ENVIRONMENTAL IMPACT ASSESSMENT PROJECT REPORT

FOR

THE AERODROME NEAR PAIPAI BASECAMP IN BLOCK A,

MARSABIT NORTH DISTRICT

JUNE 2012

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PROJECT REPORT

FOR

ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROPOSED AERODROME NEAR PAIPAI BASECAMP, BLOCK 10A, MARSABIT NORTH DISTRICT

JUNE 2012

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We the undersigned, confirm that the contents of this report are a true representation of the Environmental Impact Assessment Project Report of the proposed Aerodrome near Paipai basecamp in Block 10A, Marsabit North District

Prof. Norbert Opiyo-Akech (Team Leader and Director)	Dr. Daniel Olago (Lead Expert and Director)
Sign.....	Sign.....
Date.....	Date.....

EXECUTIVE SUMMARY

This environmental impact assessment (EIA) project report presents baseline biophysical and socio-economic information, project mitigation measures, and an environmental management and monitoring plan for a proposed Paipai Aerodrome, designed to service the exploratory oil and natural gas well drilling programme in the National Oil Corporation of Kenya (NOCK, 1987) designated exploration Block 10A, in Marsabit North (Chalbi) District. This project report has been prepared for the project proponent, Tullow Kenya B.V. (TKBV) by Earthview Geoconsultants. This has been done in accordance with the requirements of Kenya's Environmental Management and Coordination Act of 1999 and subsidiary legislation, and in fulfilment of the more general requirement that projects maintain a clean, sustained and healthy environment. This EIA project report is aimed at establishing and mitigating any potential impacts resulting from the proposed Paipai Aerodrome operations during development and operational phases at the identified site in the project area.

Following the recent discovery of oil in the Lokichar Ngamia-1 well, Block 10BB in northern Kenya, by Tullow Oil and Africa Oil BV, the proponent has been encouraged to explore Block 10A to meet the world global demand for oil. To do this, the proponent intends to improve on transport efficiency to meet set targets and project milestones. This will be achieved by the development of the Paipai Aerodrome near the test well oil drilling sites. The aerodrome will bring 'closer' requisite goods and services intended to service the drilling activities.

Prior to the field study, a desktop study was conducted to review the available reports, and to design plans and maps in order to compile relevant biophysical and socio-economic information of the project area. The field study (detailed environmental impact assessment, community sensitization and social impact assessment, and development of mitigation measures and environmental management plan) was between 23rd to 26th May Biophysical studies covered environmental aspects such as physiography, climate, hydrology, drainage, soils, geology/hydrogeology, vegetation, wildlife, and aquatic environment. The socio-economic environmental study covered information on issues such as population, literacy, social amenities (healthcare and schools), land use, land tenure, the social dimensions of well- being and income levels, water supply, sanitation levels and security, along with other pertinent issues. The field study also enabled cross-checking of the data compiled during the desktop study.

Regulation No.7 of the Environmental (Impact and Audit) Regulations, 2003 lays down the specific issues that the project report must address, which in summary are: the nature, location, activities, and design of the project; the materials that are to be used; the potential environmental, economic and socio-cultural impacts and mitigation measures; plans for the prevention and management of accidents and for ensuring the health and safety of workers and neighbouring communities; and the project budget. These issues are to further address, as outlined in the Second Schedule of the Environmental (Impact Assessment and Audit) Regulations (2003): ecological considerations; sustainable use; ecosystem maintenance; social considerations; landscape and land uses; and water. Within this framework, the collection of relevant baseline data, and consultations with stakeholders and the public are important, and ought also to be included in the report. The scope of this EIA project report can be summarised as:

- Stakeholder engagement;
- Review of relevant data and ground-truthing;

- Utilising existing baseline data (biophysical, social and health) for the description of the project area;
- Prediction and evaluation of potential impacts;
- Determination of appropriate mitigation measures that can eliminate, reduce/minimise the impacts;
- Development of an Environmental Management Plan (EMP); and
- Report preparation.

This study was carried out to evaluate the potential and foreseeable impacts on the environment resulting from the proposed development. The physical scope is limited to the proposed site and the immediate environment that may be affected by, or may affect, the proposed project. Any potential impacts, (localized or delocalized) have been carefully evaluated along the guidelines provided by EMCA 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003. The EIA is aimed at providing information that will help the authorities make an informed decision when awarding the licence to TKBV.

The primary objective of the proposed activity is to develop the Paipai Aerodrome in response to the need for efficient air transport and services and increased activities demanded by the oil exploration activities within the project area. Details are given in this report of the main project activities, from design to decommissioning and the personnel and support requirements. Information on various discharges, emissions and wastes likely to emanate from the project activities are described and management policies put in place to mitigate any impacts that may arise from them. The project area has a very poor road network and communication facilities. Recently however, the proponent has invested in a BTS supported by Safaricom telecommunications network. Maikona is the only other area covered by Safaricom telecommunications network. Together, the two BTS's have enabled Kargi to be within reach by mobile telephony. This will aid in the exploratory activities by providing efficient communication between the projects' technical staff and the local communities.

Public participation in this project was facilitated through interviews with the project proponent and neighbours of the proposed project area. There was no objection to the proposed project by any member of the neighbouring community. They however reiterated that more emphasis should be put towards ensuring that the proposed project would not negatively interfere with the environmental integrity of the surrounding areas. Most of those interviewed welcomed the development of this project in the area more so because they are already seeing the benefits of the water borehole drilled at the camp site and hope that they will continue to benefit from the Company's operations. A sample of the neighbours' comments, occupation, contacts and signatures has been appended to this report.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This environmental impact assessment (EIA) project report presents baseline biophysical and socio-economic information, project mitigation measures, and an environmental management and monitoring plan for a proposed Paipai Aerodrome, designed to service the exploratory oil and natural gas well drilling programme in the National Oil Corporation of Kenya (NOCK, 1987) designated exploration Block 10A, in Marsabit North (Chalbi) District. This project report has been prepared for the project proponent, Tullow Kenya B.V. (TKBV) by Earthview Geoconsultants. This has been done in accordance with the requirements of Kenya's Environmental Management and Coordination Act of 1999 and subsidiary legislation, and in fulfilment of the more general requirement that projects maintain a clean, sustained and healthy environment. This EIA project report is aimed at establishing and mitigating any potential impacts resulting from the proposed Paipai Aerodrome operations during development and operational phases at the identified site in the project area.

1.2 PURPOSE OF THE REPORT

An EIA project report is a systematic process that predicts and evaluates the potential impacts that the proposed project may have on the biophysical, socio-economic and human environment and develops mitigation measures that, when incorporated in the project, can eliminate, reduce or minimise the potential effects and where practicable, enhance the benefits that such a project may bring to the communities living within the project area and the government in general if the proposed activities turn out to be successful.

1.3 DEVELOPER IDENTIFICATION

Tullow Oil PLC is one of the world's largest independent oil and gas exploration companies, and is a FTSE100 company. The Group has over 80 licences in more than 20 countries, with operations in Africa, Europe, South Asia and South America.

This EIA is carried out for TKBV (Pin P051340553U), a subsidiary company of Tullow Oil PLC, with respect to the proposed exploratory oil and gas well drilling in the project area. This aaerodrome is in response to the need for efficient air transport and services and increased activities demanded by the oil exploration activities within the project area.

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Africa Oil Corporation and EAX (Afren) are the development partners. TKBV will engage its civil engineer to oversee the development of the aerodrome supported by qualified technical staff.

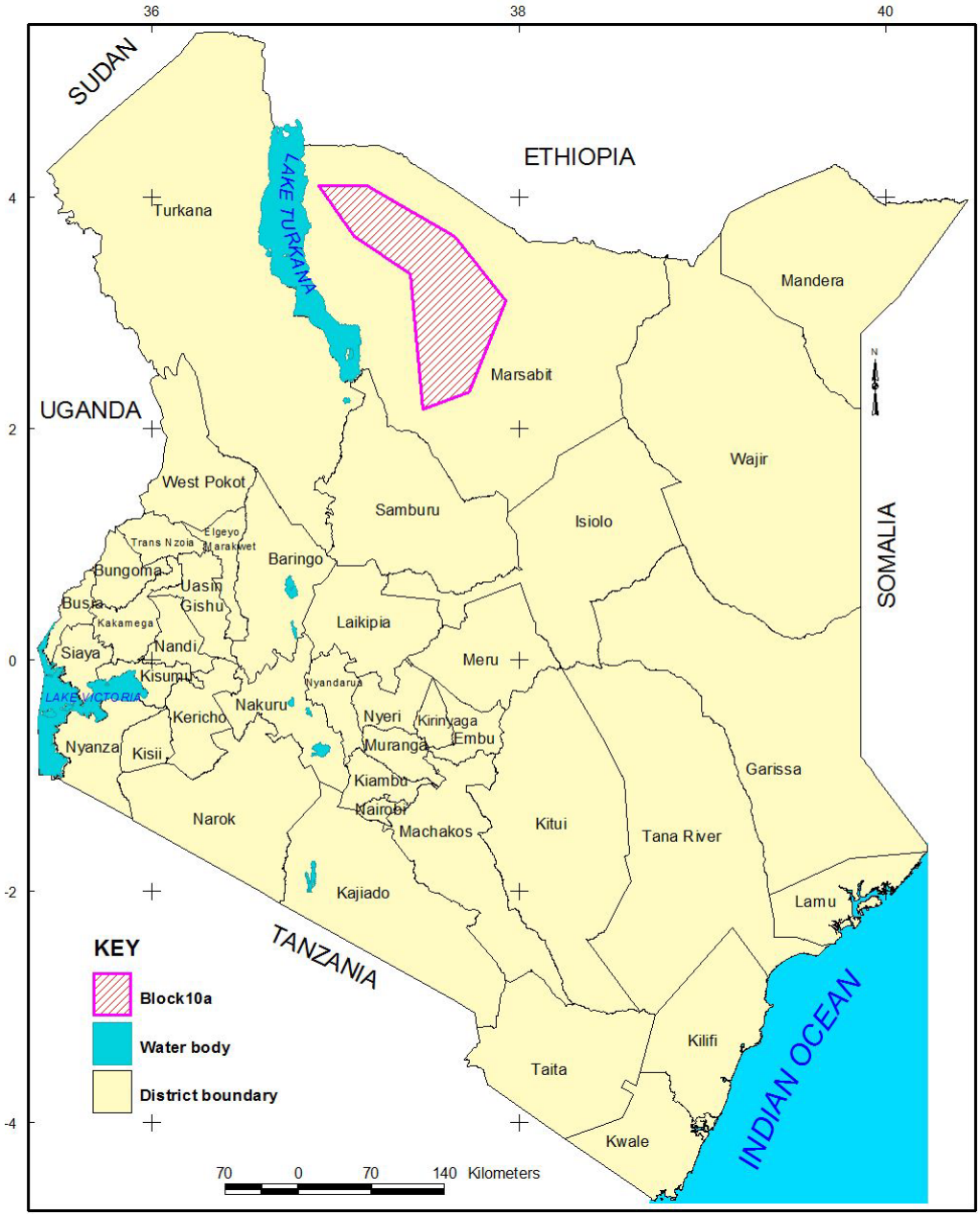

Figure 1.1: Location map of the project area.

1.4 BRIEF SITE DESCRIPTION

The National Oil Corporation of Kenya (NOCK) has identified potential petroleum exploration regions in Kenya and demarcated them into blocks. The project area, where the Paipai Aerodrome will be constructed, is in Block 10A as classified by NOCK and covers parts of Chalbi District.

The project area is characterised by harsh climatic conditions with up to 90% of the landmass being arid while the remaining 10% can be classified as semi-arid. The most prominent

physiographic features in the study area are the Chalbi and Koroli deserts (Charley, 1987; Key, 1987; Key and Watkins, 1988), which are characterised by relatively thick fluvial and lacustrine sediments and recent soils (Bosworth and Morley, 1994; Dindi, 1994). There is, however, no clear-cut demarcation between Chalbi and Koroli deserts and the two are collectively referred to as the Chalbi Desert. The highest population is concentrated in the major centres such as Kargi, Maikona and Kalacha.

Due to the harsh arid and semi arid climatic conditions existing in the project area, the vegetation cover is generally sparse and stunted, or completely lacking in the Chalbi and Koroli deserts. Rainfall is bi-modal with a general annual mean that ranges between 300-550 mm (the arid zones receive between 150-350 mm annually). The long rains are experienced in the months of March to May with a peak in April, while the short rains are experienced between the months of October and December with a peak in November (Sombroek et al., 1982). However, rainfall is extremely variable and unreliable with droughts and famine being common. During the dry season, the temperature ranges between 30 and 37^{o}C while in the wet season, the temperature ranges between 20 and 25^{o}C. The highest temperatures are experienced in the month(s) of August/September and may often exceed 37^{o}C while the lowest temperatures are experienced in the months of November and December (Sombroek et al., 1982) with very low relative humidity.

Plate 1.1: The aerial view of paipai I campsite, The Aerodrome will be adjacent to the camp

The project area is predominantly home to the culturally rich Gabra and Rendille communities. The Gabra occupy Kalacha and Maikona areas, while the Rendille are found in the Kargi and

Kurkum areas. Economic activities are minimal, with the main source of livelihood being pastoralism (up to 80% of the population). The livestock comprises of camels, goats, sheep, donkeys and a few cattle. Other economic activities in the project site include small-scale business, basketry and weaving, development (brick making) and formal employment. There are no industrial activities. Minimal irrigation agriculture has been attempted at Kalacha area but faces challenges like crop destruction by wildlife, particularly baboons, and lack of capital. Tourism is a potential economic activity as the area hosts some of the world's rare and endangered animals such as the Grevy zebras, and various bird species. The communities also have rich cultures that can promote ecotourism. Aesthetic features include the oases found in the desert and the unique sand dunes and rocky outcrops that can be key tourist attractions.

The project area has a very poor road network and telecommunication facilities, with the only area covered by a mobile network (Safaricom) being Maikona. Recently however, TKBV have installed a Safaricom BTS that has greatly improved communication with a reach extending to Kargi. The road running north-west from Kargi, through the Chalbi Desert, to North Horr, Maikona and Kalacha is impassable during the wet season, while the other route north-east from Kargi to Maikona and the Huri Hills-Kalacha junction is rocky. Kalacha and Maikona have functional landing strips.

1.5 PROJECT BACKGROUND, OVERVIEW, JUSTIFICATION AND OBJECTIVES

1.5.1 Project Background

TKBV has the Production Sharing Contract (PSC) awarded by the Government of Kenya and hence the operator in the project area, and is working in collaboration with its partners Africa Oil Corporation and EAX (Afren) to carry out exploratory drilling within the identified potential prospect areas. Its role currently is to carry out well appraisal and production of oil and/or gas if the prospects turn out to be economically viable. To achieve its primary role of test well oil prospecting, TKBV intends to construct a Category D Aerodrome licensed to operate under the Civil Aviation (Aerodromes) Regulations, 2008 of the Kenya Civil Aviation Authority. TKBV is committed to ensuring that the activities that will be carried out to achieve the stated objectives will be done in a manner that is not detrimental to the natural environment or the local communities.

1.5.2 Overview of the Project

To service the oil exploration activities, TKBV intends to construct the Paipai Aerodrome that will accommodate light aircraft to be used to conduit technical staff and goods to ensure efficient operations for the project. Activities pertaining to the Paipai Aerodrome development will be as follows;

- Site and access way preparation;
- Mobilisation (movement and transport of equipment, personnel and materials);
- Civil works that include ground clearing, shallow excavations, grading and compaction;
- Demobilisation;
- Maintenance of Paipai Aerodrome and;
- Decommissioning and abandonment (dependent on the success of the exploration).

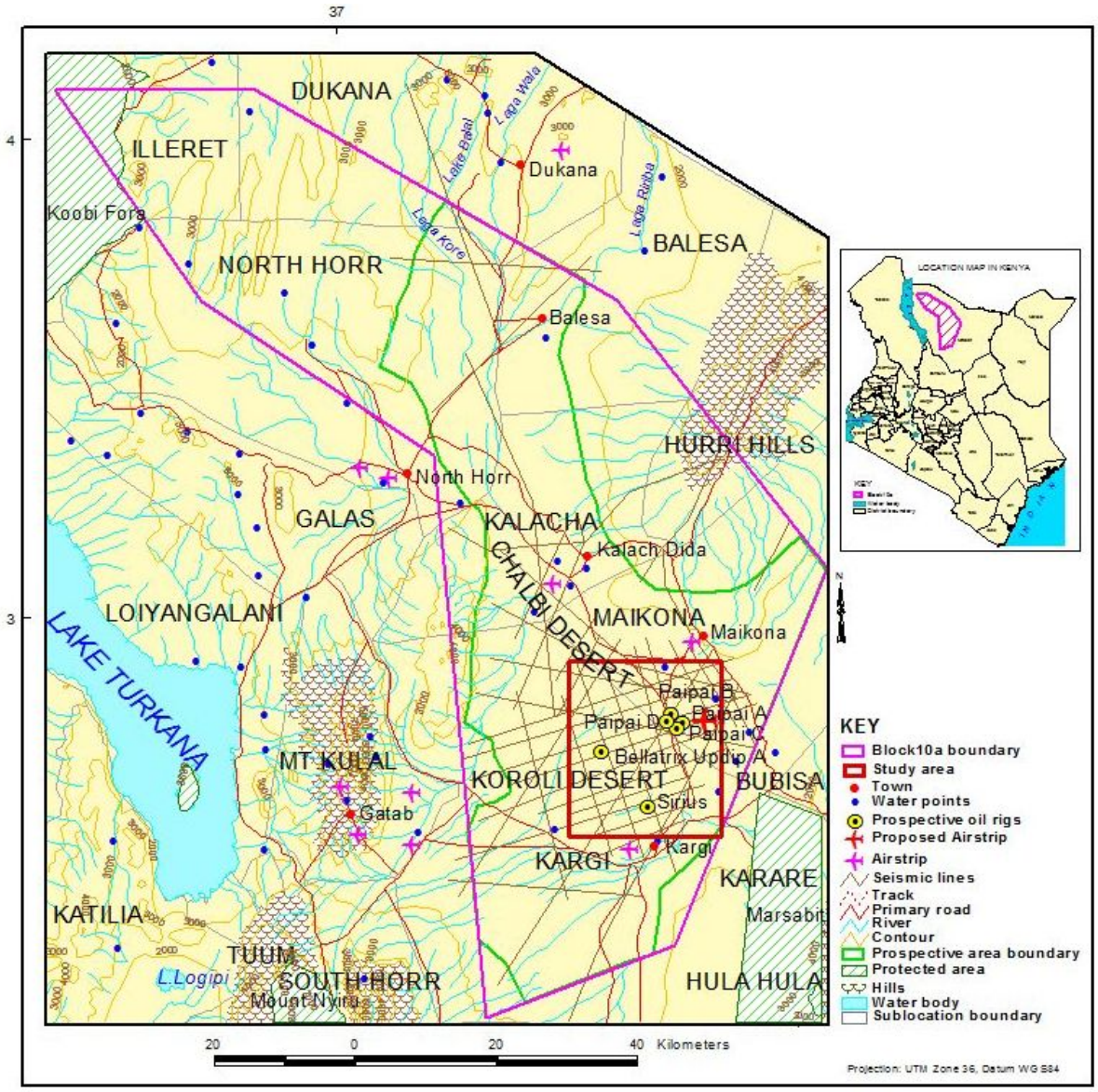

Figure 1.2: Location of the proposed Paipai Aerodrome adjacent to the Paipai drilling sites

The workforce will reside in the Paipai base camp that was subcontracted by ARDAN Risk and Support Services Limited, a professional civil and building contractor with experience in setting up such camps. Issues such as camp security, provision of basic services (e.g. accommodation, water, sanitation, lighting, and healthcare), waste management, materials storage areas, etc., have been incorporated in the camp design. The camp is sited away from existing settlements, and its location is adjacent to the test well site. The health and safety of the crew and the general public at large is ensured by the company complying both with the relevant national legislation, and its own in-house environmental health and safety (EHS) policies which embrace the international best practices for such activities. An emergency response plan is in effect in case of any accidents. A close working relationship is fostered with the local communities via the community liaison officer (CLO). Unskilled and semi-skilled workers will be recruited locally.

1.5.3 Project Justification

Following the recent discovery of oil in the Lokichar Ngamia-1 well, Block 10BB in northern Kenya, by Tullow Oil and Africa Oil BV, the proponent has been encouraged to explore Block 10A to meet the world global demand for oil. To do this, the proponent intends to improve on transport efficiency to meet set targets and project milestones. This will be achieved by the development of the Paipai Aerodrome near the test well oil drilling sites. The aerodrome will bring 'closer' requisite goods and services intended to service the drilling activities.

Energy is an important factor in socio-economic development (GVEP Kenya, 2006). The project is in line with the objectives of the national Energy Policy (improving access to affordable energy services, enhancing security of supply, promoting development of indigenous energy resources; promoting energy efficiency and conservation; and promoting prudent environmental, health and safety practices), the Economic Recovery for Wealth and Employment Creation Strategy (expanding and improving infrastructures, developing arid and semi-arid lands, and safeguarding environment and natural resources), and Kenya Vision 2030 (enhanced equity and wealth creation for the poor in semi-arid and arid districts, must generate more energy at a lower cost and increase efficiency in energy consumption).

1.6 PURPOSE OF THE EIA

This study was carried out to evaluate the potential and foreseeable impacts on the environment resulting from the proposed development. The physical scope is limited to the proposed site and the immediate environment that may be affected by, or may affect, the proposed project. Any potential impacts, (localized or delocalized) have been carefully evaluated along the guidelines provided by EMCA 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003. The EIA is aimed at providing information that will help the authorities make an informed decision when awarding the licence to TKBV.

1.6.1 Administrative and Legal framework

Development of the Paipai Aerodrome in the project area will conform to existing local, national and international standards for environmental protection and management with particular reference to air operational activities. Earthview Geoconsultants assessors have reviewed the policies, legal and administrative arrangements, and local and international protocols that have a direct bearing on the proposed development, with a view to establishing the frameworks within which the significance of the various impacts expected from the proposed development could be evaluated. Since this is an aviation related project, emphasis has been placed on those frameworks and protocols that have a direct bearing on the aviation industry. These include, and are not limited to, the International Civil Aviation Organization (ICAO) rules (Annex 14) that deal with aerodrome design, the Kenya Airports Authority Act, Cap. 395, the Civil Aviation Act, Cap. 394, the Civil Aviation (Aerodrome) Regulations, 2008 and The Air Passenger Service Charge ct, Cap. 475. Given the significance accorded to the relocation of human populations, the World Bank guidelines governing resettlement issues have been reviewed. In addition, international conventions such as the Vienna Convention on the Protection of the Ozone Layer, the Montreal Protocol on Substances that Deplete the Ozone Layer, the Basel Convention on the Trans-boundary Movement of Hazardous Wastes, and the Kyoto Protocol, have been considered. These have formed the basis for the determination of the significance of the various impacts associated with the proposed project.

1.6.2 The Mandate of NEMA

The National Environment Management Authority (NEMA) is the institution that has been established under the Environmental Management and Coordination Act (EMCA) of 1999 in order to deal with matters pertaining to the environment, with the object and purpose of exercising general supervision and co-ordination over all matters relating to the environment and to the principal instrument of government in the implementation of all policies relating to the environment. Some of its mandates that are relevant to EIAs are to:

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects with a view to ensuring the proper management and rational utilisation of environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya;
- Carry out surveys which will assist in the proper management and conservation of the environment;
- Undertake and co-ordinate research, investigation and surveys in the field of environment and collect, collate and disseminate information about the findings of such research investigation or survey;
- Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under the Act;
- Monitor and assess activities, including activities being carried out by relevant lead agencies in order to ensure that the environment is not degraded by such activities, environmental management objectives are adhered to and adequate early warning on impending environmental emergencies is given;
- Undertake, in co-operation with relevant lead agencies, programmes intended to enhance environmental education and public awareness about the need for sound environmental management as well as for enlisting public support and encouraging the effort made by other entities in that regard;
- Publish and disseminate manuals, codes or guidelines relating to environmental management and prevention or abatement of environmental degradation;
- Render advice and technical support, where possible, to entities engaged in natural resources management and environmental protection so as to enable them carry out their responsibility satisfactorily.

