe – Middle aged female</p> <ul style="list-style-type: none"> She was grateful that Tullow arranged for the meeting and hoped that they will continue to get the feedback not just for the EWT activities but for other Tullow operations in the area. She also pointed out that she would make an effort to go and visit the Tullow office at Lokichar in order to learn about the job opportunities available She requested that the consultations should start from the lowest levels going to the top since most of the leaders may give viewpoints that do not necessarily reflect what is on the ground She wanted to know what will happen to the livestock and trees in the area in the event of toxic emissions during the flaring 	<p>KTL/Tullow response</p> <ul style="list-style-type: none"> On the issue of consultations starting at the lowest level, GO said that Tullow consults with stakeholders at all levels (from the grassroots to the leadership) in a transparent manner. On the issue of toxic emissions during flaring, GO said that the flaring will be limited to the initial cleaning up stages and will not have adverse impacts on livestock and trees.

14.13 Appendix 7: Public stakeholder meeting and baseline photos

Figure 9: Baraza at Lokicheda village



Figure 10: Baraza at Nakukulas village



Figure 11: FGD with women at Nakukulas village



Figure 12: FGD with men at Nakukulas village



Figure 13: ECD School at Nakukulas Village



Figure 14: Nakukulas Primary School



Figure 15: Inside Nakukulas primary school ECD Class



Figure 16: Water tank provided by Tullow at Nakukulas primary school



Figure 17: Class rooms at Nakukulas build by African Oil In October 2011



Figure 18: Nakukulas ECD classrooms under construction



Figure 19: Stores within Nakukulas primary school



Figure 20: Drinking water point at Nakukulas



Figure 21: Nakukulas Dispensary



Figure 22: Nakukulas Village settlement



Figure 23: Nakukulas ECD classrooms under construction



Figure 24: Borehole at Nakukulas village



Figure 25: Watering point Serving Nakukulas and Lokicheda villages



Figure 26: Animal Kraal at Lokicheda village



Figure 27: Nakukulas Tullow Water Point



Figure 28: Animals gather at Nakukulas Water Point



Figure 29: Lokicheda Charcoal marketing yard



Figure 30: Tullow Watering points at Lokicheda village



Figure 31: Catholic church at Nakukulas village



Figure 32: Primary school at Lokicheda village



Figure 33: Animal shelters at Nakukulas (*Anok Angaandi*)



Figure 34: *Kraal* within Lokicheda village



Figure 35: Baseline mapping meeting at Lokicheda



Figure 36: Lokicheda Water Pan



Figure 37: FGD meeting at Nakukulas with the youth



Figure 38: Animal shelter *Anok Ngikaalei*



Figure 39: Watering point at Nakukulas Primary School



Figure 40: Lokicheda village fenced with branches for security



Figure 41: Camels drinking water at Lokicheda water point