1.6.3 Requirements and Scope of Work for the EIA

A project report is defined, in the preliminary section of the EMCA (1999) and the interpretation section of the Environmental (Impact and Audit) Regulations (2003), as a summarized statement of the likely environmental effects of a proposed development referred to in section 58 of the Environmental Management and Co-ordination Act, 1999. Section 58 requires that a proponent intending to carry out any undertaking listed in the Second Schedule to the Act must submit a project report to the National Environment Management Authority ('the Authority') in the prescribed form accompanied by the prescribed fee.

Regulation No.7 of the Environmental (Impact and Audit) Regulations, 2003 lays down the specific issues that the project report must address, which in summary are: the nature, location, activities, and design of the project; the materials that are to be used; the potential environmental, economic and socio-cultural impacts and mitigation measures; plans for the

prevention and management of accidents and for ensuring the health and safety of workers and neighbouring communities; and the project budget. These issues are to further address, as outlined in the Second Schedule of the Environmental (Impact Assessment and Audit) Regulations (2003): ecological considerations; sustainable use; ecosystem maintenance; social considerations; landscape and land uses; and water. Within this framework, the collection of relevant baseline data, and consultations with stakeholders and the public are important, and ought also to be included in the report. The scope of this EIA project report can be summarised as:

- Stakeholder engagement;
- Review of relevant data and ground-truthing;
- Utilising existing baseline data (biophysical, social and health) for the description of the project area;
- Prediction and evaluation of potential impacts;
- Determination of appropriate mitigation measures that can eliminate, reduce/minimise the impacts;
- Development of an Environmental Management Plan (EMP); and
- Report preparation.

1.6.4 The EIA Review and Approval Process

Where the Authority finds that the project report conforms to the requirements of Regulation 7 (1), it must within seven days of receiving the report, submit a copy to each of the relevant lead agencies, the relevant District Environment Committee, and where it involves more than one district, to the relevant Provincial Environment Committee. Each of these lead agencies and Committees must then submit their written comments to the Authority within twenty-one days from the date on which they received the project report from the Authority or within any other period that the Authority may prescribe (Regulation 9). Once the Authority comes to a decision, it must communicate that decision, together with the reasons for it, to the proponent within forty-five working days from the date on which the project report was submitted to it (Regulation 10(1)). Where the Authority is satisfied that the project will have no significant impact on the environment, or that the project report discloses sufficient mitigation measures, it may issue a licence (Regulation 10(2)). If, however, it finds that the project will have a significant impact on the environment, and the project report discloses no sufficient mitigation measures, the Authority will require that the proponent undertake an environmental impact assessment study in accordance with the Regulations.

1.7 THE EIA TEAM

Earthview Geoconsultants (K) Limited was appointed by TKBV on 24th May, 2012 to undertake the EIA for the proposed Paipai Aerodrome development in the project area. Earthview is a well-established consultancy firm based in Nairobi with good capacity in environmental and social impact assessments and audits, geological and hydrogeological studies, geographic information systems, natural resource surveys, and project planning, implementation and management. Earthview is officially registered with the National Environment Management Authority as an Environmental Consultancy Firm. The firm comprises of individuals with many years' experience and knowledge in these and other areas. The firm is conversant with national legislation and regulations that relate to the sectors in which it carries out its activities, including NEMA requirements for environmental

and social impact assessments and audits, as well as applicable international best practices and standards.

Name	Role	Qualifications	Experience (years)
Prof. Norbert Opiyo-Aketch	Overall coordination/Geological issues	PhD	30
Dr. Daniel Olago	Coordination/Biophysical and Socio-economic issues	D.Phil.	20
Mr. Joseph Nganga	Soil and Waste Management	BSc	20
Mr. Peter Kibe	GIS Expert	MSc	20
Mr. Nicholas Aketch	Administration/Socio-economics	BSc	8
Ms. Emily Atieno	Policy/Legislation/Regulations	LLB	25

1.8 OBJECTIVES OF THE EIA PROJECT REPORT

In carrying out the project, and considering the national legislative and regulatory requirements for EIAs, TKBV shall seek to:

a) Identify, evaluate and propose suggested mitigation measures for potential environmental impacts of the proposed project on the various biophysical and socio-economic structures of the area;
b) Assess and analyse the environmental costs and benefits associated with the proposed project;
c) Outline environmental management plans and monitoring mechanisms during the project execution phase;
d) Ensure that concerns and aspirations of the local community are addressed in all stages of the project cycle;
e) Ensure that the project activities do not in any way interfere with the environmental sustainability of the area. This is ensured by giving due consideration to:
    - Rare, endangered and endemic flora and fauna and the ecosystems in and around the project area
    - Birds and migration routes
    - Local communities and land tenure systems;
    - Sensitive historical, archaeological and cultural sites.
f) Put in place mitigation and monitoring measures that will ensure that any potential negative impacts arising from activities of the project are eliminated or reduced at the earliest opportunity to obviate any harmful effect to the environment;
g) Boost the economy by providing jobs and trading opportunities to the local community in the region.

1.9 TERMS OF REFERENCE (TOR)

The following are the Terms of Reference (TOR) for the EIA:

- To hold meetings with the project proponent to establish the procedures, define requirements, responsibilities and a time frame for the proposed project;
- To carry out a systematic environmental and social impact assessment of the proposed Paipai Aerodrome development within the project area, following the National Environment Management Authority legislative and regulatory requirements and best international practice for an activity of this nature;

- To provide a description of the proposed activities throughout the entire implementation process of the proposed project with special focus on potential impacts to the surrounding environment and the socio-economic fabric of the local communities;
- To produce an Environmental Impact Assessment Project Report that contains the details of potential negative impacts, together with recommendations for their mitigation and/or prevention, as well as positive impacts and recommendations for enhancing and/or encouraging them;
- To develop an Environmental Management and Monitoring Plan for the proposed project.

1.10 STRUCTURE OF THE REPORT

The structure of the report is based on that proposed in the NEMA EIA Guidelines (2002), and is indicated in Table 1.1 below.

Table 1.1 Structure of the EIA Project Report

Chapter	Title	Contents
1	Introduction	Introduction to the project area; identification and activities of the project proponent in other regions; project background, objectives and justification; purpose of the EIA and objectives of the report; the EIA team; TOR for the report.
2	Project Description	The technology and processes to be used in the implementation of the project; workforce requirements; the materials to be used in the development and implementation of the project; the products, by-products and waste generated by the project.
3	Methodology	Methods used in carrying out the assessment; identification of gaps in knowledge and uncertainties, which were encountered in compiling the information.
4	Legal and Regulatory Framework	A concise description of the national environmental, legislative and regulatory framework, and international best practices.
5	Baseline Environmental Parameters of the Project Area	Description of the potentially affected environment within the framework of the proposed EIA; assessment of existing pre-project impacts and potential project and residual impacts.
6	Analysis of Project Alternatives	Alternative technologies, processes available, and reasons for preferring the chosen technology and processes.
7	Environmental Impact Assessment	Environmental effects of the project including the social, economic and cultural effects and the direct, indirect, cumulative irreversible, short-term and long-term effects anticipated.
8	Environmental Management Plan	Environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the, time frame and responsibility to implement the measures; provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the course of carrying out activities or major industrial and other development projects; measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies.
9	Conclusions and Recommendations	Summary of the conclusions and key recommendations from the EIA.
References	References	List of references and websites referred to in the text.

Appendices	1. Minutes of meetings	Minutes of meetings held with communities, community leaders and other stakeholders in the project area.
	3. Certificates	Certificates of the consultants and the company doing the EIA project report.
	4. Pin Number and VAT certificates	Pin number and VAT certificates of the proponent.
	5. Other relevant documents	Relevant copies of the PSC contract with the Government of Kenya and certificate of registration.

CHAPTER 2

PROJECT DESCRIPTION

2.1 INTRODUCTION

TKBV is proposing to undertake the development of the Paipai Aerodrome to service the Paipai base camp and drilling sites, initially consisting of a single well to explore for oil and natural gas in the project area (see Figure 1.1). The project area lies within the Chalbi and Karoli deserts and the surrounding environment.

The primary objective of the proposed activity is to develop the Paipai Aerodrome in response to the need for efficient air transport and services and increased activities demanded by the oil exploration activities within the project area. Details are given in this report of the main project activities, from design to decommissioning and the personnel and support requirements. Information on various discharges, emissions and wastes likely to emanate from the project activities are described and management policies put in place to mitigate any impacts that may arise from them. The project area has a very poor road network and communication facilities. Recently however, the proponent has invested in a BTS supported by Safaricom telecommunications network. Maikona is the only other area covered by Safaricom telecommunications network. Together, the two BTS's have enabled Kargi to be within reach by mobile telephony. This will aid in the exploratory activities by providing efficient communication between the projects' technical staff and the local communities.

2.2 PROJECT LOCATION

The project area lies in Marsabit North (Chalbi) district as shown in Figure 1.1.

There are no tarmacked roads in the project site. The two main roads, one heading north- west from Kargi and traversing through the Chalbi Desert heading to North Horr, Maikona and Kalacha, and the other road north-east from Kargi towards the Maikona-Marsabit junction and the Hurri Hills-Kalacha junction, are impassable during the wet season. The latter road is rocky and bumpy though navigable during the rainy season. Kalacha and Maikona have well-maintained Paipai Aerodromes.

2.3 QUALITY ASSURANCE OF DESIGN

In surface development with spatial structural modifications, such as in the project, certain basic parameters must be reasonably and accurately defined in the overall project specification and adhered to, to ensure full realisation of the project objectives. TKBV will therefore plan to meet the following quality objectives:

- Compliance with statutory requirements both locally and internationally;
- The system must meet the performance requirements;
- Environmental and safety considerations;
- Operability and maintainability;
- Life expectancy;
- Extendibility; and

- Use of innovative technology.

2.4 OVERVIEW OF PAIPAI AERODROME DEVELOPMENT PROGRAMME

The proposed Paipai Aerodrome has a sand/gravel pavement surface type and a 6,600kg bearing strength using the Aircraft Classification Number – Pavement Classification Number method. There shall be basic rescue and fire-fighting facilities in place and in the event of emergency, the Drilling Operations Paramedic will be available (fully equipped treatment facility). The facility will have pavements and access roads as follows:

- **Runways**
    - A sand and gravel surface type Runway, true bearing 047°/227°; designation number 05/23; measuring 1,500m length, by 30m width; with a 2° slope.
    - Runway end safety areas and stopways measuring 1,620m length by 60m width.
    - 35m long by 25m wide taxiway from aircraft parking area. The apron surface shall be gravel and the aircraft stands shall be unpaved with the run-up area paved
    - Helicopter landing pad (Helipad)

- **Design traffic**
    - Paipai Aerodrome operates as a Category “D” Aerodrome with the Dornier 228 bearing a maximum take-off weight of 6600kg/14,550lbs and Cessna 208B Caravan (3,790kg/8,752lbs) as the principle aircraft. On occasion, the aerodrome may receive charter and/or unscheduled operations. There is a provision for night ground lighting, for emergency landings and night flying.

Plate 2.1: Donier 228 aircraft on touchdown at Maikona Airstrip

- **Access roads**

  - The access road from the Paipai Aerodrome to the base camp will be designed to accommodate passenger traffic into and out of the Paipai Aerodrome. The development of the Paipai Aerodrome will lead to the development of other support infrastructure, which will include improved security surveillance, communication, and social amenities not only within the Paipai Aerodrome boundaries, but also within the greater project area.

- **Facilities and natural obstacles**

  Obstacles: The geographical coordinates and the top elevation of significant obstacles in the approach and take-off area, in the circling area and in the vicinity of the aerodrome are:
  - A communications mast situated at N 2°47'14.85", E 37°41'2.75" that is 350m to the north-west of the runway.
  - A ridge on rising ground to the North at N 2°47'35.15", E 37°41'40.39" that is about 400m from the threshold of the runway.
  - A proposed oilrig towering 50m above ground, at N 2°47'22.00", E 37°40'56.99", 630m west of the aerodrome.

2.4.1 Site selection and preparation

Site selection for the proposed Paipai Aerodrome would entail the surveying of a suitable area for the project. Among the parameters to be considered are:

- Landform/topography (morphology, meso relief and microrelief; slope class and length)
- Surface condition of soils, physical properties (texture, structure, bulk density, drainage characteristics); and chemical properties (sodicity and/or salinity).
- Prevailing Wind information (wind speed(s)) and direction.
- Birds' migration patterns (if any) and bird types recorded for the area.

Site preparation activities would consist of opening up an access road. Clearing the access route may involve minimal removal of vegetation and topsoil disturbance. The proposed access route will be surveyed prior to commencement of the clearance activities to ensure that options for the least possible disturbance to vegetation and soil are factored into the access road design and development methods. Route clearance should be completed before the movement of equipment to the Paipai Aerodrome site. The Paipai Aerodrome site after identification shall require to be demarcated. An area covering 45,000 m^2 or 4.5 Hectares that is deemed to be adequate for the proposed facility will be demarcated. Vegetation will then be cleared using light hand cutting to pave way for civil works. The proposed site slopes in a south-westerly direction by approximately 2° which is nearly level to gently undulating. This type of slope would entail minimal surface disturbance to form the Paipai Aerodrome facility.

2.4.2 Development phase

This phase entails the uprooting of shrub-stumps. In an area characterized by sparse vegetation, this can be done by handtools to minimize surface disturbance especially on the displaced threshold area and beyond the runway visual range. A grader will then be used to

level and grade the Paipai Aerodrome. The natural slope that tends towards the south-westerly direction forms a natural drainage mosaic, and grading can be done along the mosaic.

2.4.3 Compaction

The soil texture for the site is sandy clay. Compaction can be done using a roller and water supplied from the base camp to increase soil moisture (if the soil is dry) for effective compaction. Where the clay content is higher in the soil matrix (north-eastern end) of the Paipai Aerodrome facility (Plate 5.10), sand should be added to increase soil porosity and aid in compaction.

2.5 WATER SUPPLY

TKBV have drilled a borehole that services the general usage of the base camp. This slightly saline water (Section 5.26, Table 5.4) will be used during the project implementation. Potable water for staff will be supplemented with bottled drinking water.

2.6 EMISSION AND WASTE MANAGEMENT

The proposed Paipai Aerodrome development may result in the following:

- Emissions to air
- Generation of operational and domestic waste.

2.6.1 Emissions

Air Emissions

Air emissions will arise from both direct and indirect sources. Direct emission sources will include vehicles and machinery; indirect emission will be from fugitive emissions such as increased vehicle traffic causing dust generation. The principal atmospheric emissions from these sources will include carbon dioxide (CO_2) and carbon monoxide (CO) oxides of nitrogen (NO_X) and sulphur dioxide (SO_2), which affect the environment as seen in Table 2.1.

Table 2.1: The environmental impacts of different atmospheric releases

Type of emission	Environmental Impact
Carbon dioxide (CO_2)	A GHG that is believed to contribute to climate change
Carbon monoxide (CO)	Enhances low level ozone production, indirectly contributing to climate change
Sulphur dioxide (SO_2)	Contributes to acid deposition/acid rain and toxic gas

Fugitive (indirect) emissions could arise from increased vehicular activities, loading and unloading, spills, leaks from seals and flanges, poor housekeeping practices (for example containers left unsealed) and from small-scale engineering and maintenance operations such as welding. These emissions will be of small volumes and short-lived. They can be minimised by good maintenance practices, by following operational controls for the loading and unloading of materials and watering down during compaction. To minimise unnecessary emission generation, the proponent will ensure that there is extensive pre-planning to ensure that the required equipment, materials and personnel are available at the right location and at the correct time.

Noise emissions

The civil works equipment (grader, roller) will generate noise. Noise will also be produced by trucks bringing in sand and water. In addition, noise will be generated during the operational phase of the Paipai Aerodrome via aeroplane(s) flight, landing and taxiing activities.

2.6.2 Wastes

Waste can be regarded as eliminated or discarded matter that is no longer useful or required after the completion of a process. Wastes over time, if not properly handled, often accumulate and this is usually harmful to the environment.

Types of wastes

Wastes during the project implementation can be categorised as either domestic or operational wastes. Table 2.2 below shows the common wastes and their environmentally significant constituents.

Table 2.2: Waste categories generated.

CATEGORY	TYPE OF WASTE	MAIN WASTE COMPONENT	POSSIBLE ENVIRONMENTALLY SIGNIFICANT CONSTITUENTS
Domestic	Domestic sewage	Biodegradable organic matter	BOD, solids, detergents, coliform bacteria
	Domestic refuse	Packing materials, cleaning materials, garbage, garden leftovers, kitchen waste	Plastics, glass, organic waste
Operational	Drainage	Rain water	Hydrocarbons
	Gases	Exhaust and crank case gases	NO_X, SO_2, CO_X, carbon particulate
		Vapours	Hydrocarbons
		Fugitive gases	Dust particulates
	Waste lubricants	Lube oil, grease	Heavy metal organics

Waste management methods

The waste management aspects as a result of the project activities will be handled at the base camp which is equipped to handle waste matter. The base camp is about 300 m from the project site and hence accessible. Such wastes will be disposed of in laid down waste management procedures which include the following:

i. Sewage treatment and disposal:

A sewage disposal system will be established in the campsite during the Paipai Aerodrome development and the subsequent drilling operations and since the exploration process is a temporary activity, the sewage will be diverted to a septic tank or soak pit. There will be clear separation of grey and black water which allows for proper disposal mechanisms to be put into place. The Contractor will ensure that the installed system meets national requirements and international industry standards.

ii. Landfill and/or pit burial:

Landfilling (in pits lined with impermeable membranes) is the most common onshore disposal technique used for disposing of inert unrecyclable materials and is also used for drilling wastes such as mud and cuttings. Landfilling, if approved by the County Council, is a low-cost, low-tech method that does not require wastes to be transported away from the well site, and, therefore, it is a very attractive option for the proponent. Once the pit locality is closed, the area will be graded to prevent accumulation of water. The sites will then be revegetated with native tree species.

iii. Open burning:

This method can be defined as the combustion of unwanted combustible materials such as paper and wood in open dumps, where smoke and other emissions are released directly into the air without passing through a chimney or stack. Proper strategies will be put into place to ensure that burning does not cause nuisance and that burning will take place during daytime.

iv. Off-site disposal:

Wastes which cannot be handled at the drilling site will be removed to a designated off-site and suitably disposed of for reuse/recycling/municipal disposal.

2.7 DECOMMISSIONING/ABANDONMENT

2.7.1 General activities

It is envisaged that the project is closely related to the test well drilling programme. This programme will be of a short duration (around 3 months). Upon completion of the drilling and testing, the rig will be decommissioned and mobilised to another well site and site decommissioning and restoration will be undertaken. However there is a possibility of long-term use of the Paipai Aerodrome even after the oil exploration activities. In case of a foreseeable limited use of the facility (or closure), the following are some of the activities involved in decommissioning:

- Fencing off of the Paipai Aerodrome
- Putting in place permanent beacons to mark the boundaries of the Paipai Aerodrome in case of vandalism of the fence material.
- Revegetating areas adjacent the threshold of the Paipai Aerodrome with suitable plant material

2.8 SUPPORT OPERATIONS

The development of the Paipai Aerodrome needs support in terms of food, water, fuel, equipment, and material supplies. The supply of these will be coordinated by the base camp operations manager and the civil engineer (TKBV). Day-to-day development activities will be managed by a supervisor based on site. Quality standards of the project shall be the prerogative of the civil engineer who shall carry out efficacy tests on materials and carry out inspections in phases to project completion. Wastes generated as a result of the development

activities, shall be transferred, as necessary, to the base camp for proper disposal. Appropriate medical and transport facilities will be on site in the event that a medical emergency requires immediate evacuation of personnel, and a medevac procedure will be in place.

CHAPTER 3

ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

3.1 APPROACH TAKEN FOR THE EIA

The approach that was taken for the EIA assessment included, with respect to the proposed Paipai Aerodrome development, the following:

1. Scaling and work evaluation (determination of geographical and other boundaries; preliminary assessment);
2. Detailed assessment based on: project design and technologies *vis-à-vis* environment, social, cultural and economic considerations of the project area; evaluation of pre-existing environmental, social, cultural and economic conditions, pressures and impacts; identification and evaluation of potential environmental, social, cultural and economic impacts that may arise from the proposed project; public consultations to explain what the project is all about and to receive their views, perceptions, concerns and local expert knowledge and advice with respect to the proposed project;
3. Determination/evaluation of the significance of the potential project impacts and recommendation of mitigation measures; development of an Environmental Management Plan and Monitoring Programme; and decommissioning of the project;
4. Preparation of the EIA Study Report.

3.2 WORK EVALUATION FOR THE EIA

The work evaluation for the EIA was based on the NEMA requirements (section 1.6.3) and customised for the project to be undertaken (outlined in Chapter 2), as per the objectives and terms of reference outlined in sections 1.8 and 1.9.

3.3 TOPICS ADDRESSED AND ISSUES CONSIDERED

Topic or Context	Issues Considered	Rationale	Spatial Scope	Limitations of Methodology and Consequences for the Study Outcomes
Project Design, Technologies, Scale and Extent	• Project components • Equipment and machinery used • Personnel required • Facilities required • Management of fluid and solid wastes • Occupational and public health and safety • Supplies • Decommissioning	• Project components equipment/ machinery used, and facilities will have a number of environmental impacts related to development, operations and decommissioning • Identification and prioritisation of factors requiring mitigation • Personnel and public safety during operations need to be ensured	• Proposed Paipai Aerodrome site • Access road • Base camp site, storage, repair and waste disposal and facilities	• None
Legislative and Regulatory	• Legislation and regulations	• Need to ensure that all applicable laws are followed	• National legislation and	• None

Framework	applicable to project design, execution, affected parties, and environment protection	during project execution • Need to be conversant with the authorizations required for the regulatory approval of the project • Some legislation, regulations and guidelines have embedded mitigations relevant to the proposed Paipai Aerodrome development	regulations and authorities responsible • International best practices in aviation industry • Company EHS, CSR and Code of Conduct	
Geographical Aspects and Boundaries	• Description of the project area • Identification of key features	• Determination of the context within which the work is to be done • Assessment of the scale and extent of the work	• Project area	• None
Administrative set-up	• Key administrative units and their roles in the project area	• Establishment of jurisdictions • Identification of key administrative contacts • Role in emergency situations (e.g. security threats) and response	• Project area	• None
Communication and Transport	• Road infrastructure • Air transport network • Telecommunications network	• These will determine the ease with which the project will be carried out • Identification of areas difficult to access • Inform on types of equipment/machinery that will be required for the project • Assist in development of contingency/emergency plans	• Project area	• None
Governmental, Non-Governmental and Community Based Organisations	• Activities and projects carried out in the area	• Identification of potential local partners particularly with respect to CSR	• Project area	• None
Physiography and Geology	• Physiography and geology • Assessment of terrain ruggedness • Assessment of susceptibility to landslides, earthquakes, subsidence and floods • Active surface processes	• Establishment of baseline conditions • Identification of potentially difficult areas to work in – terrain and accessibility by vehicles • Identification of areas requiring extra safety precautions • Identification of hazard-prone areas •	• Project area	• Information based on previous EIA report done for the area and ground truthing of the specific project site.
Soils	• Soil condition • Areas subject to wind and water erosion • Soil texture and drainage characteristics	• Establishment of baseline conditions • Ease of accessibility by vehicles • Identification of hazard prone areas (e.g. ponding/flooding)	• Project area	• Information based on previous EIA report done for the area and ground truthing of the specific

	• Soil chemical quality • Assessment of rehabilitation potential	• Identification and prioritisation of factors requiring mitigation		project site.
Climate	• Temperature • Winds • Precipitation	• Establishment of baseline conditions • Information useful for project elements such as cooling of temperature-sensitive equipment and installations • Personnel safety from adverse weather and related conditions e.g. flooding	• Access roads • Selected camp sites and rig facilities • Project area	• Information based on previous EIA report done for the area and ground truthing of the specific project site. • No data available for trend analysis.
Surface and Ground Water Resources	• Ground and surface water sources • Ground and surface water use • Planned water use • Changes in quantity • Identification of project components that can affect water use	• Establishment of baseline conditions • Potentially high demand for water by project group in a water scarce region • Planned water uses that affect water quantity may be blamed on the project proponent • Identification and prioritisation of factors requiring mitigation	• Selected camp site and exploratory well drilling site and facilities • Project area	• Inaccessibility of some areas due to flooding and ponding of the Chalbi Desert
Air Quality	• Ambient air quality • Generation of dust, smoke, odorous fumes, and other toxic gaseous emissions • Identification of project components that can lower air quality	• Establishment of baseline conditions • Assessment of project impacts on air quality • Identification and prioritisation of factors requiring mitigation	• Access roads • Selected camp sites and rig facilities • Project area	• Lack of air quality data on particulate loading, SO_x and NO_x or any other gaseous compounds in the area. Area is, however, rural and undeveloped so air quality can be assumed to be good and varies mainly due to variations in wind speeds (natural particulate loading).
Terrestrial Environment (Habitats, Flora and Fauna)	• Vegetation cover and classes • Habitat conditions • Floral and faunal communities which are uncommon, threatened or endangered • Environmentally sensitive localities • Wildlife corridors	• Establishment of baseline conditions • Physical disturbance of terrestrial environment during operations such as pit excavations, campsite development and drilling rig operation • Determination of pre-project endanged communities • Assessment of areas	• Project area	• Old data, but the ecosystem structures are resilient to the effects of land degradation and deforestation. Land cover, for example, has become more patchy, but the species diversity

	• Pastoral areas • Assessment of ecosystem state	requiring special precautions • Avoidance of human-human and human-wildlife conflicts • Identification and prioritisation of factors requiring mitigation		within the various ecotones remains the same.
Land Resources	• Land use and designation • Existing activities in the area • Currently known and exploited mineral resources • Resource inventory	• The land resources are critical resources supporting livelihoods in the area. • Consideration of competing resources	• Project area	• None
Archaeological, Historical and Cultural Sites	• identification of archaeological, historical, cultural sites	• Establishment of currently known sites • Avoidance of such sites during the development of Paipai Aerodrome	• Project area	• None
Visual Aesthetics	• Aesthetic or high scenic value	• Establishment of baseline conditions • Assessment of project impacts such as vegetation clearance along cut lines and at campsites	• Proposed Paipai Aerodrome site • Access roads	• None
Noise and Vibrations	• Ambient noise and vibration levels in the area • Potential sources of noise and vibrations produced by project operations • Noise impacts on terrestrial fauna	• Establishment of baseline conditions • Noise and vibrations impacts on the project workforce and the neighbouring public • Impacts on nearby structures and facilities	• Proposed project site • Access roads	• Lack of studies on noise and vibration impacts on fauna
Solid and Liquid Wastes	• Disposal of sewage or domestic wastes • Damage to the environment through accidental spills of oil, fuel, cargo, waste or sewage •	• Establishment of baseline conditions • Campsites will require to install waste discharge systems	• Campsite • Working areas	• None
Social Characteristics	• Level of services available • Social support information • Identification of key community needs	• Quality of life baseline. • Ability to absorb change	• Project area	• Language barrier in some places • Unwillingness to adopt new social practices
Economic Setting	• Area targeted for growth • Labour and employment	• Quality of life baseline • Development level baseline • Willingness to adopt new economic activities	• Project area	• Unwillingness by the locals to adopt new economic opportunities
Health Setting	• Status of health facilities • Access to health services	• Determination of the available health facilities in the area • Availability of officials in the	• Project area and the surrounding environment	• Inaccessibility of some areas

	• Occupational health and safety hazards • Hazards due to the use, storage, disposal or transportation of flammable, explosive, or toxic substances • Emission of electromagnetic or other radiation which may adversely affect electronic equipment or human health • Traffic hazards	available health facilities • Emergency preparedness		
Security and Public Safety	• Public risks • Crime • Conflicts over resources • Fires	• Need to enhance security in the project area • Emergency preparedness	• Project area and surroundings	• Some areas are considered as high risk areas in terms of security (inter-tribe conflicts - Rendille vs Gabra)
Public Consultations	• Awareness creation on the project • Environmental pressures in the area • Expert and indigenous knowledge of the area	• Involvement of all stakeholders • Information gathering on environmental issues and concerns in the project area • Acceptability of the project	• Project area and the surrounding environment	• Language barrier
Corporate Social Responsibility	• Community prioritisation of areas/projects for possible CSR assistance	• These were stated during the public consultations	• Project area and the surrounding environment	• High and sometimes unrealistic expectations
Mitigation Measures	• Mitigation hierarchy	• Avoiding or reducing at source • Abating on-site • Abating off-site • Repair or remedy • Compensate for loss or damage	• Proposed Paipai Aerodrome • Access road	• None
Environmental Management Plan	• Effective mitigations specified for the topics addressed • Costs • Responsibility • Management • Relevant legislation and regulations • Decommissioning	• Least possible interference with the environment • Compliance with principles, policies and legislation relating to conservation of environment • Decommissioning of campsite	• Proposed Paipai Aerodrome • Access roads	• None
Environmental Monitoring Plan	• Parameters to be monitored • Personnel required • Training needs	• Ease of monitoring • Effectiveness of monitoring method • Cost of monitoring • Frequency	• Proposed Paipai Aerodrome • Access roads	• None

3.4 COLLECTION OF BASELINE DATA

3.4.1 Overview of Methods

The general framework of the baseline data collection was as follows:

- Scaling and scoping (determination of geographical and other boundaries; preliminary assessment).
- Review of existing regulatory framework and institutional arrangement.
- Detailed environmental assessment and community sensitization.
- Impact identification and development of suggested mitigation measures.
- Development of an Environmental Management Plan including costs estimates and responsibility assignment.

Prior to the field study, a desktop study was conducted to review the available reports, and to design plans and maps in order to compile relevant biophysical and socio-economic information of the project area. The field study (detailed environmental impact assessment, community sensitization and social impact assessment, and development of mitigation measures and environmental management plan) was between 23rd to 26th May Biophysical studies covered environmental aspects such as physiography, climate, hydrology, drainage, soils, geology/hydrogeology, vegetation, wildlife, and aquatic environment. The socio-economic environmental study covered information on issues such as population, literacy, social amenities (healthcare and schools), land use, land tenure, the social dimensions of well- being and income levels, water supply, sanitation levels and security, along with other pertinent issues. The field study also enabled cross-checking of the data compiled during the desktop study.

3.4.2 Physiography and Geology

The physiography and geology data were obtained as described in the EIA report for test well drilling and entailed the following: A literature search and field verification of the physiography, regional geology and geological setting of the project area. Further, this was related to the potential of associated hazards such as subsidence, landslides, earthquakes, soil erosion, etc., and assessed in relation to the proposed Paipai Aerodrome development to be done in the area.

3.4.3 Soils

Soils data were obtained as described in the EIA report for test well drilling. The surface physical characteristics of the study area were described to determine wind and soil-water erosion hazards, flooding, ponding and water-logging potential and accessibility of the study area by equipment and vehicles. A GPS was used to geo-reference the project area. Desktop work included embedding the project area onto the soil map and harmonizing the soil legend.

3.4.4 Climate

Wind data was captured using portable measuring equipment. To verify the findings, the wind and precipitation data were also obtained from published literature and reports.

3.4.5 Air Quality

Determination of the ambient air quality in this rural and sparsely populated setting was assessed qualitatively.

3.4.6 Surface and Ground Water Resources

Water potential and quality baseline data was obtained as described in the EIA report for test well drilling. Assessment was done through literature review and analysis of water samples collected from shallow wells and springs during the EIA field work. The locations of all sampling points were determined and recorded using a GPS receiver. Water results for the project site based at the Paipai base camp have been presented in section 5.2.6, Table 5.4.

3.4.7 Terrestrial Environment

Baseline information for the terrestrial environment, including floral and faunal components, was obtained as described in the EIA report for test well drilling. Data was acquired through field observations and supported by literature review. Considerations included: inventories of habitat types and species (including local names, where provided); vegetation cover, classes, and dominance levels; presence of rare and endangered species; presence of ecological reserves, and any critical ecosystem components; assessment of existing habitat loss or biodiversity decline; and the potential impacts of the exploratory oil and gas well drilling project on the existing ecosystems, flora, and fauna. Field guide books were used in helping to confirm identified species. Habitats and animal encounters of interest were recorded, and photographs of species of mammals, birds, reptiles, amphibians, and arthropods present at the time of observation were taken.

3.4.8 Land and Lake Resources and National Parks

The above information was obtained as described in the EIA report for test well drilling. The assessment was achieved through literature review and direct observation. The issues considered included available natural resources, heritage sites, as well as land use patterns in the area. Also considered was the potential impact of the proposed exploratory oil and gas well drilling project on the resources and heritage sites.

3.4.9 Visual Aesthetics

An assessment of visual aesthetics was based on observations in the field. The following issues were considered:-

- Scenery;
- Geomorphology and landscapes;
- Pristine natural environments;
- Potential impacts of the proposed exploratory Paipai Aerodrome development and associated operations on the visual aesthetics of the area.

3.4.10 Noise and Vibrations

The potential disturbance caused by noise levels during the proposed Paipai Aerodrome development within the project area was taken into consideration during the fieldwork period.

3.4.11 Solid and Liquid Wastes

Possible impacts from solid and oil wastes generated as a result of the proposed Paipai Aerodrome development were assessed taking into account increased use of motor vehicles and civil works equipment, and mitigation measures suggested. An assessment of methods to be employed in solid waste and effluent management in the proposed project was made and implementation suggestions recorded.

3.4.12 Public Consultations and Socio-Economics

Public consultation was accorded high priority so as to inform and create awareness about the proposed Paipai Aerodrome development project, as well as to capture and address the issues and concerns of the communities and other stakeholders within the project area. Thus, these consultations have been designed to be a continuous process throughout the various phases of the project activities, with a view to disseminating information to, creating awareness amongst, and sharing knowledge with, the communities and stakeholders on the project components and their potential impacts and mitigation strategies.

Public consultations were carried out with the following aims:

- To inform the local people and their leaders about the proposed Paipai Aerodrome development project and its objectives;
- To maintain effective communication between TKBV and the host communities;
- Obtain the consent of the people to undertake the project activities and to comply with mandatory statutory regulations;
- Being aware of stakeholders' views of the project with respect to the current environmental conditions in the area and any changes thereof in the future;
- To gather the concerns and views of the local people on the proposed project and the activities to be undertaken;
- To establish if the local people foresee any positive and/or negative impacts associated with the proposed Paipai Aerodrome development, and suggest ways of mitigating negative impacts and enhancing positive impacts arising from it;
- Considering effective participation of the host communities in maintaining and sustaining the beneficial impacts of the project;
- To identify and document the diverse socio-cultural and economic structures in the project area that could potentially be impacted by the project activities;
- Identify legacy issues associated with the previous activities in the project area and ways to tackle such issues; and
- Maintaining continuous interaction with the host communities to obtain early warning information on the physical, chemical, biological, health and social components of the environment in order to tackle any incidences during the project phases.

The public consultations for the Paipai Aerodrome development in the project area were carried out as shown in Table 3.1 below:

Table 3.1: Public consultations schedule and areas covered.

	DAYS & DATES	TIME (Start/End)	AREAS COVERED	DISRICTS	GPS COORDINATES
1	THURSDAY 24/05/2012	11.00 am 12.30 pm	Maikona Location Maikona Division	CHALBI DISTRICT	N03.93291 E037.6333

Other social and economic aspects that were addressed included livelihoods, cultures, education and health. The methodologies employed to assess these aspects included review of available literature, public meetings and consultation with local residents and their leaders, and administration of formal questionnaires and interviews with opinion leaders and at household level.

3.4.13 Health and Public Safety

This assessment was carried out through: literature review of the available health data; and a site-walk survey using a checklist of environmental health and public safety issues.

The main issues assessed include:

- General level of sanitation
- Sources of water and water supply;
- Types of sewage and waste disposal facilities;
- Types and quality of housing;
- Availability of health facilities;
- Interaction between environment and health, and;
- Potential health impacts related to the project.

3.4.14 Key informant interviews

Some administrative, social, economic, cultural and health issues were captured through interviews with key informants such as district administration officers, opinion leaders, councillors, community elders, chiefs, teachers, health workers and spiritual leaders, among others. Some of the information elicited during such interviews included:

- Cultural practices;
- Religion and belief systems;
- Social amenities and infrastructure;
- Health facilities available within the project area;
- Common diseases;
- Community health concerns relating to the project;
- Views on employment of locals in the project, and;
- Security issues.

3.5 DEVELOPMENT OF THE ENVIRONMENTAL MANAGEMENT PLAN (EMP)

3.5.1 The Five-Step Process

The general methodology utilised for impact assessment is a five-step process starting with identification of project activities (Chapter 2 and Table 3.2 below) that may interact with the environment. This is followed by identification of environmental (physical and biological aspects) and social (human aspects) parameters and existing pressures from the environmental baseline study (Chapter 5). The third step involves identification and prediction of any potential positive and negative impact that may result from the defined project activities during its life cycle, based on the impact assessment criteria and rating scales outlined below. In the fourth step, the predicted impacts are then evaluated using an objective significance ranking process. In the fifth step, the cumulative impacts are assessed. This data is then used to develop the Environmental Management Plan.

Table 3.2: Impact assessment criteria and rating scales

CRITERIA	RATING SCALES
Intensity (expected size or magnitude of impact)	**Negligible** **Low** - where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected **Medium** - where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected **High** - where natural, cultural or social functions and processes are altered to the extent that it will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected
Extent (predicted scale of impact)	**Site-specific** **Local** (immediate surrounding areas) **Regional** **National**
Duration (predicted lifetime of impact)	**Short-term** - 0 to 5 years **Medium-term** - 6 to 15 years **Long-term** - 16 to 30 years - where the impact will cease after the operational life of the activity either because of natural processes or by human intervention **Permanent** - where mitigation either by natural process or human intervention will not occur in such a way or in such a time span that the impact can be considered transient
Probability (likelihood of impact occurring)	**Improbable** – where the possibility of the impact materialising is very low **Probable** – where there is a good possibility (<50% chance) that the impact will occur **Highly probable** – where it is most likely (50-90% chance) that the impact will occur **Definite** – where the impact will occur regardless of any prevention measures (>90% chance of occurring)
Status of impact	**Positive** - a “benefit” **Negative** - a “cost” **Neutral**
Degree of confidence (specialist’s level of confidence in predictions and/or information on which it is based)	**Low** **Medium** **High**

3.5.2 Assigning significance ratings

The application of all the above criteria to determine the significance of potential impacts uses a balanced combination of duration, extent and intensity, modified by probability, cumulative effects and confidence.

Significance is described as follows:

Low: Where the impact will have a negligible influence on the environment and no modifications or mitigations are necessary for the given programme description. This would be allocated to impacts of any severity/magnitude, if at a local scale and of temporary duration.

Medium: Where the impact could have an influence on the environment, which will require modification of the programme design and/or alternative mitigation. This would be allocated to impacts of moderate severity/magnitude, locally to regionally, and in the short-term.

High: Where the impact could have a significant influence on the environment and, in the event of a negative impact the activity/ies causing it, should not be permitted (i.e. there could be a 'no-go' implication for the programme, regardless of any possible mitigation). This would be allocated to impacts of high magnitude, locally for longer than a month, and/or of high magnitude regionally and beyond.

The relationship between the significance ratings and decision-making can be broadly defined as follows:

Low: Will not have an influence on the decision to proceed with the proposed programme, provided that recommended measures to mitigate impacts are implemented;

Medium: Should not influence the decision to proceed with the proposed programme, provided that recommended measures to mitigate impacts are implemented; and

High: Would strongly influence the decision to proceed with the proposed programme.

CHAPTER 4:

POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 The Constitution of Kenya, 2010

The Constitution provides that every person has the right to a clean and healthy environment (Article 42). The State is obligated to conserve the environment and natural resources and to protect genetic resources and biological diversity. In that regard it must eliminate any processes or activities that would be likely to endanger the environment. Everyone is expected to cooperate with the State agencies to protect and conserve the environment and ensure that the use and development of the natural resources are ecologically sustainable (Article 69). These environmental rights are enforceable in a court of law (Article 70). Land must be used in a sustainable manner, and in accordance with the principles of sound conservation and protection of ecologically sensitive areas. The State may regulate the use of any land or right over any land in the interest of land use planning (Article 66).
The Constitution of Kenya gives recognition to public, community and private land. Land use regulation goes beyond exploitation merely for economic purposes, and lays emphasis on conservation. It is required that wildlife conservation promotes sustainable development which includes both environmental conservation and economic development. Community land vests in communities identified on the basis of ethnicity, culture, or other similar interest. Apart from land registered or transferred, it consists of land that is lawfully held, managed or used by specific communities as grazing areas or shrines, and ancestral lands (Articles 60 – 72). The State is generally mandated to regulate the use of any land in the public interest. Public land is described as including: specified government forests; government game reserves; water catchment areas; national parks; government animal sanctuaries; specially protected areas; and all rivers, lakes and other water bodies as defined by law.

4.2 The Policy Framework

4.2.1 Environment and Development Policy

The overall goal of the Environment and Development Policy as outlined in the draft Sessional Paper No.6 of 1999 is to integrate environmental concerns into the national planning and management processes and provide guidelines for environmentally sustainable development. It covers the following environment and development issues: biological diversity; land and land based resources; water resources; fisheries and marine resources; energy resources; atmospheric resources; waste management; management of toxic and dangerous chemicals; radiation management; environmental health and occupational safety; human settlements; disaster management; implementation strategies; priorities for action; human resources development; environmental planning; environmental laws; environmental impact assessment; environment and land use practices; environment, industry and economic development; environment, research and technology coordination and participation; regional and international cooperation; and environmental management authority.

The specific goals as set out in the document are:

a) To incorporate environmental management and economic development as integral aspects of the process of sustainable development.

b) To promote maintenance of a quality environment that permits a life of dignity and well-being for all.
c) To encourage sustainable use of resources and ecosystems for the benefit of the present generations, while ensuring their potential to meet the needs of future generations.
d) To promote maintenance of ecosystems and ecological processes essential for the functioning of the biosphere.
e) To promote the preservation of genetic resources, biological diversity, their cultural values and their natural heritage.
f) To incorporate indigenous knowledge, skills, and interests for effective participation of local communities in environmental management and sustainable development.

4.2.2 National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999)

The management of water resources in Kenya is guided by four specific policy objectives, namely:

a) Preserve, conserve and protect available water resources and allocate it in a sustainable, rational and economic way.
b) Supply water of good quality in sufficient quantities to meet the various water needs, including poverty alleviation, while ensuring the safe disposal of wastewater and environmental protection.
c) Establish an efficient and effective institutional framework to achieve a systematic development and management of the water sector.
d) Develop a sound and sustainable financing system for effective water resources management, water supply and sanitation development.

4.2.3 Health Policy

The Kenya Health Policy Framework (1994) sets out the policy agenda for the health sector up to the year 2010, so this is likely to be reviewed in the near future. The policy includes strengthening of the central public policy role of the Ministry of Health, adoption of an explicit strategy to reduce the burden of disease, and definition of an essential cost-effective health care package. To operationalise this Health Policy Framework Paper, the National Health Sector Strategic Plan (NHSSP, 1999-2004) was developed in 1994. The strategic plan emphasized the decentralization of health care delivery through redistribution of health services to rural areas. The plan is currently being revised to reflect the Poverty Reduction Strategy Paper (2001-2004) agenda. The new plan focuses on the essential key priority packages based on the burden of disease and the required support systems to deliver these services to the Kenyans. Major players in the health sector include the government represented by the Ministry of Health (MoH) and the Local Government, private sector and non-governmental organizations (NGOs). The organization of Kenya's health care delivery system revolves around three levels, namely the MoH headquarters, the provinces and the districts. The headquarter sets policies, coordinates the activities of NGOs and manages, monitors and evaluates policy formulation and implementation. The provincial tier acts as an intermediary between the central ministry and the districts. It oversees the implementation of health policy at the district level, maintains quality standards and coordinates and controls all district health activities. In addition, it monitors and supervises district health management boards (DHMBS), which supervise the operations of health activities at the district level.

4.2.4 Energy Policy (Sessional Paper No.4 of 2004)

The broad objective of the national energy policy is to ensure adequate, quality, cost-effective and affordable supply of energy to meet development needs, while protecting and conserving the environment. The specific objectives are to:

a) provide sustainable quality energy services for development;
b) utilise energy as tool to accelerate economic empowerment for urban and rural development;
c) improve access to affordable energy services;
d) provide an enabling environment for the provision of energy services;
e) enhance security of supply;
f) promote development of indigenous energy resources; and
g) promote energy efficiency and conservation as well as prudent environmental, health and safety practices.

4.2.5 Economic Recovery for Wealth and Employment Creation Strategy

The overall goal of the Strategy is to ensure clear improvements in the social and economic well-being of all Kenyans, thereby giving Kenyans a better deal in their lives and in their struggle to build a modern and prosperous nation (GVEP Kenya, 2006). The key areas covered in the Strategy are:

a) expanding and improving infrastructures;
b) reforms in Trade and Industry;
c) reforms in forestry;
d) affordable shelter and housing;
e) developing arid and semi-arid lands; and
f) safeguarding environment and natural resources.

The Strategy, which has commanded a great deal of attention in recent years, essentially subsumes the Poverty Reduction Strategy Paper (PRSP).

4.2.6 Kenya Vision 2030

Kenya Vision 2030 was launched on October 30, 2006, and is the country's new development plan for the period 2008 to 2030. It seeks to transform Kenya into an industrialized "middle-income country providing a high quality of life to its citizens by the year 2030".

Vision 2030 is based on three 'pillars': the economic, the social and the political. The adoption of the Vision follows the successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation (ERS) launched in 2002. The Vision is to be implemented in successive five-year medium-term plans, with the first such plan covering the period 2008-2012.

The economic, social and political pillars of Kenya Vision 2030 are anchored on macroeconomic stability, continuity in government reforms, enhanced equity and wealth-creation opportunities for the poor, infrastructure, energy, science, technology and innovation, land reform, human resources development, security, as well as public sector reforms.

4.3 Kenya Legislation and Regulations

4.3.1 The Kenya Airports Authority Act, Cap. 395

This statute establishes the Kenya Airports Authority which is run by a Board of Directors whose general duties are to: a) provide a coordinated system of aerodromes and its facilities; b) administer, control and manage aerodromes; c) provide, develop and maintain services and facilities for the efficient operation of aircraft; d) provide rescue and fire fighting equipment and services at aerodromes; and e) approve the establishment of private airstrips and control its operations. In carrying out these functions, the Board may among other things, construct or maintain buildings at aerodromes and value land and property for the Authority's purposes. In performing its main duties, the Board must ensure that the Authority's undertaking are operated efficiently, economically and with regard to safety. It must also provide all reasonable facilities (other than visual aids to navigation) for the handling and operation of aircraft and their passengers. In addition, it must ensure that no person or body is given undue preference or subjected to any undue disadvantage. The control and executive management of the Authority is vested in the managing director. The Authority has the power to acquire land for its purposes. It may take water from any natural watercourse subject to the approval of the Minister for Water Development, and to any law regulating the use of such water (sections 8, 9, 13, 17).

4.3.2 The Air Passenger Service Charge Act, Cap. 475

This is a revenue law requiring that a service charge be imposed on passengers departing by air from an airport within Kenya. The specified amounts to be paid may vary from time to time. Passengers on transit and children under the age of two are exempt from liability to pay the charge. If an airline fails to pay the charge, that airline will be liable to pay what is due to the Commissioner-General of the Kenya Revenue Authority. The airline may designate an agent to collect the monies on its behalf and to remit it to the Commissioner (section 3, 4, 5, 5A).

4.3.3 The Kenya Civil Aviation (Amendment) Act, 2002, Cap. 394

The Kenya Civil Aviation Authority is the regulatory body established to control and operate the civil aviation system in Kenya. Its core regulatory functions involve safety and security, licensing and certifying of technical personnel, aerodrome and aircraft operators, and provision of air navigation services The Authority's functions must be consistent with the International Convention on Civil Aviation, 1944 (the Chicago Convention), any Annex to it that relates to the international standards and recommended practices, as well as other international conventions and protocols on civil aviation that Kenya is party to. Further, it is obligated to perform its part as required by agreement, treaty or arrangement between Kenya and any other country, inter-governmental organization or other body in relation to safety and efficiency of air navigation. All aircraft, persons, aerodrome facilities or services are bound by the requirements of the regulations made under the Act. The Authority may recommend an exemption to the Minister, as long as that exemption is in the public interest and is not likely to adversely affect aviation safety. The Minister has the obligation to submit to the Chicago Convention variations of any Annex and any amendment to it that relates to international standards and recommended practices on civil aviation, or other international conventions and protocols that Kenya is party to (Sections 3A, 3B, 7J, and 8A).

4.3.4 The Civil Aviation (Aerodromes) Regulations, 2008

These Regulations apply to Government aerodromes only. The Director of Aerodromes is responsible for managing and maintaining aerodromes established under section 8 of the Civil Aviation Act, as well as the administration and enforcement of the Regulations. In addition the Director has a wide range of powers including to issue and cancel permits, detain aircraft, authorize the search of persons and vehicles, and safety measures. There are restrictions on firearms and dangerous goods within an aerodrome, and regulations on precautionary safety measures to be taken during fuelling operations. There are also restrictions on dumping and other activities that would be a danger to aircraft or persons, for instance, the dumping of garbage that would attract birds or wild animals or be a nuisance. However, there is in existence a proposed *Civil Aviation (Aerodromes) Regulations (Amended), 2012,* prepared by the Authority. These very comprehensive Regulations are in the draft stage, awaiting comments from the public and other stakeholders. They are intended to widen the scope of the extremely limited Civil Aviation (Aerodromes) Regulations, 2008 to encompass other categories of aerodromes. They will also deal with the construction, licensing and certification of aerodromes; the obligations of the aerodrome operator; wildlife hazard management; obstacle restrictions and their removal; aeronautical ground lighting; aerodrome visual aids; aerodrome operations, services, equipment, installations and facilities; and aerodrome maintenance, and information sharing, among other things. This is evidently a step towards full compliance with international standards and best practices on civil aviation, and in particular the Chicago Convention on Civil Aviation, 1944 (Regulations 2 - 4, 7, 10, 12, 21). The Kenya Civil Aviation Authority does have a Manual of Aerodrome Standards covering a wide range of these aerodrome operations. Where it does not have provisions in place, it makes reference to the International Civil Aviation Organisation Standards as being applicable.

4.3.5 The Civil Aviation (Security) Regulations, 2008

These Regulations apply to all aircraft except state aircraft or military or police aviation operations in Kenya and are intended to: a) enhance and safeguard aviation security against acts of violence or unlawful interference and b) regulate the conduct of persons at airports and on board aircraft for aviation security purposes. In addition to regulating aviation security, the Kenya Civil Aviation Authority defines and allocates tasks and coordinates activities of the agencies responsible for various aspects of aviation security under the National Civil Aviation Security Programme (NCASP) established under it. The Authority conducts regular surveys to identify security needs, carries out security inspections and audits of security controls, and conducts tests of such security controls to assess their effectiveness. Every operator of an airport serving civil aviation must establish and implement a written security programme that meets the requirements of the NCASP and the subject Regulations.
Every airport serving civil aviation must establish an Airport Security Committee to coordinate the implementation and maintenance of security controls and procedures as specified in the operator's security programme under the NCASP. Other functions are to oversee the implementation of the decisions or directives of the National Civil Aviation Security Committee, and to ensure that basic minimum-security measures and procedures are adequate to meet threats, and recommendations to improve security measures and procedures are implemented, (Regulation 23). An airport operator is required to maintain and carry out security measures and procedures at the airport to protect passengers, crew, aircraft, airports and aviation facilities and equipment, and prevent acts of unlawful interference and assure that appropriate action is

taken when such an act occurs or there is a threat of such act occurring. This may involve establishing security restricted areas and ensuring that anyone appointed to implement security controls has the appropriate training and can competently perform those duties.
The Authority may at its discretion or on application by any person, exempt a person, airport or category of airports from the application of these Regulations. In determining an application for exemption under the Regulations, the Authority may consider the fact that it would be impracticable to apply the provisions of the Regulations or to comply with the specific requirements from which exemption is sought and may carry out a security risk assessment to determine the threat levels. The Authority may refuse or grant the exemption, or grant it subject to conditions to be imposed (Regulations 3, 5, 24, 68).

4.3.6 The Civil Aviation (Air Navigation Services) Regulations, 2008

An air navigation services provider must submit a manual of air navigation services operations upon application for a certificate. The manual must include, among other things, the safety management system and quality assurance; contingency plans for system failure; provision for compliance with the Civil Aviation (Security) Regulations, 2008; fault and defect reporting; search and rescue responsibilities and coordination; and a summary of safety factors considered before seeking certification. The approval of the Kenya Civil Aviation Authority must be obtained in order to install and use air navigation service facilities in the designated airspaces and aerodromes. The Authority carries out safety inspections and audits on air navigation facilities, services, documents and records of the service provider to ensure the Regulations are being observed. A person who holds a certificate for air navigation must have a safety management system that complies with the Authority's requirements. There is provision for exemption from any application of the Regulations and the applicant must submit the application to the Authority, giving among other things, a detailed description of the alternative means by which the applicant will ensure safety equipment on a level with that established by the regulation in issue; and a review and discussion of known safety concerns as regards the requirement, including information on any relevant accidents or incidents the applicant is aware of. The Authority will evaluate the request and decide whether or not to grant it (Regulations 16, 17, 20, 21, 45, 47).

4.3.7 The Civil Aviation (Aerial Work) Regulations, 2007

These Regulations apply to people involved in agricultural operations, rotocraft external-load operations, glider and banner towing operations and aircraft operations for game viewing, vehicle traffic and sports, sight-seeing, television and movie filming, aerial photography and aerial survey. Anyone wishing to conduct rotocraft external-load operations within Kenya must do so within the terms of a rotocraft external-load operator certificate issued by the AuthorityIn an emergency involving the safety of persons or property, the certificate holder may deviate from the provisions of the Regulations to the extent necessary to meet that emergency. The Kenya Civil Aviation Authority must however be notified of that deviation and the certificate holder must submit to it a complete report of the aircraft operation involved, including a description of the deviation and the reasons for it. All rotocraft external-load operations must be conducted in accordance with the operating manual (prescribed in Regulation 43). A person may apply to the Authority for exemption to the Regulations but must give a detailed description of the alternative means by which a level of safety equal to the one established by the regulation in question will be ensured, and present a review and discussion of any known safety

concerns, including information about any relevant accidents or incidents that the applicant is aware of (Regulation 3, 26, 35, 80).

4.3.8 The Civil Aviation (Airworthiness) Regulations, 2007

These Regulations apply to all persons operating or maintaining a) a Kenya registered aircraft, wherever operated; b) an aircraft registered in another Contracting State but operated by a person licensed in Kenya, and is maintained in accordance with the standards of the aircraft State of Registry, wherever that maintenance is performed; and c) an aircraft of other Contracting States operating in Kenya. All aircraft to which this regulation applies must obtain a valid noise certificate issued by the competent authority in order to operate. Part A of the First Schedule to the Regulations contains a classification (as set out in the ICAO Annex 16, Volume I of the Chicago Convention) of the aircraft that must be noise certified. The certificate is issued on the basis of satisfactory evidence that the aircraft complies with the requirements which are at least equal to the applicable standards specified in Annex 16 Volume I of the Chicago Convention. Any aircraft ceasing to comply with the applicable noise standards will have its noise certificate suspended or revoked. If the aircraft is found on reassessment to comply with the applicable standards, the Authority will re-instate or grant a new noise certificate (Regulations 3, 33, 34).

4.3.9 The Civil Aviation (Instruments and Equipment) Regulations, 2007

All aircraft must be equipped in accordance with the law of the State of Registry, and no one may fly an aircraft registered in Kenya unless it is equipped as specified in the Regulations. Anyone operating an aircraft in Kenya must ensure that all the required emergency equipment is on board the aircraft, is clearly marked, and is stowed or maintained so as not to cause danger on the aircraft. All required instruments and equipment of an aircraft must be approved and installed in line with applicable requirements as to airworthiness. An operator who desires to operate in Kenya a foreign registered aircraft that uses an airworthiness inspection programme approved by the State of Registry, must first ensure that all the instruments and equipment required by the Regulations are properly installed and inspected in conformity with the State of Registry requirements. The minimum performance standard and the operational and airworthiness requirements must be met. All aircraft must be equipped with emergency and flotation equipment that is readily accessible to the crew and passengers, and must be inspected regularly. An aircraft may not be flown over land areas designated by the state concerned as areas where search and rescue would be especially difficult, unless it is equipped with signalling devices and life-saving equipment, including means of sustaining life in that area. The aircraft must also have an automatic emergency locator transmitter. Appropriate hand fire-extinguishers must be provided for use in crew, passenger, and cargo compartments and galleys (Regulations 3, 43, 47, 51).

4.3.10 The Public Health Act, Cap. 242

This legislation focuses on securing and maintaining health. The Director of Medical Services may enter any premises to execute or superintend rules for prevention of disease. Any noxious or waste water discharged from any premises into any watercourse, irrigation channel or bed not designated to receive it is deemed a nuisance (section 118). It is the duty of every local authority to take measures to prevent any pollution dangerous to the health of any supply of water which the public uses for domestic purposes. They must purify the water supply should it

become polluted, and take appropriate action against any person polluting any such water supply or any stream so as to cause a nuisance or danger to health (section 129). They are also obligated to take measures to maintain clean and sanitary conditions and to prevent or remedy any nuisance that may cause injury to health (section 116). The Minister may make rules (a) as to the standard or standards of purity of any liquid which may be discharged as effluent after treatment or (b) for the discharge of liquid or other material prone to cause offensive smells, pollute streams, or are likely in any way to be a nuisance or dangerous to health (section 126).

4.3.11 The Occupational Safety and Health Act, No. 15 of 2007

This legislation applies to all workplaces. Every occupier must ensure the health, safety and welfare at work of all the people working in his workplace as well as protect other people from risks to safety and health occasioned by the activities of his workers. The occupier's duty to ensure the safety, health and welfare of all persons at work in his premises includes providing a working environment and work procedures that are safe. The likely emission of poisonous, harmful, or offensive substances into the atmosphere should be prevented, and where such incidents occur, they must be rendered harmless and inoffensive. Machinery, protective gear, and tools used in all workplaces have to comply with the prescribed safety and health standards. Dust, fumes or impurity must not be allowed to enter the atmosphere without appropriate treatment to prevent air pollution or harm of any kind to life and property. Highly inflammable substances must be kept in a safe place outside any occupied building. Where dangerous fumes are liable to be present, there must be a means of exit and suitable breathing apparatus made available. Means for extinguishing fire must be available and easily accessible, and evacuation procedures tested regularly (Sections 6, 21, 47, 55, 64, 78, 79, 81, 82).

4.3.12 The Local Government Act, Cap. 265 (Revised 2010)

This Act gives local authorities the power to control or ban businesses, factories and workshops which may emit smoke, fumes, chemicals, gases, dust, smell, noise or vibration, and in so doing become a danger or annoyance to the neighbourhood. The local authority may therefore lay down conditions under which such enterprises may carry on business (section 163). A local authority may refuse to grant or renew a licence, or cancel it on various grounds, some of which are (a) that it would cause nuisance or annoyance to the residents; and (b) that the methods adopted or proposed to prevent noxious or offensive vapours, gases or smells arising from the trade are not efficient (section 165).

4.3.13 The Physical Planning Act, Cap. 286

The statute applies to all parts of the country save for those areas exempted by the Minister. Each local authority has the power to prohibit or control the use and development of land and buildings in the interests of proper and orderly development of its area. If a local authority is of the opinion that a proposed development, dump site, sewerage treatment plant, quarry or other development activity will impact on the environment adversely, it will require the applicant to submit an environmental impact assessment report for consideration. Development permission must be obtained from the local authority for any development to be carried out in the area (Sections 2, 29, 30).

4.3.14 The Wildlife (Conservation and Management) Act, Cap. 376

Where the Minister is satisfied that in order to secure the safety of the flora and fauna or to preserve the habitat and ecology within a national park, reserve or sanctuary, it is necessary to restrict or forbid any activity in the adjacent area, he may declare it a protected area and prohibit those activities. The Wildlife Director or any authorized officer of the Service may close a portion of a national park or any road or part of a road within the park to the public or any class of people, for a period for the protection of animal or plant life, or for the safety of the public, or for the protection of a road, or for climatic reasons, or for any other reason (Regulation 4). The Minister may declare that any provision of the Act shall apply to non-game animals, or to any trophy or meat of any such animal, and on publication of the notice the animal concerned will be deemed to be a game animal or game bird (section 15).
Where the Minister is satisfied that in order to secure the safety of the flora and fauna or to preserve the habitat and ecology within a national park, reserve or sanctuary, it is necessary to restrict or forbid any activity in the adjacent area, he may declare it a protected area and prohibit those activities (Section 15).

4.3.15 The National Museums and Heritage Act, Cap. 216

The Minister may prohibit or restrict access or any development which in his/her opinion is liable to damage a monument or object of archaeological or palaeontological interest there. A protected area means a site which has been and remains so declared by the Minister under section 25 (1). These include (a) an open space, (b) a specified site on which a buried monument or object or archaeological or palaentological interest exists, including the adjacent area, or (c) a geo-park. The protected area may be placed under the control of the National Museums of Kenya. Where private land is included in a protected area, the owner of the land is entitled to compensation. All antiquities lying in or under the ground, or on the surface of any land protected under the law as a monument, or being objects of archaeological, palaeontological and cultural interest are the property of the Government (sections 25, 34, 35, 46).

4.3.16 The Energy Act, No. 12 of 2006

Anyone in the petroleum business must comply with the Kenya Standard or other approved standard on environment, health and safety and in conformity with the relevant laws in that regard. A person transporting petroleum by inland waters, pipeline or any other mode must institute measures to ensure that the mode of transportation is safe. Anyone engaged in any licensed undertaking must notify the Energy Commission of any accident or incident causing loss of life, personal injury, explosion, oil spill, fire or any other accident or incident causing significant harm or damage to property or to the environment (sections 98, 117).

4.3.17 The Water Act, Cap. 372

The Minister is mandated to prescribe a system for classifying water resources in order to determine resource quality objectives of each water resource. It is an offence to willfully obstruct, interfere with, divert or obstruct water from any watercourse or water resource, or to negligently allow such acts, or to throw any dirt, effluent, trade waste or other offensive or unwholesome matter or thing into or near any water resource in such a way as to cause or be likely to cause pollution of the water resource (sections 12, 44 and 94).

4.3.18 The Water Resources Management Rules, 2007

No one may discharge any toxic or obstructing matter, radioactive waste or other pollutants into any water resource unless the discharge has been treated to permissible levels. Discharge of effluent into a water resource requires a valid discharge permit issued by NEMA. The willful and deliberate spilling into any water source or onto land where such spillage may contaminate any surface or groundwater is not permitted. Any threat of contamination must swiftly be dealt with (Regulations 81, 82, 88). NEMA may identify a catchment area or part of a catchment area or water resource to be recognized as a protected area or designated as a groundwater conservation area if it is satisfied that it is necessary to protect the water resource and its multiple uses (Regulation 123).

4.4 National Environment Management Authority - Act and Regulations

4.4.1 The Environmental Management and Co-ordination Act, 1999

The Environmental Management and Co-ordination Act, 1999, provides for the establishment of an appropriate legal and institutional framework for the purpose of managing the environment and matters connected with it. The National Environment Management Authority ('the Authority') is established under section 7 of the Act. Its mandate is to monitor the operations of industries, projects or activities to determine their immediate and long-term effects on the environment. The Act (Part .VIII) sets out provisions pertaining to environmental quality standards. It establishes a Standards and Enforcement Review Committee whose broad functions are to (a) advise the Authority on how to establish criteria and procedures to measure water and air quality and (b) issue standards and guidelines for the safe and proper disposal of waste (sections 70, 71, 78, 86). Where Kenya is a party to an international convention, treaty or agreement on the management of the environment, the Authority must initiate legislative proposals to give effect to them and in addition identify other measures necessary to implement the treaty, convention or agreement nationally (section 124). The Authority may prescribe measures to ensure that the biological resources in place are preserved, issue guidelines to promote the conservation of the various terrestrial and aquatic systems, and protect species, ecosystems and habitats threatened with extinction. Any area of land, lake or river may be declared a protected natural environment in order to promote and preserve specific ecological processes, natural environment systems or species of indigenous wildlife. Noise must not be emitted in excess of the laid-down standards (sections 42, 43, 51, 54, 72, 102).

4.4.2 The EIA Guidelines and Administrative Procedures

The Environment Impact Assessment and Administrative Procedures arose from the policy framework and the legislative and regulatory (the Environmental Management and Co-ordination Act, 1999, and its regulations) procedures in order to assist in the integration of environmental concerns in economic development so as to foster sustainable development. The document sets out guidelines for carrying out Environmental Impact Assessment (EIA), Environmental Audit and Monitoring, Strategic Environmental Assessment and dealing with issues of transboundary, regional and international conventions, treaties and agreements. It sets out the procedure in EIA studies and Environmental Audits as well as the contents and format of the reports required to be submitted to NEMA for consideration. The EIA study review process and decision-making are also explained. The guidelines are mainly intended to assist

project proponents, EIA practitioners, lead agencies and members of the public to understand the process and the basis on which decisions are made.

4.4.3 The Environmental (Impact Assessment and Audit) Regulations, 2003

Any project that is likely to have a negative impact on the environment must be submitted to an environmental impact assessment process. The terms of reference must include matters considered germane in the environmental impact assessment process as set out in the Second Schedule to the Regulations. In addition, the study must take into account environmental, social, cultural, economic, and legal considerations. The report must state: a) the proposed location of the project and a description of the environment likely to be affected; b) the products, by-products and waste generated by the project; c) the project's environmental effects, including the socio-cultural consequences and the anticipated direct, indirect, cumulative, irreversible, short-term and long-term impacts; d) an environmental management plan proposing the measures for eliminating or mitigating adverse impacts on the environment; e) an action plan to prevent and manage foreseeable accidents and dangerous activities in the course of carrying out the project; and f) the measures to prevent health hazards and to ensure security in the workplace for the employees (Regulations 4, 7, 11, 16 and 18).

4.4.4 The Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit-Sharing) Regulations, 2006

Regulation 4 provides that no person shall engage in any activity that may have an adverse impact on any ecosystem or lead to the unsustainable use of natural resources. The conservation of biological diversity applies to any area of land, lake or river which the Minister has declared to be a protected natural environment system for purposes of promoting and preserving biological diversity in accordance with section 54 (on protection of environmentally significant areas) of the parent Act (Regulation 8).

4.4.5 The Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

The Regulations prohibit the making of loud, unreasonable, unnecessary or unusual noise or excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of other people and the environment. There are laid-down permissible noise levels which may not be exceeded unless the noise is reasonably necessary to preserve life, health, safety or property. Any person intending to engage in any commercial or industrial activity likely to emit noise or excessive vibrations must carry out that activity within the prescribed level of emission (Regulations 3-5, 11).

4.4.6 The Environmental Management Co-ordination (Fossil Fuel Emission Control) Regulations, 2006

Every person in Kenya is entitled to a clean and healthy environment and is obligated to safeguard and enhance that environment. Internal combustion engines are subject to inspection and must pass tests to show that they comply with the standards and requirements for the control of air pollution or contamination. It is an offence to operate an internal combustion engine which emits smoke or other pollutant in excess of the emission standards.

NEMA may approve any substance to be used as a fuel catalyst if it improves fuel economy, enhances combustion and reduces harmful emissions that adversely affect human, animal and plant health, and degrade the environment. In order to better control toxic emissions, all internal combustion engines must use only fuel that has been approved by the Authority. The cost of clearing pollution through fuel emission is borne by the polluter (Regulations 4, 7, 8, 12).

4.4.7 The Environmental Management and Co-ordination (Water Quality) Regulations, 2006

Everyone is required to refrain from any act which directly or indirectly causes water pollution, and no one may throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such material in or near it so as to cause pollution. No one is permitted to carry out any activity near lakes, streams, springs and wells that is likely to have an adverse impact on the quality of the water without an environmental impact assessment licence. It is an offence to discharge or apply any poison, toxic or obstructing matter, radioactive wastes or other pollutants or permit the dumping or discharge of any such matter into water meant for fisheries and wildlife (Regulations 4-8, 12 and 24).

4.4.8 The Environmental Management and Co-ordination (Waste Management) Regulations, 2006

Anyone generating waste must minimize it by adopting cleaner production methods. This may be done by improving the production process through conserving raw materials and energy, eliminating the use of toxic raw materials and reducing toxic emissions and wastes. Other methods would be to monitor the product cycle by identifying and eliminating the product's potential negative impacts, recovering and reusing the product where possible, and reclaiming and recycling it. Waste can also be minimized by incorporating environmental concerns in the design and disposal of the product. Every industrial undertaking must mitigate pollution by installing at its premises anti-pollution equipment for treating the waste it generates. Discharge or disposal of any waste in any form into the environment is not permitted without prior treatment. An Environmental Impact Assessment licence must be obtained by anyone intending to engage in any activity likely to generate hazardous waste. Anyone generating toxic or hazardous waste must have it treated according to the laid-down guidelines (Regulations 14, 15, 17).

4.5 International Practices, Standards and Conventions

Kenyan laws and regulations on civil aviation as they stand at present are inadequate as they do not cover all the major aspects of civil aviation operations. As a result, the Kenya Civil Aviation Authority has been, and still is, operating below acceptable international standards. The on-going review of the regulations on aerodromes, once completed satisfactorily, will go a long way towards remedying this situation, as will the enactment of legislation based on the provisions of the Chicago Convention (in particular Annexes 1 to 18) . In the meantime, all civil aviation operations will need to be complemented by all applicable global standards and best practices as well as the principles contained in relevant international conventions.

Article 2 of the Constitution of Kenya provides that the general rules of international law shall form part of the laws of Kenya, as shall all the treaties and conventions that she ratifies. Kenya ratified the Chicago Convention on Civil Aviation, 1944, on May 1st, 1964. This Convention has

18 Annexes covering all the key aspects of civil aviation, namely: personnel licensing; rules of the air; meteorological service for international air navigation; aeronautical charts; units of measurement to be used in air and ground operations; operations of aircraft; aircraft nationality and registration marks; airworthiness of aircraft; facilitation; aeronautical telecommunications; air traffic services; search and rescue; aircraft accident and incident investigation; aerodromes; aeronautical information services; environmental protection; security (safeguarding international civil aviation against acts of unlawful interference; and safe transport of dangerous goods by air.

4.5.1 Annex 14 to the International Civil Aviation Convention

The purpose of most specifications in this Annex is to improve the safety of aviation. Volume I of the Annex applies to all public airports. It deals with the planning and design of aerodromes as well as their operation and maintenance. The airport's movement area comprises the runways, the taxiways and the apron. The specifications of their physical characteristics, namely width, surface slope and distances from other facilities make up the greater part of the Annex. Later inclusions cover specifications for runway end safety areas, clearways and stopways. These facilities form the basic structural system for airports. Besides the ground environment of the airport, specifications must define its airspace. To ensure the continued expansion of the airport, the volume of this airspace must also be defined to prevent aerodromes from becoming unusable due to objects and buildings projecting into space. Limits are laid down as to how high these objects and/or buildings may be permitted to rise. The requirements to provide specific obstacle limitation surfaces and their dimensions are classified by the type of runway. Six runway types are recognized: non-instrument approach runways, non-precision approach runways, precision approach runways categorized as I, II and III, and takeoff runways.

Visual aids are the primary means used to guide and control aircraft on the ground. They must of necessity be standardized as they need to be understood by pilots all over the globe. High intensity lights are used for both day and night operations, while simple markings may suffice in some daytime conditions. Airport signs are an additional type of visual aid.

A part of the Annex is intended to improve the safety of equipment near runways in order to reduce the danger such equipment may pose to aircraft operations. Requirements for secondary power supply are also included. Features of airports that might attract birds that endanger aircraft operation are done away with. A rescue and fire fighting service is of vital importance to the operation of an airport, and all international airports must have one. Accurate information on the condition of airport facilities must be provided if any aircraft is to take off or land safely. The Annex sets out the nature of such information (e.g. the level of airport rescue and fire fighting services, and the condition of the runway surfaces) and how it is to be determined and reported.

Volume II of the Annex deals with heliports. It addresses the physical characteristics and obstacle limitation surfaces required for helicopter operations, covering surface level and elevated on-shore heliports and helidecks. Also included are the marking and lighting of heliports, and rescue and fire fighting equipment of heliports.

4.5.2 Annex 16 to the International Civil Aviation Convention

Annex 16 of the Chicago Convention (adopted in 1971) recognizes the adverse environmental impact that may be related to aircraft activity. It deals with the protection of the environment from the effect of aircraft noise and aircraft engine emissions. Volume I covers noise certification. Volume II contains standards which prohibit the intentional venting of raw fuel to the atmosphere from certain specified aircraft, as well as standards which limit the emission of smoke. Also included are standards which limit the emission of carbon monodioxide and other dangerous gases.

4.5.3 The Vienna Convention on the Protection of the Ozone Layer, 1985

Under this Convention, States committed themselves to protecting the ozone layer and to cooperation in increasing understanding of atmospheric processes, being aware of their potentially harmful impact on human health and the environment due to a damaged ozone layer. The parties commit to taking appropriate measures to protect human health and the environment against these adverse effects resulting or likely to result from human activities which modify or have the potential to modify the ozone layer. The measures include a) cooperating on research and sharing information in order to better understand and assess the effects that modification of the ozone layer has on human health and the environment, b) adopting appropriate legislative and administrative measures and cooperating in harmonizing policies to control, limit, reduce or prevent or reduce these activities under their jurisdiction, and c) cooperating on the formulation of agreed procedures, measures and standards for implementing the Convention.

4.5.4 The Montreal Protocol on Substances that Deplete the Ozone Layer, 1987

This Protocol is an international agreement to protect the stratospheric ozone layer from harmful synthetic chemical compounds. The Protocol targets synthetic chemical substances that destroy the upper level protective ozone layer of the planet and whose destructive behaviour persists for decades or even centuries, depending on the chemical compound. The Protocal stipulates that the production and consumption of compounds that deplete the ozone in the stratosphere are to be phased out, as, once released into the atmosphere, they could significantly deplete the stratospheric ozone layer that shields the earth from damaging ultraviolet-B radiation.

4.5.5 The Basel Convention on the Transboundary Movement of Hazardous Wastes, 1989

The main objective of this Convention is to protect human health and the environment against the adverse effects of hazardous wastes. It applies to a wide range of “hazardous wastes” based on their origin and/or composition, as well as their characteristics. It also covers household and incinerator ash under “other wastes”. It aims to: a) reduce hazardous waste generation and to promote environmentally sound management of hazardous wastes, wherever they happen to be disposed of (This is done through provisions requiring States to observe the basic principles of environmentally sound waste management); b) restrict transboundary movements of hazardous wastes unless it is seen to be in accordance with the principles of environmentally sound management (This is achieved by prohibitions on exporting hazardous wastes to Antarctica, to a State not party to the Convention, or to a party which has banned the import of hazardous wastes); and c) regulate cases where transboundary movements are

permissible (It may be allowed only if it represents an environmentally sound solution, if the principles of environmentally sound management are observed, and if it is done in accordance with the Convention's regulatory system).

4.5.6 The Kyoto Protocol, 1997

This Protocol, arising out of the United Nations Framework Convention on Climate Change (UNFCCC), was adopted to help combat the adverse effects of climate change, or global warming. It calls for nations to commit to reducing greenhouse gas emissions. It has set mandatory targets on greenhouse gas emissions ranging from -8 to +10% on each country's individual 1990 emissions levels with the intent to reduce their overall emissions by at least 5% below existing 1990 levels in the commitment period 2008 to 2012. There is a prescribed timetable for emission reduction. New mandatory targets are to be set for the period after 2012.

4.5.7 International Best Practice and Standards

4.5.7.1 The International Civil Aviation Organization (ICAO)

The International Civil Aviation Organization (ICAO) has set civil aviation goals and standards and recommended practices to guide international civil aviation in enhancing safety and security standards in the industry, increasing efficiency in civil aviation operations, and promoting development of the industry in a manner that is not detrimental to the environment.
ICAO recognises the Safety Management System which is widely accepted and used globally as a key tool in the realization of best practices in the industry. It necessitates the regular assessment of performance to ensure that the goals set by Civil Aviation bodies are achieved and improved on. Appropriate training to enhance the competency of technical personnel is vital for improving efficiency and commitment to periodical audits on safety and security procedures help control risks to aviation.

4.5.7.2 The World Bank Resettlement Policy

The World Bank's environmental and social safeguards policies require that the country in issue prepare an Environmental and Social Management Framework (ESMF) and a Resettlement Policy Framework (RPF) in line with the national laws, applicable international treaties, and OP 4.1). Once the site is identified, Environmental and Social Impact Assessments (ESIAs) and Resettlement Plans are prepared as part of the project implementation but before the infrastructure is put in place. The magnitude and complexity of the resettlement plan will determine its scope and level of detail. The plan is grounded on the existing information on the proposed settlement and its impacts on the persons who will be displaced and other groups that may be affected. The legal issues involved in the resettlement must also be considered. The plan will include a description of the project, the potential impacts, the objectives, the socio-economic aspects, the legal and institutional framework, costs and budget, among other things.

CHAPTER 5

BASELINE ENVIRONMENTAL AND SOCIAL PARAMETERS

5.1 INTRODUCTION

This chapter provides a description of the current environmental and socio-economic situation against which the potential impacts of the proposed Paipai Aerodrome project area can be assessed, and any future changes monitored and rectified if necessary. It provides details of the desktop studies, field survey, and reference to results from laboratory analyses of samples collected in the field, which are based on the methods applied as outlined in Chapter 3, in relation to the Paipai Aerodrome development site and its surrounding areas which may be directly or indirectly impacted upon by the proposed development activities.

5.1.1 Project Location and Layout of the Chapter

The general project area lies in Marsabit North (Chalbi) district (Figure 5.1). It is bounded by latitudes *ca.*3 ºN and longitudes *ca.*35ºE.

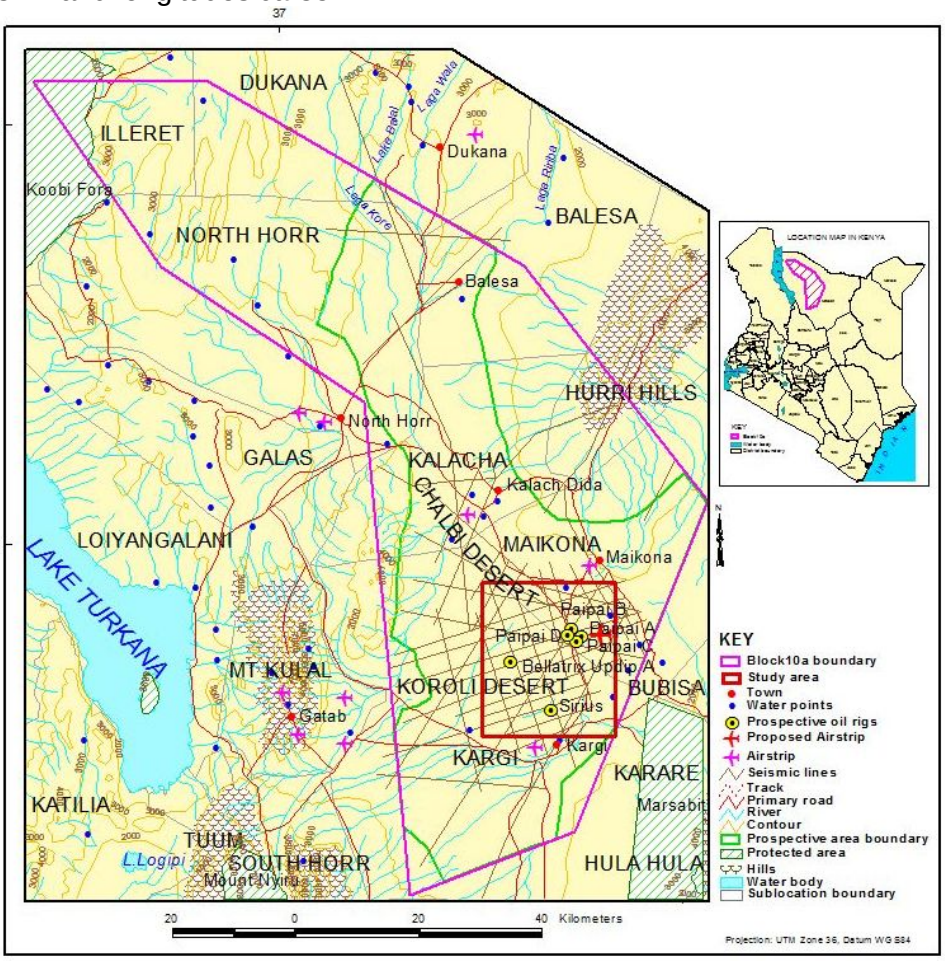

Figure 5.1: Location of the project area.

5.1.2 Geographical Aspects and District Boundaries

The key geographical aspects of the project area have been described in Chapter 1, section 1.4. The project area lies in Marsabit North (Chalbi), part of the area covered in Block 10A (Figure 5.1). Marsabit District was recently sub-divided into three districts, namely Marsabit South, Marsabit Central, and Marsabit North (Chalbi) Districts, which cover a total area of approximately 14,747.57 km^2 and all fall under one local authority namely the Marsabit County Council (Figure 5.2). The Proposed Paipai Aerodrome site is adjacent to the Paipai base camp and the Paipai test well drill sites (Figure 5.1).

It should be noted that information provided in this chapter may be limited due to lack of previous research or published literature. However, many of these gaps have been in-filled to varying degrees by the field investigations that were carried out in the course of preparing the report, though some factors such as long-term trends in, e.g., local climate and air quality, were constrained by scarcity of data. The data inadequacies have been pointed out in Chapter 3, section 3.3. It is recommended that TKBV undertake monitoring programs with the relevant authorities to ensure compliance with the environmental guidelines, especially in instances where baseline information is insufficient.

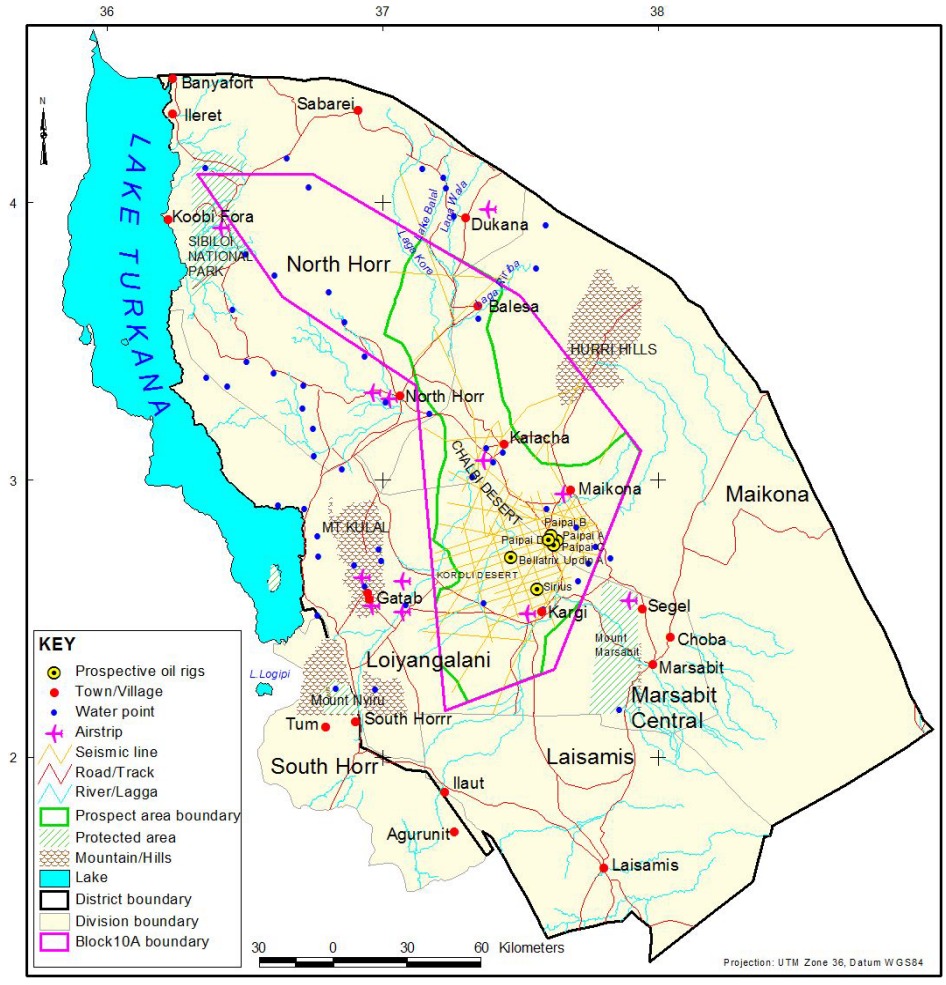

Figure 5.2: Districts within the study area

5.1.3 Administrative Structure

Block 10A in general where Tullow Kenya B.V is prospecting for oil lies in the three districts of Marsabit Central, Marsabit North (Chalbi) and Marsabit South, and have their administrative headquarters in Marsabit, Maikona and Laisamis Towns, respectively. Loiyangalani District, which was subsequently carved out of Marsabit South District, has its headquarters in Loiyangalani. Marsabit District has three constituencies, namely Laisamis, Saku and North Horr, all served by the Marsabit County Council. Districts are headed by District Commissioners, constituencies by elected Members of Parliament, and County Councils by Mayors elected from amongst and by popularly elected Councillors. Since the implementation of the new constitution that was promulgated in August 2010 is still ongoing, the old structure where Districts fall under Provinces is still in place. The Districts of the area are in North Eastern Province, which is headed by a Provincial Commissioner whose headquarters is in Marsabit.

5.1.4 Communications and Transport

The main road to the project area is the Nairobi-Isiolo-Moyale highway, which is bitumen up to Isiolo Town and currently under development to extend it to Laisamis Town. This highway, which is used by livestock dealers and small-scale business people to transport their wares to and from Nairobi, can be used to transport development and exploration machinery to the project area. The project are itself is characterized by a poor murrum and earth road network; there are no tarmac roads. These roads are motorable, but are generally impassable during rainy seasons.

There are a number of airstrips close to the major towns of Maikona, Kargi, Marsabit and Kalacha (Figure 5.1). Marsabit Airport is the airport of choice for larger aircraft as it has a tarmac runway that is approximately 1.6km long. Kalacha has an 800m long airstrip within the town and another larger, but disused one, about 5km out of town. These airstrips do not have management facilities or offices on site.

The project area is not well-covered by telecommunications services save for Maikona and Kargi which have Safaricom and Telkom wireless network coverage respectively, although the Telkom wireless network at Kargi is not very reliable. Recently TKBV installed a safaricom BTS at the Paipai Base camp which has improved the communication by mobile telephony in the area with a reach to Kargi which is served by Telkom wireless. The land-based telephone network is extremely poor and unreliable. The mobile telephone network is much better and more reliable, though there are still vast areas that are not under coverage. Radio communications are not, as a rule, used by the public. They fall in the domain of security agencies (e.g. Kenya Police, Kenya Army), some governmental agencies and parastatals such as Kenya Wildlife Services (KWS), and tourist safari companies. These radio communications are not inter-linked, as they are run on different radio frequency bandwidths. Satellite telephones are therefore of prime importance for work in the region (covered by Thuraya), but are generally very expensive and therefore also not in use by the general public.

5.1.5 Government, Non Governmental and Community-Based Organizations

There are several non-governmental/religious-based organizations operating within the project area (Block 10A). These organizations, in collaboration with the government, assist the community through provision of essential socio-economic and cultural services. Some of the

organizations that have had a positive impact in the area include the Catholic Church, Pastoralists Integrated Support Programme (PISP), Solidarities, Community Initiative Facilitation and Assistance (CIFA), African Inland Church (AIC), Food for the Hungry Kenya (FHK), Care Kenya, and Arid Lands Resource Management Project (a community-focused drought management project of the Kenya Government that utilizes a credit facility from the World Bank).

5.2 BASELINE SURVEY

5.2.1 Physiography and Geology

The proposed site is in the Chalbi Basin, an inland drainage basin surrounded by lava uplands. In its centre lies the Chalbi playa, a bare surface of mud subject to occasional flooding, at 370 m above sea-level. A volcanic plateau borders the Chalbi Basin to the east and extends both northwards (towards Kalacha) and southwards (towards Kargi). A number of volcanic shields, e.g. the Huri hills, rest on the basalt plateau.

Most of the rivers draining into the hydrologically closed Chalbi Basin are found on the western and southern parts and tend to be mostly east-west oriented; they originate from Mount Kulal to west (Balesa River) and Mount Nyiro to the south-west (Kargi Lugga). Others originate from Mount Marsabit to the south-east (Sangarta and Sangai Lugga) and Huri Hills to the north-east (Lugga Dambito). The ephemeral rivers on the western side of the project area flow in a west-east direction into the Chalbi playa. The rivers may flood their channels during the wet seasons.

The project area is founded on Proterozoic sedimentary and volcanic rocks that were folded and metamorphosed during the Late Proterozoic-Cambrian Mozambiquian Orogeny and located within the Anza Graben. Post-Cambrian uplift or erosion produced a planar land surface upon which the coarse clastic sediments of the Maikona formation were deposited (MENRM, 1987). Further erosion and regional warping produced the regional sub-Miocene planar surface which defined the NW-trending Chalbi Basin. Fossiliferous lacustrine beds were deposited in this Basin during the Miocene (the Karole formation west of the project area) on top of the Maikona formation. Dune fields also surrounded the playa (Chalbi desert) (Muturi and Siambi, 1984), which is overlain by Quaternary sediments. Fluctuating climate caused lake level changes in the Chalbi Basin (IPAL, 1983).

5.2.2 Soils

Soil Mapping Units

The exploratory well drilling sites are found in the piedmont plains (Mapping unit YV) complex of sedimentary plains and dunes (Ps2+D1) and lacustrine plains that form part of the Chalbi Desert (Mapping unit PI3). The sites accordingly, are Sirius, Bellatrix and Paipai respectively (Figure 5.23 below). The mapping unit within the exploratory drilling sites and the Paipai Aerodrome project area is summarised below. The soil classification process follows the FAO-UNESCO legend that accommodates the worlds' soils in order to overcome gaps in national classification systems and to provide a common basis for soil correlation. The identification of soils is based on the presence of diagnostic horizons and diagnostic properties which are defined by measurable morphological, physical and chemical criteria related to soil characteristics that are the result of soil formation. There are 26 soil units recognized by the FAO-UNESCO legend of which Kenya has 23. The soil mapping unit description refers mainly

to the characteristics of the subsoil, usually 'B' horizon, to a depth of 100cm (less if impenetrable material such as bedrock occurs at a shallower depth). Among the parameters described is: drainage condition, effective soil depth, colour (moist condition), mottling (if present), consistence (moist condition), calcareousness (if present), salinity, sodicity (if present), rockiness (if present), stoniness (if present), cracking (if present), texture, additional information on special topsoil or subsoil features, landform, geology, inclusions of other soils, etc. (Sombroek et al., 1982). For mapping units the first letter represents the landform while the second letter represents the geology of the unit.

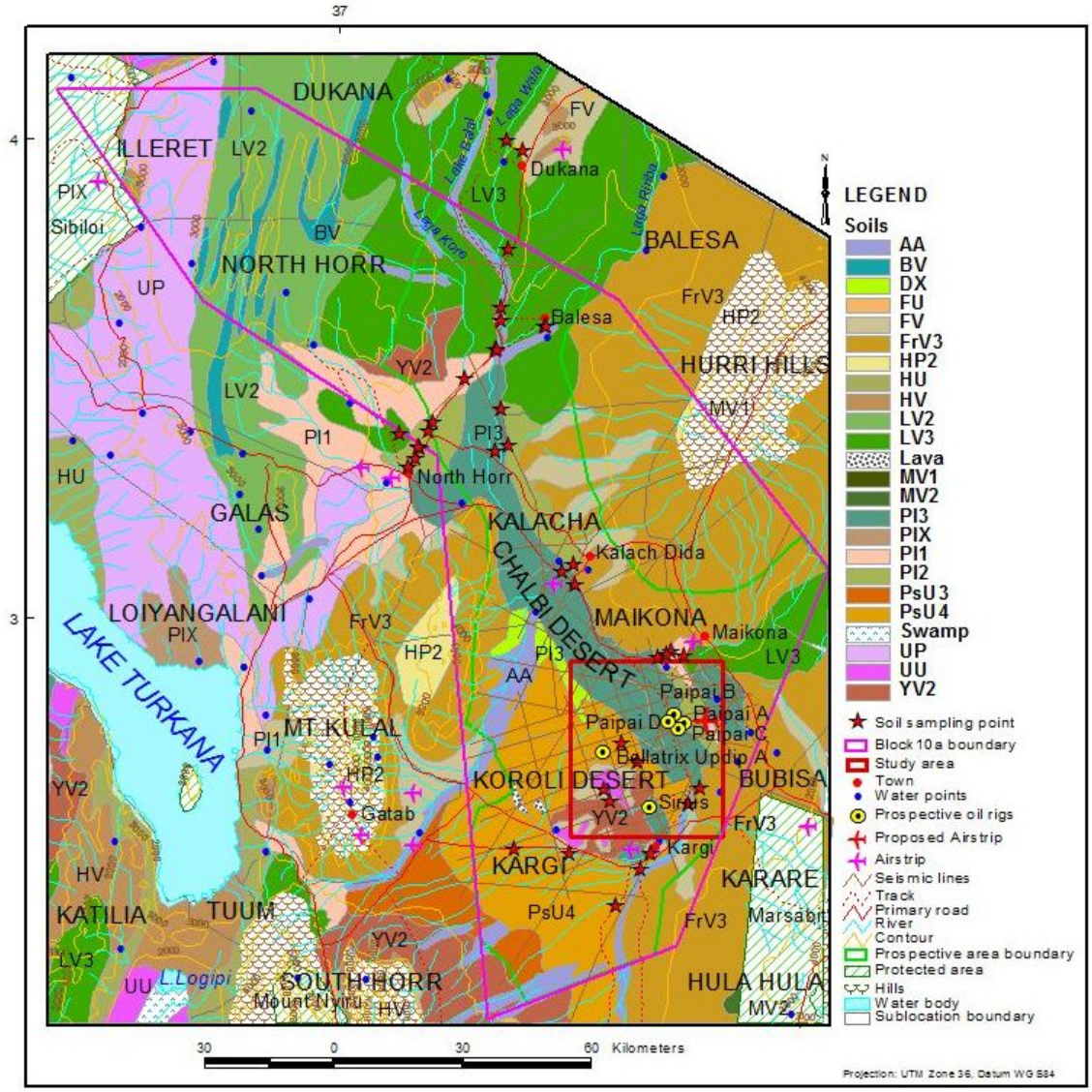

Figure 5.3: Soil map of the project area showing the exploratory drilling sites.

The proposed Paipai Aerodrome project site [(Threshold co-ordinates runway 05: N 2°46'51.12" , E 37°40'53.89" at 382m (1260feet) AMSL and runway 23: N 2°47'25.11", E 37°41'30.44" at 394m (1300ft) AMSL; centre of strip coordinates: N 2°47'8.03", E 37°41'12.06" at 388m (1280 feet) AMSL(figure 5.1)] lies in the outer fringes of the lacustrine plain (Mapping unit PI3) that forms part of the Chalbi Desert. The lay of the project site is akin to the outer edge of a bowl that slopes gently towards the middle and hence towards the Chalbi Desert. This meso relief

(gently sloping to undulating) ensures that drainage is not impeded and therefore there are no localized salt pans. The study was done during the wet season and there was no evidence of surface ponding like that found within the Chalbi. The unit has been decribed below.

Mapping unit PI3

The lacustrine plain (Mapping unit PI3) is level to nearly level with a slope of 0-2% and bounded by undulating meso relief consisting of dunes. The geology of the unit is sediments from various sources. The unit has sandy surface soils with quartzite primary minerals that exhibit sealing and crusting (Plate 5.2 & 5.3). The unit also has abundant localized salt puffs that are whitish in colour. Salt crystals in common shallow salt pans can be seen in much of the unit. The surface is nearly barren with sparse vegetation consisting of *Astrostripa* and spear grass varieties. The unit is bound on the western side by PI2 unit which has common sand dunes that support *Acacia tortilis*, *Commiphora africanas* and *Indigofera spinosa* vegetation. These dunes are common in distribution and active with loose, surface sandy soils that are susceptible to increased wind-caused erosion.

The surface characteristics of the proposed Paipai Aerodrome project site indicate soils with a sandy clay textural matrix with slightly higher percentage of clay on the north-eastern end compared to the south-westerly end of the proposed Paipai Aerodrome. Quartzite primary minerals are abundant and the coarse sand particles provide for increased porosity and hence better drainage. This fact together with the gentle slope tending south-westwards ensures that the Paipai Aerodrome drains well towards the Chalbi Desert.

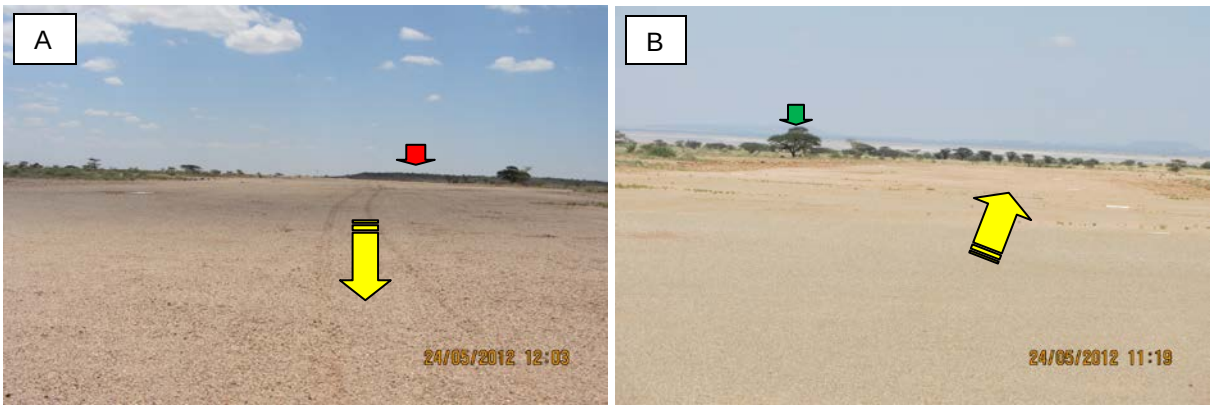

Plate 5.1 (a&b): (a) Paipai Aerodrome site view from NE towards SW and (b), same site and same view, from mid position towards the Chalbi Desert (Yellow arrows indicate direction of slope from high to lower elevation). Note the low ridge (vertical relief of 20m) at the rear of the aerodrome threshold ('A'- red arrow) and Acacia tortilis trees at the fringes and towards the Chalbi Desert ('B'-green arrow)

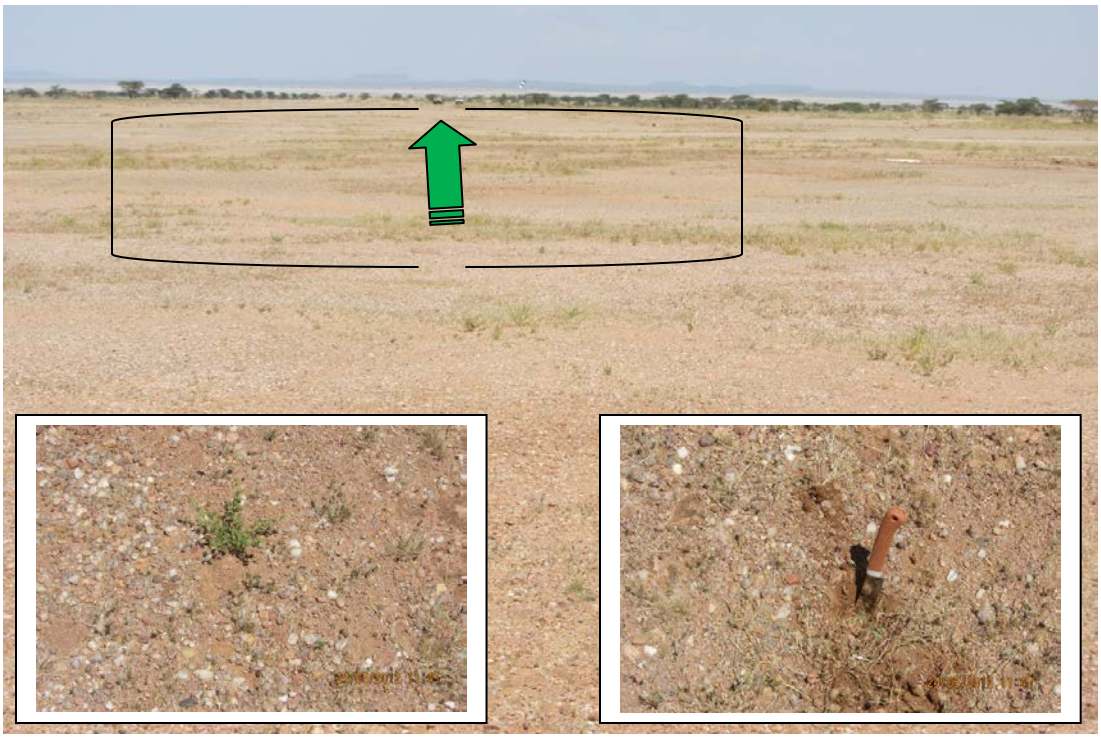

Plate 5.2: Paipai Aerodrome site from NE end close-up, sloping towards the SW (green arrow) showing undulatng microrelief (braces) and dwarf shrubs and grass spp vegetation (inset left) and moist, friable, sandy clay textured soils with surface quartzite pebbles that support vegetation growth (inset right).

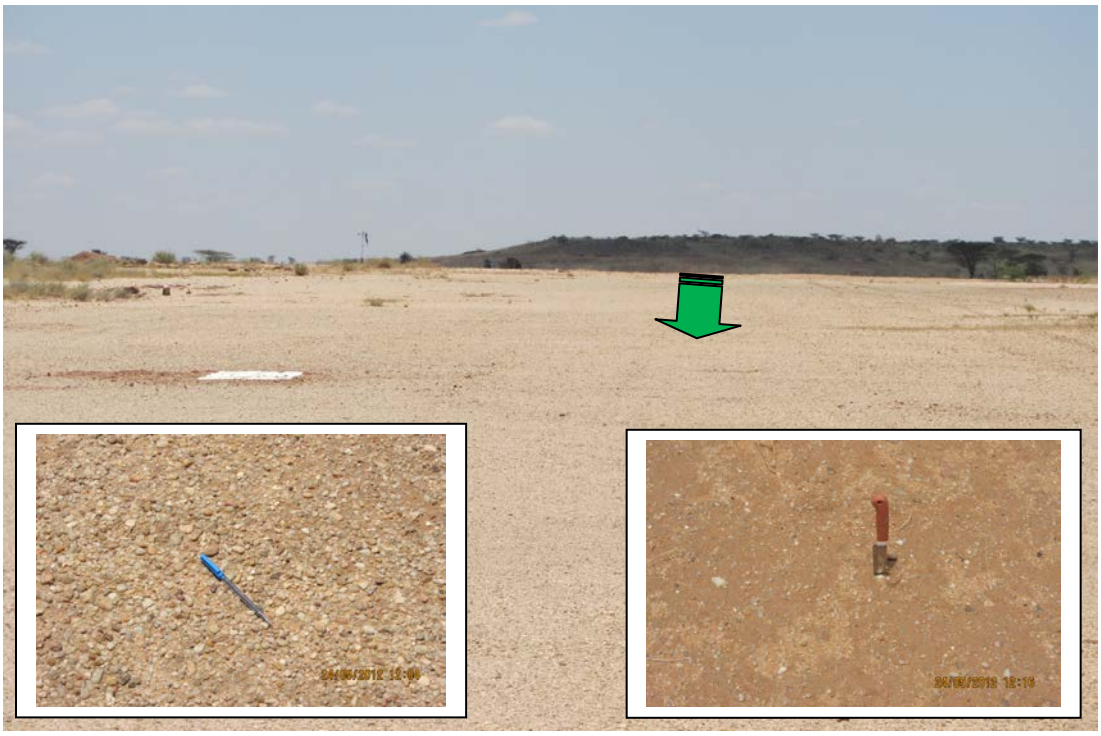

Plate 5.3: Paipai Aerodrome site from SW end close-up showing gently sloping (green arrow) smooth, microrelief devoid of vegetation and coarse quartizite surface pebbles(inset left) and moist, firm, sandy clay textured compact soils that are sealed (inset right).

Table 5.1: Soil Description within specified soil mapping unit observed during the field survey that is significant for project logistics and EMP

Unit	Locality	Brief Description	(*)Natural Hazards	Implications for the Project and EMP
Lacustrine plain (Mapping unit Pl3)	Found to the west of the Chalbi Desert and south of Maikona	The soils are poorly drained, moderately deep to deep, dull yellow orange, friable to firm, calcareous, overlying a *caliche* layer, saline sandy clay (The soil classifies as *haplic Solonchak* (Sombroek et al., 1982). Locally (project site) The surface soils are moderately well drained, moderately deep to deep, dull yellow orange, friable to firm (NE & SE ends respectively), saline coarse sandy clay.	• Potential soil structure degradation due to inherent salt content • Denuded unit with very little vegetation	• Mechanical compaction on soil may further degrade the poorly structured soil. • Further surface disruption may denude the existing scanty and sparse vegetation

5.2.3 Climate

The project area is characterized by two types of climatic conditions: dry and wet, and hot and dry; it is an arid to semi-arid zone. The mean annual rainfall for the arid and semi-arid zones ranges between 300-550 mm, but may significantly be lower, ranging between 150-350 mm annually for the very arid zones such as Chalbi Desert. The relative humidity is very low. The bi-modal rainfall distribution is extremely variable and unreliable and drought is a constant threat. The long rainy season is between the months of March to May with a peak in April, while the short rainy season is during October to December with a peak in November (Sombroek et al., 1982). During the dry seasons (January to February; June to September), the temperature ranges from 30–37^{o}C, while in the wet seasons it ranges from 20-25 ^{o}C. The highest temperatures are experienced in August/September and may often exceed 37^{o}C while the lowest temperatures are experienced in November and December (Sombroek et al., 1982).

Relationship to Project and EMP

These climate characteristics have the following implications for the project team:

- Due to the high temperatures, the project team should have adequate water supplies;
- Erratic, unpredictable and torrential rains that result in flash floods can pose a danger to crew especially at lugga crossings. Transportation in the field can also be bogged down as a result of flooded and ponded areas, with the risk of crews being cut off for a number of hours or even days.

5.2.4 Air Quality

The project area is sparsely populated, undeveloped and in a rural setting far from major towns, cities, agricultural and industrial centres that are the major contributors of air pollution. Despite this, the area is arid and semi-arid and is characterized by strong winds and whirlwinds that move significant amounts of dust and soils from one area to another, and this has resulted in formation of sand dunes and other types of aeolian deposits. Thus, the air “pollution” in the area

relates to the significant quantities of air-borne dust. Minimal and transient air pollution also occurs as a result of the few vehicles traversing the area and raising dust, as well as releasing exhaust fumes. Herds of grazing animals also cumulatively contribute to dust pollution in the course of movement from one point to another. At the proposed Paipai Aerodrome site, the wind is easterly and its speed varies between 3.5m/s and 4.5m/s.

Relationship to Project and EMP

Strong winds within the Chalbi and Karoli deserts often whip up dust storms that can reduce visibility and pose accidents and health problems, as well as jam sensitive machinery and electronic equipment.

Abatement of these effects is considered in the mitigations in Chapter 7.

5.2.5 Surface and Groundwater Resources

5.2.5.1 Surface Water Resources

The surface water potential is extremely low, particularly during dry seasons (for water quality results, refer to section 5.2.6). Permanent supplies of surface water in the area are rare and confined to a limited number of spring-fed pools, oases, water pans, earth dams and luggas. Other sources of surface water are the rather erratic, mostly transient rivers (luggas) that flow only for a few hours or days after rain, draining into the Chalbi Basin and recharging the ground water. A small earth dam, newly constructed by the National Water Corporation is found at Kargi Township area, otherwise the surface waters rapidly disappear by natural seepage and evaporation.

5.2.5.2 Groundwater Resources

Groundwater resources form the most available source of water supply in the project area. It is exploited through shallow wells (excavated in luggas) that are either open or fitted with hand pumps. Many hand-dug shallow wells exist in Kargi area along the luggas; out of 6 wells, only one has a good source of drinking water. The water is used both for domestic purposes and watering livestock.

The peripheral springs appear to have two sources: (1) water confined within the volcanic shield flows radially and downwards away from the summit areas for eventual discharge at the interface of the thin peripheral lavas and underlying sedimentary rocks; and (2) low-pressure artesian water that is held in sedimentary rocks where they are overlain by shields, discharging where the confining volcanic overburden ends.

Relationship to Project and EMP

Due to the scarcity of water resources, TKBV should source its own water supply from their borehole at Paipai basecamp for the Paipai Aerodrome development and personnel residing in the camp and working within the project area. The borehole could be handed over to the neighbouring community at the end of the oil exploration project. An unlikely potential project impact on water resources (quantity) would be the possible compaction of near-surface aquifers, particularly close to where springs emerge, by heavy vehicles and/or machinery. Compaction would reduce the aquifer storage capacity and transmissivity, resulting in lower yields at the spring outlet.

5.2.6 Water Quality

Potential ground and surface water pollution will need to be considered in the context of development, sanitation and domestic waste discharge facilities and systems that will be installed at the Paipai Aerodrome development site (see Chapter 2) and unplanned leakages of oils and/or grease at the development site.

Baseline water samples collected for physico-chemical analysis at the the Paipai base camp borehole are indicated in Table 5.4 below. Microbiological analysis was not undertaken due to technical logistics relating to sample preservation time (only six hours maximum before they are analysed) and lack of water analytical laboratories in the project area, therefore, only physio-chemical analysis was carried out.

Table 5.2: Water quality in the project area (Paipai base camp–Borehole). WHO limits are for drinking water quality. Red shaded cells show the limits are exceeded.

Parameter	Unit	Result	Guide Low	Guide High	Low	Normal	High	Symbol	Current
pH		**8.83**	6.50	8.50				pH	8.83
Electrical Conductivity	mS cm -1	**1.77**		< 1.50				EC	1.77
Ammonium	ppm	**0.44**		< 1.50				NH4	0.44
Calcium	ppm	**< 0.05**		< 250.00				Ca	< 0.05
Magnesium	ppm	**< 0.01**		< 50.00				Mg	< 0.01
Potassium	ppm	**0.80**		< 12.00				K	0.80
Sodium	ppm	**401.10**		< 200.00				Na	401.10
Nitrate N	ppm	**26.35**		< 11.00				NO3N	26.35
Nitrite	ppm	**0.02**		< 3.00				NO2	0.02
Phosphorus	ppm	**0.12**		< 0.20				P	0.12
Iron	ppm	**0.12**		< 0.30				Fe	0.12
Manganese	ppm	**< 0.01**		< 0.50				Mn	< 0.01
Zinc	ppm	**< 0.01**		< 3.00				Zn	< 0.01
Copper	ppm	**< 0.01**		< 2.00				Cu	< 0.01
Boron	ppm	**0.36**		< 0.30				B	0.36
Chlorides	ppm	**244.17**		< 250.00				Cl	244.17
Bicarbonate	ppm	**363**		< 250				HCO3	363
Fluorides	ppm	**0.33**	**0.50**	**1.50**				Fl	0.33
Sulphur	ppm	**24**		< 84				S	24
Colour	H.U	**< 10**		< 15				Col	< 10
Hardness	%	**17.12**		< 500.00				CaCO3	17.12
Total dissolved solids	ppm	**556**		< 1000				TDS	556
Carbonate	ppm	**3.00**		< 121.00				CO3	3.00
Silicon	ppm	**15**		< 50				Si	15

The water found in the Paipai borehole is not suitable for human consumption. The values of pH, Ec, Na, Nitrate-N, Boron and bicarbonates are all above the WHO limits (Table 5.4). The nitrate concentration renders this water unfit for human consumption. The high nitrate content in

the water could be due to the exploited aquifer being leaky and interacting with an organic-rich sedimentary rock layer or palaeosol at depth. This water is also bitter in taste, due to the high sodium and salt levels. Currently the water is being used for general domestic purposes like washing of equipment and general cleaning. However, the water can be used in the construction of the aerodrome especially during compaction. Avoid using water to form cement, ballast and sand mixture paving blocks used as outer markers for the runway. The saline water will cause cracks in the blocks. Use non saline water for this.

5.2.7 Terrestrial Environment

The information available on the terrestrial environment is based on research, surveys and old published literature and reports – no new work is apparently being carried out on species inventory and ecology in the area, as well as on human impacts such as land degradation and deforestation, that may have some implications on ecosystem integrity, species diversity, and resilience. The remoteness, inaccessibility and insecurity in some parts of the area have hampered these activities. Nevertheless, the ecosystem remains largely pristine due to the nomadic nature of the people, with fragmentation and degradation being the most significant factor due to the growing human and livestock populations.

The area belongs to the larger 'Somali-Masai regional centre of endemism' ecoregion (northern part of Kenya and south-west Ethiopia) (White, 1983), which is moderately rich in species, but has a low level of endemism. The grasses, shrubs and trees of the ecoregion are fire-tolerant because fires are frequent in the dry season. In years of high rainfall, huge areas of semi-desert annual grasslands are found. *Aristida adcensionis* and *Aristida mutabilis* dominate, but during droughts these species and the grasslands can be absent for many years. The next most extensive vegetation types are dwarf shrublands, dominated by *Duosperma eremophilum* on heavier, wetter sedimentary soils and *Indigofera spinosa* on stabilized dunes (White 1983).

The habitats in Block 10A range from barren landscapes (parts of Maikona, Chalbi and Karoli Deserts), to near-barren landscapes interspersed with pockets of dwarf shrubs and *Acacia spp* in areas such as North Horr, Balesa, Kalacha, Dukana, and Kargi. Dense bushland of *Salvadora persica* and *Acacia tortilis* occur in hilly areas of Maikona and Kurkum respectively. The areas of North Horr (Dabandable Hills), Ririma area of Kargi, and Kurkum have sparse bushland habitat types dominated by *Acacia spp*, *Balanites aegyptica,* and/or *Cadaba* sp. Dwarf shrublands of *Indigofera spinosa* and *Euphorbia cuneata* are found in parts of North Horr, Elgade and Balesa*.* Along the luggas and water courses, there are pockets of riverine woodlands occurring in cohort with shrubs of *Salvadora persica* and *Calotropis procera* (Figure 5.3).

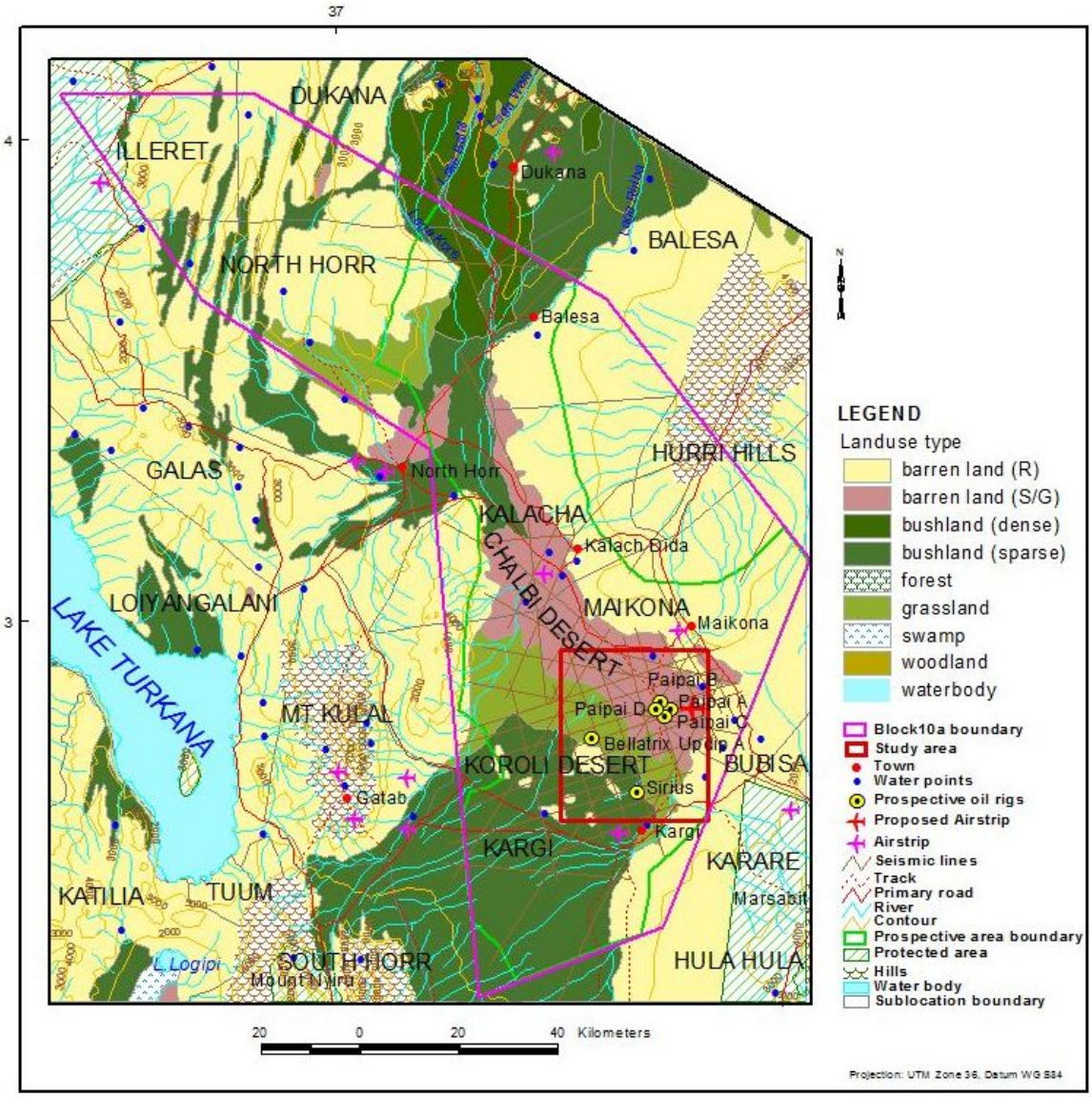

Figure 5.3: Vegetation map of the project area

Amongst the animals that can be found in this region are the arid-adapted mammalian fauna which include: Burchell's zebra (*Equus burchelli*), Grevy's zebra (*Equus grevyi* - a species listed by IUCN as endangered), Beisa oryx (*Oryx beisa beisa*, listed by IUCN as of least concern), Grant's gazelle (*Gazella granti*), Topi (*Damaliscus lunatus*), Lion (*Panthera leo*), Cheetah (*Acinonyx jubatus*, Vulnerable), Leopard (*Panthera pardus*), Reticulated giraffe (*Giraffa camelpardalis reticulata*), and Elephant (*Loxodonta africana*). Among the small mammals there is also a near-endemic Gerbil, *Gerbillus pulvinatus*. The populations of large wild mammals are greatly reduced. In particular, the Black rhino (*Diceros bicornis*, critically endangered) used to be found here, but has been exterminated through over-hunting (Boitani, 1999 and East, 1999).

The common terrestrial birds include: Black-faced sandgrouse, Kori bastard, Heuglin's bastard, Black bellied bastard, Helmeted guinea fowl, Vulturine guinea fowl, Taita fiscal, Superb starling, white crowned starling, Brown necked crow, Mourning dove, White bellied cuckoo, Abyssinian

roller, white browed sparrow weaver, crested lark, shinning sunbird, speckled pigeon, Namaqua dove, White headed buffallo weaver, White browed sparrow weaver, Eastern pale chanting goshawk, Sacred ibis, Yellow billed hornbill, Egyptian vulture, Griffon vulture, Lapet faced vulture and Somali ostrich.

5.2.7.1 Habitat Type for the project site

Near barren

This habitat type can be found at the proposed Paipai (A, B, C and D) sites, where less than 20% of the landscape has vegetation cover save for perennial *Duosperma spp* dwarf shrubs and annual *Austostripa* and *Aristida spp* grasses that constitute the vegetal cover that fringes the ChalbiDdesert. The project site however is vegetated (Plate 5.4).
Locally, the vegetation at the project site is wooded sparse dwarf shrubland dominated by *Acacia tortilis* and *Indigofera spinosa* dwarf shrubs and grass *spp.*

Plate 5.4: Wooded, sparse dwarf-shrubland dominated by Acacia tortilis (yellow arrow) and Indigofera spinosa dwarf shrubs (red arrows) and grass spp, adjacent the proposed Paipai Aerodrome site which is on the foreground (vegetation described is south of the facility)

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Relationship to Project and EMP

The Paipai Aerodrome site is nearly barren save for the vegetation on the fringes. It is usually used for dust-baths by livestock (donkeys and camels). The issue of vegetation clearance will be minimal and the sparse vegetation on site may require light hand cutting.

The activities of TKBV are not expected to significantly alter the flora of the region as the Paipai Aerodrome development and feeder road clearance will be site specific and highly localised (covering not more that 4.5 Ha of land area), and the impacts are expected to be short to medium-term. The area has sound ecosystem integrity, species diversity and is capable of regenerating itself once use of project site is complete. However to restore the area to original form, to counteract potential denudation and hence negative environmental impact, it is recommended that TKBV reclaims the land by re-planting indigenous trees on project decommissioning.

5.2.7.2 Terrestrial Fauna

Faunal species that can be found in this ecosystem include the Grevy's zebra which is the biggest and wildest of Africa's three zebra species, and is endemic to northern Kenya and Ethiopia. Their numbers have fallen sharply in recent years - from about 15,000 in the 1970s to an estimated 2,500 in 2005. They are now classified as endangered as a result of habitat loss, competition with livestock, and hunting. The major threats to the ecoregion are overgrazing, habitat modification and insecurity that makes it difficult to carry out conservation and research activities.

5.2.7.2.1 Mammals

Many mammals hide or seek shelter during the daylight hours and are therefore hard to see. Signs of their activity, such as footprints and burrows, were observed during the course of this fieldwork. The mammals that can be found in the project area include: Olive baboon (*Papio anubis),* Black backed jackal (*Canis mesomelas),* Guenther's dik dik (*Madoqua quentheri),* Spotted hyaena (*Crocuta crocuta),* Porcupine (*Hystirx cristata)*, Grant's gazelle (*Gazzela granti)*, Gerenuk (*Litocranius walleri*), Ground squirrels (*Xerus inauris),* Cape hare (*Lepus capensis),* Grevy's Zebra *(Equus grevyi)*, Warthog (*Phacochoerus africanus)*, Reticulated giraffe (*Giraffa camelopardalis reticulate)*, and Beisa oryx (*Oryx gazella beisa*) .

5.2.7.2.2 Birdlife

Birdlife in the area is supported by the varied habitats and inlcudes Spotted thick-knee, Spur winged plover, Crowned plover, Egyptian vulture, Lapet faced vulture, Griffon vulture, Chestnut sandgrouse, Yellow-billed hornbill, Yellow throated spur fowl, Common bulbul, Egyptian goose, White-faced whistling duck and brown necked crow (Plate 5.5).

Plate 5.5: Brown-necked crows perched on the watch tower roof and security berm at the Paipai base camp near the proposed Paipai Aerodrome site.

5.2.7.2.3 Arthropods

Arthropods present represent several orders: Odonata (Dragon flies), Orthoptera (Grasshoppers and Crickets), Isoptera (Termites), Coleoptera (Beetles), Lepidoptera (Butterflies and Moths), Diptera (Flies and Mosquitoes), Hymenoptera (Wasps and Bees), Blattodea (Cockroaches) and Phasmida (Walking sticks). Arachnids present include ticks, spiders and scorpions.

Relationship to Project and EMP

TKBV needs to carry out its activity with the mitigations outlined in the EMP in Chp 8 to avoid polluting and modifying the habitat of the endangered Grevy's zebra, the vulnerable Gerenuk, and more generally, that of the ecosystem. Areas of Kalacha Dida and Kalacha Goda springs should be avoided as it supports the endangered Grevy Zebra.
Locally, TKBV needs to comeup with a potential bird strike policy. The Medate Koro and Medate Forole springs to the south and south-west of the Paipai Aerodrome site respectively, harbour a rich varied birdlife. Sacred ibis, Marabou storks, Ravens, Marshal eagle and several waterbirds have been spotted from the project site flying towards the watersources. Grant's gazelle, Grevy's Zebra and Spotted hyaena have been spotted near the proposed Paipai Aerodrome site. It is imperative that TKBV think of ways to manage the Paipai Aerodrome to avoid wildlife and livestock crossings when the facility is in use.

5.2.8 Land Resources

The main land resource in the project area is livestock that forms the backbone of the local people's livelihood. The main livestock in the area are camels, goats, sheep, donkeys, and a few herds of cattle. Water resources are scarce, with certain areas experiencing acute water shortage. Areas like Kalacha and Maikona have adequate supply of water for both domestic and livestock use. Along the luggas in the area, duom palms grow and are used for basketry and thatching temporary houses. Locally, the Medate Koro and Medate Forole springs provide adequate water supply for domestic and livestock use around the project area.

Relationship to Project and EMP

The nature and scale of the project will not significantly affect the land resources: Minimal vegetation will be cleared.

5.2.9 Archaeological, Historical and Cultural Sites

The proposed project area is home to the culturally rich Gabra and Rendile communities. The Gabra occupy Dukana, Balesa, North Horr, Kalacha and Maikona area while the Rendille are found in Kargi. While no site has been officially gazetted, there are historical and cultural sites within the block which the communities do not want disturbed. Locally there is a graveyard at the hills that are found in the North-east fringes of the proposed Paipai Aerodrome site.These sites are listed in the Table 5.3 below:

Table 5.3: Cultural sites within the project area

AREA	SITE TYPE	IDENTIFICATION CRITERIA/ LOCATION	COMMENTS
1. Kargi	1. Livestock Ritual/ Cleansing Site	Fare and Algas	Livestock are cleansed here to keep off any invaders. The sites have stacked stones and signify the origin of the Rendille community.
	2.Livestock Watering Point	Koroli Oasis within the Chalbi Desert	This is a very important livestock-watering point for the community.
2. General	1. Cultural/Religious (Yaa) Sites	Found on hilly areas only.	Yaa are the community's elders' shrines where the traditional religious elders intercede for the community. Each of the five Gabra clans has its shrine. These sites are revered and should not be interfered with whatsoever.
3. Kalacha Area	Artifact Site (Not gazetted yet)	Afkaba found in a gorge about 12 kilometres from Kalacha town centre	These are community guarded caves that have ancient drawings depicting the origin of the Gabra community.
4. project site	Graveyard	Found on the ridge in the north-east fringe of the proposed Paipai Aerodrome	These are gravesites representing conflicts between communities who have used the ridge as a citadel during war times. Those who died in action were buried in the ridge

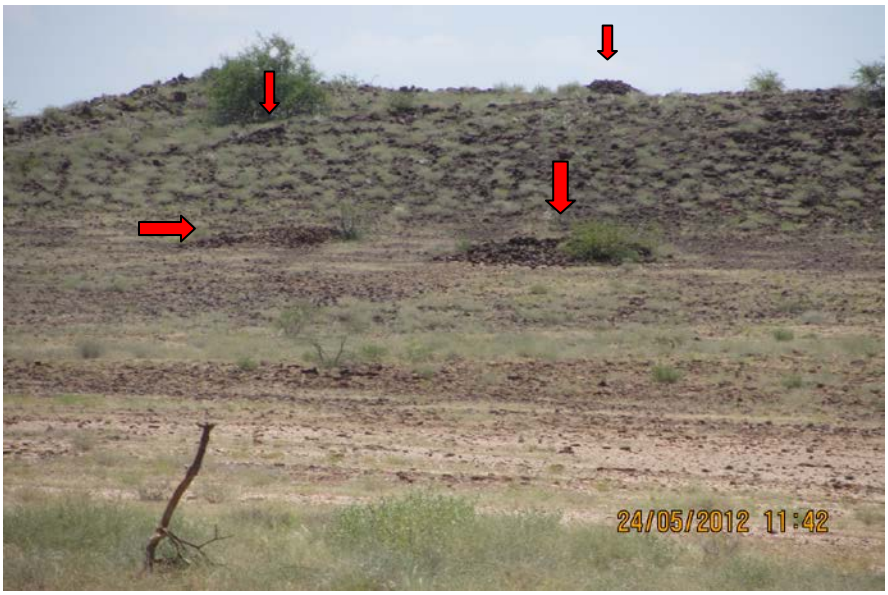

Plate 5.6: Graves (red arrows) sited on the ridge (20m vertical interval) 400m on the NE fringe of the runway threshold of the proposed Paipai Aerodrome site

5.2.10 Visual Aesthetics

The project area is a gently sloping lacustrine plain with hills on the north-eastern fringe and the Chalbi Desert toward the south-westerly direction. To the south the land is vegetated with acacia tree species, dwarf shrubs and grasses. This area serves as the reserve grazing grounds when all the other areas are devoid of vegetation due to adverse climate conditions. The Medate Koro and Forole springs supplement vegetation growth and support birds and wildlife. The presence of birdlife around the springs, and wildlife, augment the aesthetic effect of the environment.

Relationship to Project and EMP
Principles of "green" architecture and eco-friendly technologies and considerations should be employed when constructing and maintaining the Paipai Aerodrome during the project's life.

5.2.11 Noise and Vibrations

Ambient noise in the project area is low as it is in a rural setting where there are neither industries nor significant traffic. Prior work in the project area reported noise level variations that ranged between 47.1-89.6 dB which was attributed to fluctuations in wind speeds and lack of vegetation cover (see Block10A seismic survey EIA report of November 2008).

Relationship to Project and EMP
Principles of "green" architecture and eco-friendly technologies and considerations should be employed when constructing and maintaining the Paipai Aerodrome during the project's life.

5.2.12 Solid and Liquid Wastes

There are no activities within the project area that generate solid waste or oil waste at present. It is however expected that the operations of the company will generate some solid and liquid wastes as described in Chapter Two, section 2.6.2.

Relationship to Project and EMP

There is an existing waste management service available at the Paipai basecamp within the project site. Waste generated during the development and operational phase of the project will be handled and disposed off within the TKBV Paipai basecamp. The waste management policy developed by TKBV will be followed in order to minimise or eliminate any potential environmental impacts.

5.2.13 Socio-economic Baseline

This section provides information on key socio-economic issues and activities existing in the project area. It includes an overview of social characteristics, economic settings, health, education, and demography. While the team acquired as much information as possible, it should be noted that detailed information on some of the issues are either not available or they date back several years.

5.2.13.1 Demography

The project area (Paipai I) is sparsely populated, being mainly inhabited by nomadic pastoralists from the Gabra, Rendille and Borana communities.

5.2.13.2 Education

There are few learning institutions within the area. The lack of adequate infrastructure, the nomadic nature of the population, and the fact that children are often introduced into herding at a young age have all contributed to the very high levels of illiteracy and the situation that most children do not attend school. Non-governmental organizations such as the Catholic Church, in collaboration with the Government, have helped establish learning institutions in areas like Maikona, Kalacha and Kargi. Maikona, which is the only town close to the project area, has two secondary schools (Plate 5.7 below): Maikona Girls Secondary and Bonaya Godana Memorial Boys' Secondary School.

Plate 5.7: Schools located at Maikona town, the only centre close to the project area. Source: Previous study by Earthview Geoconsultants team

5.2.13.3 Housing

Permanent houses are mainly concentrated within towns and are used primarily for commercial purposes. There are also semi-permanent and temporary houses in the rural areas (Plate 5.8).

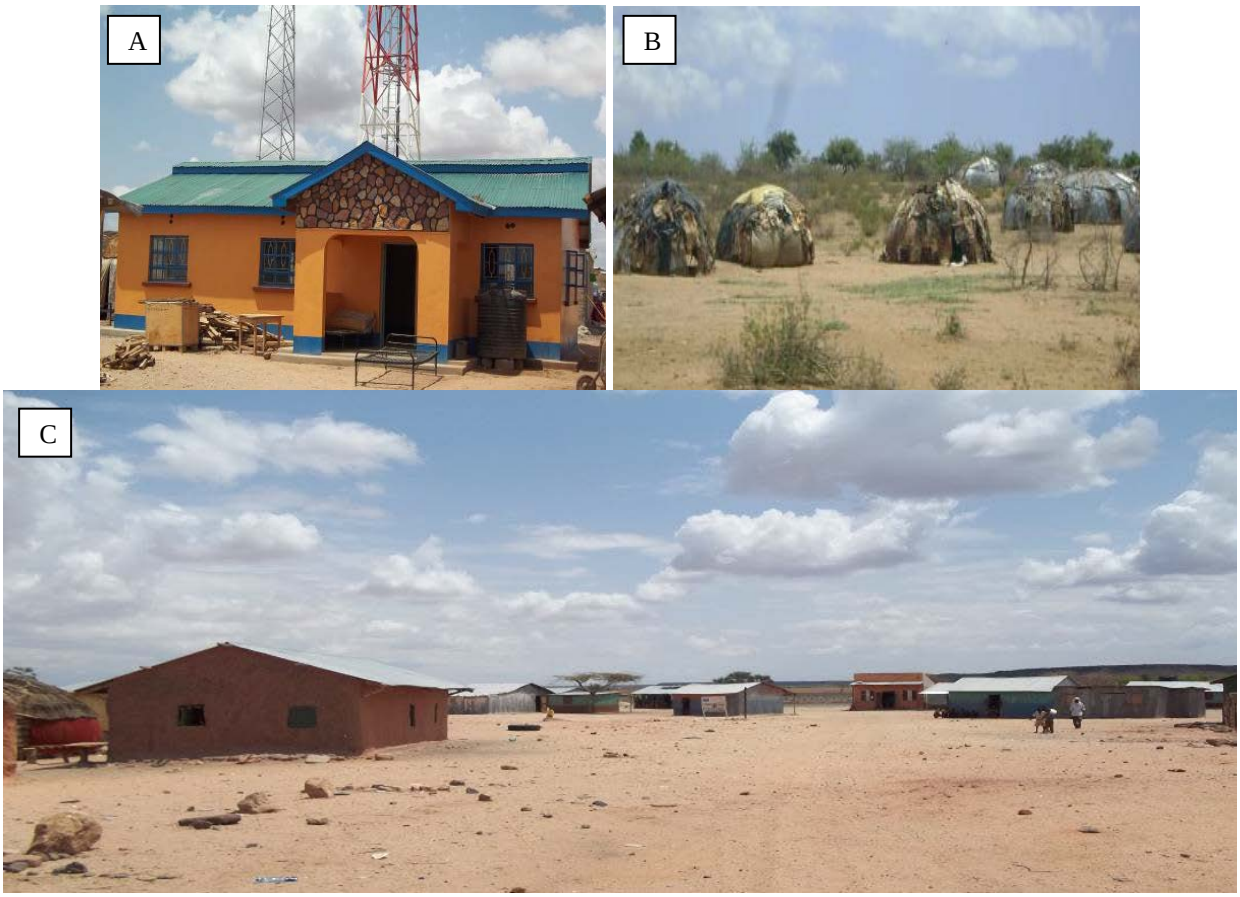

Plate 5.8: Different housing types in the project area. A – permanent home constructed with stones; B – temporary home constructed with wood and other materials; C – permanent houses for commercial use.

5.2.13.4 Energy Sources

The main source of energy is wood fuel, which is used by many households in the community (Plate 5.9). The area is a source of firewood for the Maikona community and the activities of the Aerodrome should not hinder the locals from collecting firewood in the area. Solar energy is utilised by a few households while wind energy is only utilised at the mobile service provider's BTS mast.

Plate 5.9: Firewood collected for use by the casuals during the previous EIA study by Earthview Geoconsultants Ltd.

5.2.13.5 Land Tenure System

Most of the land in the area is government owned or trust land. Only a minimal amount of land is privately owned. Most of the land is not utilized due to its rocky nature, but some is used for grazing.

5.2.14 Economic Setting

5.2.14.1 Labour Force

The area is sparsely populated with only Maikona Town being near the project area in a radius of over 40km. Due to low levels of literacy within the area, the available labour force consists mainly of unskilled labourers; most of the locals focus on subsistence livestock as their source of livelihood.

5.2.14.2 Livestock and Crop Production

Livestock keeping is the main economic activity of the communities in the area (Plate 5.10). The livestock are camels, goats, donkeys, sheep and cattle. Challenges faced by this sector include inadequate pastures and water, mainly due to drought, livestock overgrazing and poor infrastructure, as well as inaccessibility to markets.

Crop production is generally not undertaken in the area due to unfavourable climatic conditions (very hot and dry with minimal unreliable rainfall). Their nomadic way of life has also contributed to low levels of crop growing.

Plate 5.10: Watering livestock at Maikona. Source: Previous study by Earthview Geoconsultants team

5.2.14.3 Health Setting

The churches together with the government have contributed immensely towards the provision and support of several healthcare facilities in the area, like dispensaries (Plate 5.11) which are located in the town centres: Kalacha, Maikona and Kargi dispensaries. However, there is a need to increase health facilities in the area in order to enhance better health and make it possible for residents to have options for medical care.

Plate 5.11: Dispensary at Maikona. Source: Previous study by Earthview Geoconsultants team

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5.2.15 Security and Public Safety

There are a few intermittent security incidents in the project area due to conflicts over grazing land, water points and livestock rustling between communities (especially those at the borders). The government has put in place some security measures in the area; there are a number of chiefs' camps and police posts with administration police who have enhanced security. Although it was not noted during the field study, there are also a good number of locals, some of whom serve as Kenya Police Reservists (KPRs), with weapons. There is a borehole at the project site (Paipai I campsite) where communities are getting water for animals and domestic usage. Care must be taken to ensure no conflicts arise over the water resource.

5.2.16 Community Views and Concerns

Several views of the proposed project, both positive and negative, were raised by the community.

a) Potential Positive Impacts

1. The locals would get jobs during the grading and compacting of the airstrip;
2. The communities felt that there should be sharing or the resource. Locals and other people should be allowed to use the airstrip if the Maikona airstrip is not usable;
3. The airstrip will also help in cases of emergency.

b) Potential Negative Impacts

1. Environmental degradation by cutting trees where the airstrip is located;
2. Conflicts will arise where the communities are passing with their animals and a plane is coming to land;
3. Their animals will be scared by the loud noises coming from the planes;
4. There is an oasis about 7km from the airstrip that can be polluted by the fossil fuels from the planes.

The communities were assured that effective measures will be in place to ensure that the negative impacts perceived are taken care of by the project proponent.

Relationship to Project and EMP

The social, cultural, health, and the economic situation in the project area will be given careful thought and consideration during all TKBV relations and communications with the communities within the area. Although the communities have strong social and cultural networks, the area is one of the least developed and isolated regions of Kenya. The communities live in a harsh environment, and are faced with frequent and recurrent droughts, coupled with widespread and frequent water shortages, that make their daily lives very difficult. Almost annually they require relief and emergency services to provide food, healthcare and shelter. Despite these difficult conditions, they do have a pastoral-livestock system, which is unfortunately further challenged by ethnic and cross-border conflicts related to cattle rustling. There are several NGOs active in the area to assist local communities.

5.2.17 Corporate Social Responsibility

The community, through a consultative meeting with the local leaders in the District Commissioner's office commended the Company for the cordial relationship they have had since Tullow Kenya B.V. started operating in the area and requested the Company to give consideration in providing continued support in the following areas:

- Provision of job opportunities to the locals;
- Building of social amenities such as schools and hospitals;
- Provision of security in the area during oil exploitation so as to avoid conflict between communities.

5.2.18 Public Consultation

Public participation basically involves engaging members of the public to express their views. Public participation tries to ensure that due consideration will be given to public values, concerns and preferences when decisions are made.

Public participation in this project was facilitated through interviews with the project proponent and neighbours of the proposed project area. There was no objection to the proposed project by any member of the neighbouring community. They however reiterated that more emphasis should be put towards ensuring that the proposed project would not negatively interfere with the environmental integrity of the surrounding areas. Most of those interviewed welcomed the development of this project in the area more so because they are already seeing the benefits of the water borehole drilled at the camp site and hope that they will continue to benefit from the Company's operations. A sample of the neighbours' comments, occupation, contacts and signatures has been appended to this report.

CHAPTER 6

ANALYSIS OF PROJECT ALTERNATIVES

6.1 INTRODUCTION

A necessary part of the EIA process is the consideration of alternatives to the proposed activity. The proposed project is interrelated with the main aim of carrying out an exploratory drilling - a necessary step in the development of commercial hydrocarbon production - and is a requirement under the terms of the PSC awarded to TKBV. The many complex factors controlling the location of oil wells (e.g. surface and subsurface geology, topography, communications) usually means that there are only a few viable alternatives that can be genuinely considered. The final two alternatives may simply be whether to proceed (drill option) or not proceed ("do nothing" option). Based on this however, assuming the main oil drilling exploratory activity is in force, there are feasible alternatives to the proposed activity (a subset of the main) and they need to be considered.

6.2 PROJECT ALTERNATIVES

The proposed project (described in detail in Chapter 2) entails the development of a Paipai Aerodrome measuring a total of 1,500m by 30 m that can support a Dornier aircraft with a maximum take-off weight of 6,600 kg. The Paipai Aerodrome will service the test well drilling operations based in the Paipai base camp. The Paipai Aerodrome is also bound to open up the project area, impacting positively on security concerns, and it could be used to reach the Medate Koro and Medate Forole aquifers, potential tourists attractions. As per NEMA EIA/EA regulations which require an analysis of alternatives, this report compares the following 2 alternatives:

i. "No action" alternative; and
ii. "Undertake development" alternative, which includes a consideration of the project location and project technology alternatives.

6.2.1 "No action" alternative

The 'no action' alternative involves the rejection of the proposed project and all future potential development alternatives. Should the 'no action' alternative be chosen, the potential cost cutting and social benefits accruing from an operational Paipai Aerodrome near the test well drill site, will not be realised. In addition, the alternative would increase operational costs and effectively affect the test well drilling operational efficiency. There could be consequent impacts to security, businesses, future revenue and living standards. This option is not reccommended for the following reasons:

Contractual reasons

- The PSC contract between the Government of Kenya and the proponent obliges the proponent to prospect for petroleum resources in the Block within a specified timeline. To meet this obligation, efficiency in operations will be greatly enhanced by placing a Paipai Aerodrome facility close to the exploration site.

Distance and road conditions of alternative Maikona Airstrip

- Maikona Airstrip, which is in good service condition, is 16.79 km on a heading of 161° north-east of the Paipai aerodrome. It is a 45 minutes to 1 hour drive away from the Paipai base camp, due to the poor state of the road. The road leading to the base camp from Maikona is rocky and rutted, and where it crosses luggas, it has deep soft sand that could bog down vehicles and machinery. Consequently, travelling from Maikona Airstrip to the Paipai base camp is tedious and unpleasant.

Environmental and socio-economic reasons

- The potential direct benefits to the region are: increased security and local business opportunities. Secondary indirect benefits are employement to the locals, potentially increased standard of living and better education, social services and amenities (for example, improved access roads);
- No irreversible negative impacts that would render the project unfeasible have been found as a result of the environmental analysis conducted for the proposed aerodrome project.

The only positive impact of choosing the "No Action" alternative is that there will be no short duration impacts on the environment.

6.2.2 "Paipai Aerodrome Development" alternative

a Project location

The project location is Block 10A as per the petroleum prospecting blocks demarcation by the National Oil Corporation of Kenya (NOCK), specifically the area adjacent to the Paipai base camp area.

b Project technologies

The following project technologies are considered for the proposed project due to their importance from an environmental point of view.

i. **Leveling and compacting**

The development of the Paipai Aerodrome will entail light hand cutting of the sparse vegetation. Levelling and grading will be done using a conventional grader while the compaction will be done with a roller. The area to be cleared, graded and compacted is localized and measures 4.5 hectares.

ii. Campsite design

The access road to the campsite will be graded to near smooth surface.

CHAPTER 7

ENVIRONMENTAL IMPACT ASSESSMENT

7.1 INTRODUCTION

The baseline biophysical and social environmental parameters established in Chapter 5 are critically examined in this section in relation to the potential environmental and socio-economic impacts of the proposed Paipai Aerodrome Development programme. In addition to adhering to the mitigations below, the proponent needs to comply with the requisite national legislation and regulations that are outlined in Chapter 4 of this report.

It should be noted that the proposed project is of short duration and should be in force during the exploratory oil and gas drilling programme activities (typically between 3-4 months), and are considered to be a low impact activity that generally permits the immediate return of the operational site to its previous land use.

This Chapter identifies the potential environmental and social impacts of the proposed project, based on the components of the proposed survey (Chapter 2), in the context of the baseline conditions that have been established in Chapter 5, and with due regard to applicable legislation described in Chapter 4. The predicted impacts are then assessed using the methodology outlined in Chapter 3, and appropriate mitigation measures are determined.

7.3 PROJECT ENVIRONMENTAL AND SOCIAL ASPECTS AND POTENTIAL IMPACTS

The components of the Paipai Aerodrome Development programme related activities that have been outlined in Chapter 2 and that could result in environmental and social impacts are indicated in Table 7.1 below.

Table 9: Table 7.1:Project impact sources and prediction of impacts on environmental and social structure and characteristics of the project land area.

	Environmental or Social Parameter	Impact Source	Predicted Impacts
1.	▪ Physiography and Geology	• Clearing of Paipai Aerodrome area using (hand-cutting) • Grading of the runway (Grader) • Compacting of runway surface (Roller) • Clearing of access roads and grading (hand cutting, grader)	• Paipai Aerodrome leave long lasting impact consisting of surface scarring visible even from the air • Access roads to the site leave long-lasting residual impacts (tracks and/or scarring on surface rocks)
2.	▪ Soils	▪ Development of Paipai Aerodrome using grader and roller ▪ Clearing and grading of access road using grader ▪ Vehicular movement during project operations ▪ Oil or chemical leaks from vehicles and machinery, temporary repair yards and storage areas	▪ Compaction of soils in the working areas and access ways changing percolation rates and drainage patterns ▪ Disturbance of soil through Development and shallow excavations ▪ Possibility of enhanced gulleying and erosion (wind and water) in constructed area and access roads ▪ Rutting in loose soils

3.	▪ Air Quality	▪ Civil works equipment and associated machinery ▪ Vehicles ▪ aeroplanes	▪ Pollution from exhaust emissions ▪ Fugitive dust generation from traffic
4.	▪ Water Quality	▪ Liquid effluent discharges from sanitation systems at the campsite ▪ Oil or chemical leaks from temporary repair yards and parking and storage areas, vehicles and machinery	▪ Contamination of underlying aquifers ▪ Contamination of surface water
5.	▪ Terrestrial Environment (Habitats, Flora, and Fauna)	▪ Clearing of vegetation for Development of Paipai Aerodrome and access way ▪ Noise from civil works machinery vehicles and aeroplanes during operational phase ▪ Presence of the workforce ▪ Exotic weed and pest contamination of vehicles and equipment used outside the region and then imported to the project area	▪ Reduced vegetation cover ▪ Disturbance of wildlife (physical presence and noise) ▪ Disturbance of birdlife (physical presence and noise) ▪ Potential bird strike during the operational phase. ▪ Introduced weeds and pests
6.	▪ Land Resources	▪ Civil works equipment ▪ Vehicles ▪ Presence of humans	▪ Manmade structures may lower aesthetic value of landscape ▪ Disturbance of livestock, animals and flora
7.	▪ Archaeological, Historical and Cultural Sites and graveyards	▪ Civil works equipment ▪ Vehicles ▪ Presence of humans	▪ Compaction by heavy vehicles and machinery may damage or deface cultural sites and graveyards
8.	▪ Visual Aesthetics	▪ Paipai Aerodrome design	▪ Poor Paipai Aerodrome design does not blend in with the environment
9.	▪ Noise and Vibrations	▪ Development operations ▪ Support vehicles ▪ aeroplanes	▪ Disturbance to humans, animals and livestock ▪ Disturbance to workers ▪ Health risks
10.	▪ Solid and Liquid Wastes	Workplaces in the field	▪ Pollution of surface soils, waters and ground waters ▪ Offensive odours ▪ Health risks ▪ Litter
11.	▪ Social Characteristics	▪ Temporary Workforce influx. ▪ Activities along the proposed project site ▪ Project activities	▪ Conflict between community and immigrants ▪ Increased pollution: waste and air ▪ May interfere with grazing activities
12.	▪ Economic Characteristics	▪ Employment opportunities ▪ Tenders and supplies	▪ Potential CSR project benefits ▪ Improved short-term business opportunities for the locals ▪ Injection of cash into low-cash economies
13.	▪ Occupational Health and Safety	▪ Campsite and fieldwork environment	▪ Injuries to workers, visitors residents arising from project operations ▪ Fire hazard ▪ Other health risks such as respiratory diseases.
14.	▪ Security and Public Safety	▪ Workforce influx	▪ Improvement in security due to security enhancement for project activities

7.4 IMPACTS ASSESSMENT AND MITIGATION

During the mobilisation (and demobilisation) period, including transportation of materials to (from) the site, accidental spillage of fuel, lubricants, chemicals, etc. may occur, and the mitigation of the potential impacts of these activities are addressed in the Plans (Transport Management, Hazardous Materials Management, Spill Prevention and Response, and Emergency Response) that are outlined in the EMP in Chapter 8. Here, the mitigations relate to the activities that will be undertaken within the project area and that directly relate to the objectives and foreseen outcomes of the project.

7.4.1 Physiography and Geology

The site that is being considered for Paipai Aerodrome Development is very small in area (4.5 Ha) and the access road that will be constructed will utilise existing routes to the extent possible, hence there will be very minimal impact on physiography and geology. The risk of subsidence due to passage of heavy vehicles is negligible due to the geology, but localised compaction of surface materials may occur in some places underlain with sedimentary materials or relatively thick soils. The area is generally aseismic so earthquake risk is very low.

Mitigation:

- Use existing access roads to the Paipai Aerodrome site as much as practicable;
- Movement of the crews and vehicles should be restricted to existing roads and within the operation site to avoid creating unnecessary tracks and trampling of pasture around the Paipai Aerodrome site.
- The campsite is located near the Paipai Aerodrome and hence vehicle movement will be very short (approximately 200m from campsite)

The potential residual impacts would be related to rock scarring and displaced sediments (sand dunes) and boulders related to development of access road to the Paipai Aerodrome site. There will be no residual impacts at the drilling site.

7.4.2 Soils

Soils of the PI3 mapping unit near Maikona and that form part of the north-western and south-western fringes of the Chalbi Desert are more susceptible to compaction and hence degradation due to their higher clay content and presence of salts. Locally this affects the north eastern end of the Paipai Aerodrome site. However, if these soils are adequately dry (soil moisture content below the plastic limit) when activities occur and vehicles and machinery minimize the number of times they drive across these soils, especially on areas surrounding the Paipai Aerodrome site, compaction should be moderate and soil productivity, should not be noticeably affected.

Though the PI3 mapping unit soils are poorly drained and surface discharge of water may not be appropriate, as ponding for long periods is normal in these soils, locally the soils are moderately well drained and the sloping meso-relief tending towards the Chalbi Desert, aids in the drainage of the soils. The soils are however susceptible to erosion by wind and water in the surrounding area. The soils may also be contaminated by (mostly) accidental spillages of liquid effluents, oils, fuels, and chemicals.

Mitigation:

- Mitigations in section 7.4.1 above apply, and in addition;
- Construct drainage channels on access way leading to the Paipai Aerodrome where natural drainage may be affected;
- Vehicles should steer away from natural drains and waterways as is practicable, but a buffer zone of 20m should be maintained except at crossing points;
- Minimize vegetation clearance as much as possible when clearing the periphery area for the Paipai Aerodrome and access ways.
- Topsoil that is stripped and removed for development should be preserved for rehabilitation of the constructed (Paipai Aerodrome area) at the end of the project;
- Ensure that all vehicles and machinery do not have any oil leaks that could contaminate the soils;
- Ensure that any in-field refuelling or maintenance is performed while using a drip tray with a spill-kit available;
- Ensure that all drivers and technicians are familiar with drip-tray and spill-kit use through daily tool-box talks.

The potential residual impacts would be contaminated soils, pitting (rutting) and enhanced ponding, gulleying and erosion (windborne and water) due to altered runoff and drainage patterns at local scales.

7.4.3 Air Quality

On meso- to micro-scales, air quality variation relates primarily to changes in the wind speeds in the area and the associated particulate dust that the wind transports from one place to another. The winds can raise substantial quantities of dust. The disturbance of fine grained (fine silt to clay sized particles) soils by vehicles traversing the area will lead to small quantities of transient airborne dust being generated, dust will also emanate during landing and takeoff of planes from the airstrip more so during windy conditions, but will be far less than the naturally generated particulate air loading in the area considering the short durations that they will occur.

Project operations will affect air quality on a micro-scale, and in a transient manner, through exhaust emissions from vehicles and machinery as well as fugitive emissions (such as from leaking pipes and tubing, valves, connections and pump seals).

Mitigation:

- Limit traffic speed and restrict movement of vehicles as is reasonable to minimize dust generation;
- Water the runway regularly in between landings just enough to moisten the surface and to check on fugitive dust. Care should be made however, not to flood the runway as this will affect flight operations.
- Field vehicles, trucks and any other machinery should be switched off when not in use;
- Regular servicing of all trucks, service vehicles, and any other machinery should be carried out to ensure efficient combustion and minimisation of exhaust emissions;
- Use low sulphur fuels if available and where suitable;
- Employees working in dusty conditions must use appropriate PPE;

There shall not be any residual impacts.

7.4.4 Surface and Ground Water Resources

This section deals with mitigation of impacts on water resources in terms of quantity and availability. Mitigation of impacts on water quality is addressed in section 7.5.5 below.

Water supplies will be accessed as outlined in Chapter 2, section 2.6. There are shallow groundwater aquifers that supply the springs and oases with water which is used for domestic purposes and livestock watering. Such aquifers could potentially be compacted by heavy vehicles and/or equipment, thereby reducing yields.

Mitigation:

- The company should use its own water supply from their borehole situated at the base camp for use in development of the Paipai Aerodrome.
- It is recommended that a policy on efficient water use is drawn up and adopted prior to commencement of the project operations in order to minimise wastage of water during all phases of the project (section 4.2.2);
- The storm water drainage system will be efficiently designed and maintained;
- Efforts will be made to reduce water requirement, and recycling will be practiced wherever possible; and
- Heavy vehicle and equipment movement to and from the Paipai Aerodrome area should detour known groundwater supply points (e.g. wells, springs, oases) by at least 500m.

Residual impacts on surface and groundwater resources in terms of quantity and availability are not expected if the mitigations outlined above are effected.

7.4.5 Water Quality

There are several potential point and non-point sources of pollutants that can be generated during the life cycle of the project and that can lead to contamination of surface and ground water at site-specific and local scales. During development of the access roads, and Paipai Aerodrome Development, fluid leakages (e.g. accidental spillage of fuel, and lubricants from vehicles and other machinery being used in the development process) may occur, and could eventually contaminate surface and ground water. During the operational phase, poor site drainage and sanitary system design, accidental spillages of fuel, lubricants from vehicles, planes and other machinery may occur, if they are not properly designed or maintained. Depending on the nature of the contaminant, its source, the location at which it is released into the environment, the nature of the environment into which it is released (e.g. flowing or ponded surface water, shallow or deep aquifer), and the response time and method used to contain the pollutant, the pollution may be site-specific or local in extent, and of short to long-term duration.

Mitigation:

- Ensure that all vehicles and machinery operating in the field do not have any oil leaks that could contaminate the soils (section 4.3.17);
- Fuelling and refuelling will take place in a designated area ;

- An efficient sanitation system should be put in place in the nearby campsite to handle effluents (section.4.3.18);
- Ensure that all vehicles and machinery operating in the field site do not have any oil leaks;
- Refuelling areas must be underlain with spill-proof hard-standing or bund, with spill kits readily available and operatives trained in their use;
- All refuelling operations to be carefully overseen and managed;
- Ensure that all drivers and technicians are familiar with drip-tray and spill-kit use through daily tool-box talks.

Residual impacts on water quality are not expected if the mitigations outlined above are effected.

7.4.6 Terrestrial Environment (Habitats, Flora, and Fauna)

The immediate habitat encountered in Block 10A in the area where TKBV proposes to construct the Paipai Aerodrome is near barren, though locally the site specific area is vegetated and abundant with wildlife and birdlife

The Impacts on the habitat will be minimal as it will be constrained to the selected access road and Paipai Aerodrome areas (which have very small (4.5 Ha) areal extent), and for which appropriate mitigations have been outlined in sections 7.4.1 and 7.4.2 above. Potential impacts to livestock and wildlife could arise due to the physical disturbance (relating primarily to noise, and possible animal-vehicle collisions) during the development and operation phases. There is a possibility of bird strike incidences due to the birdlife in the environs. The floral and faunal density of the area is generally low, and the Paipai Aerodrome and access ways, in terms of size, is an insignificant feature on the landscape that will not obstruct animal movement.

Indirect (secondary and higher order) impacts relating to pollution of the environment and that may thereby impact on fauna and flora are mitigated by the actions outlined in sections 7.4.2, 7.4.5, 7.4.6 above and section 7.4.11 below. However, care needs to be taken to avoid the introduction of invasive species and pests through importation of non-sanitised vehicles and machinery that have been used in other parts of the world.

Mitigation:

- Mitigations relating to sections 7.4.1 and 7.4.2 (directly), and 7.4.5, 7.4.6 and 7.4.11 (indirectly) apply;
- Avoid clearing/altering any land unless necessary, e.g. un-vegetated patches can be used for sitting of Paipai Aerodrome, access ways facilities; if unavoidable, use best practices that minimise disturbance of the land resources, flora and fauna;
- In areas where vegetation clearing is unavoidable for Paipai Aerodrome and access ways development (estimated to be a coverage of not more than 4.5 Ha), the area should be levelled and restored where appropriate;
- Supervise construction and runway use to check on animal movement to avoid collision incidences. Form a bird strike committee and task it with carrying out an inventory of bird species and flight patterns. The committee should come up with suitable recommendations to counter this possibility.

- Ensure that equipments are in perfect working order and cause minimal or no noise/air pollution nuisance to fauna.
- Hunting, fishing, trapping and gathering of food resources by workers, when on and off duty should be strictly prohibited. All workers to be briefed regularly on this issue;
- The risk of introduction of weed and pests species to the region via contaminated vehicles and equipment will be mitigated by the wash-down of all vehicles and ancillary equipment at a designated location prior to mobilisation of vehicles and equipment to the project site.

The residual impact will be reduced vegetation cover around the Paipai Aerodrome site; however, this would regenerate in a few years upon the project decommissioning. Given the small scale of this vegetation removal, this impact is not considered significant.

7.4.7 Land Resources

Pasture and browsing are the major land resource in the area and supports the pastoral lifestyle of the local community.

Mitigation:

- Mitigations in sections 7.4.1, 7.4.2, 7.4.4, and 7.4.6 apply.

7.4.8 Archaeological, Historical and Cultural Sites

The proposed project area is predominantly home to the culturally rich Gabra and Rendille communities. The Gabra occupy Dukana, Balesa, North Horr, Kalacha and Maikona area while the Rendille are found in Kargi within the block. While no site has been gazetted, there are historical and cultural sites within the block, which the communities would like the exploration activity not to interfere with. There are no documented archaeological sites.

Mitigation:

- Consultations should be undertaken with local elders to help in identifying and avoiding any sensitive cultural sites or graveyards during the development programme in order to prevent conflict with the community;
- All project field workers must be informed, before commencement of operations, that any disturbance to, defacement of, or removal of historical, or sacred material will not be permitted.

No residual impacts are expected.

7.4.9 Visual Aesthetics

It is anticipated that there will be some minor impacts on the aesthetics of the pristine environment. Dust generated by wind erosion is not expected to affect air visibility in the project area due to the limited duration and extent of the activities.

Mitigation:

- The Paipai Aerodrome design and access ways should take into consideration the aesthetics of the selected area.

7.4.10 Noise

During Development there will be noise emissions from the civil works equipment, support vehicles, and other machinery. Planes landing or taking off will also create some noise. However, the noise is of short duration and planes are not expected to land frequently. Noise emissions from the proposed development would be localised, and thus would have minimal effect.

Mitigation:

- Ensure that equipment such as graders, rollers, and other machinery have working silencers to muffle noise and effect a noise mitigation policy for all operations in accordance with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations;
- Provide full personal protective gear to workers as appropriate (e.g. helmets and ear muffs/plugs) and as specified in the Occupational Safety and Health Act;
- Workers should be sensitized on noise-related and other hazards likely to be encountered in such a work environment, and trained accordingly; and
- Engage local leaders in sensitising the communities in the vicinity of the development about the project and its possible noise impacts.

No residual impacts are expected if the mitigations outlined above are enforced.

7.4.11 Solid and Liquid Wastes

Solid and liquid wastes will be generated by a number of operational streams during the course of implementation of the project. These include: papers, plastics, domestic waste and sewage, waste oils and others. These wastes will need to be properly managed in order not to undermine the environmental integrity of the project site. Disposal options include: incineration, compaction and removal from site, and burial (especially for biodegradable material and drill cuttings), or a combination of these activities. These options have been outlined in Chapter 2, section 2.7.2 for the various waste stream components.

Mitigation:

- Mitigations relating to section 7.4.5 apply, and in addition;
- A waste management plan (based on the principles of the Waste Management Hierarchy [section 2.7.2]) documenting the waste strategy, storage (including facilities and locations), handling procedures and means of disposal should be developed and should include a clear waste-tracking mechanism to track waste consignments from the originating location to the final waste treatment and disposal location in compliance with the Environmental Management and Coordination (Waste Management) Regulations (section 4.4.8);

- Waste materials should be segregated into non-hazardous and hazardous waste, and consideration given to re-use, recycling, or disposal (section 4.4.8) as appropriate;
- Used motor oil and filters from vehicles and generators should be removed from the area for proper disposal. Used motor oil should not be used from dust suppression on access roads. Disposal of chemicals and motor oil should be documented, including quantities involved and disposal locations;
- A plan should be prepared to prevent and contain accidental oil discharges or fuel spillages. All equipment should be fitted with drip trays and stationary fuel storage facilities should have secondary containment;
- Ensure that solid waste is removed from site for recycling/disposal only by an authorised waste handler, ideally a handler licensed under the Waste Management Regulation, 2006;
- Sound sanitation, solid and liquid waste management will be ensured to influence prevention of outbreak of diseases detrimental to the general health of the workers and the general public; and
- The EHS officer shall consult with the local authorities in Maikona, to determine where and how the different types of wastes that will be generated during the project can be disposed of.

7.4.12 Social Characteristics

The views of the local community have been summarised in section 5.11.

Mitigation:

- Ensure that the environmental integrity of the site is assured by strictly adhering to the recommended mitigation measures;
- Employ a Community Liaison Officer to keep the community informed prior to project mobilisation and on an ongoing, continual basis to ensure sensitization of the community and stakeholders *vis à vis* the project objectives, activities and scheduling of the Aerodrome activities;
- The communities should be informed well in advance of the start of the drilling project operation;
- The company should cooperate and liaise with the government departments in the area and involve also the community members, leaders and elders in the project activities;
- The company employees should respect the local cultures of the community in order to enhance a harmonious relationship;
- The company and the government police department in the area should work together to ensure there is proper security.

7.4.13 Economic Characteristics

The proposed project area has very minimal economic activity going on. The mainstay economic activity is livestock keeping. The proposed project will offer, to only a few persons, limited, short-term, unskilled employment opportunities to the locals. There is also the added short-term benefit for purchase of local goods and food and other supplies from the community. In the long run, the project for which the Aerodrome is being built will have more economic impacts to the local communities.

Mitigation:

- Liaise with local community leaders during the recruitment process;
- Unskilled manpower to be sourced locally as far as possible;
- Gender should be factored into the employment criteria;
- Sustained public awareness and sensitization about the proposed project should be continued throughout the project lifespan;

The residual impacts in this instance would mostly be positive, including the potential for short-term employment opportunities and infrastructure improvements if the airstrip access roads are designed in a manner that they would be useful to the communities post-project.

7.4.14 Occupational Health and Safety

During the Aerodrome construction and usage, and the main operations in Block 10A which would be the drilling of a test well, the workers and visitors to the site may be exposed to occupational and health hazards. Accidents between vehicles or vehicles and humans or wildlife may occur. Workers could also be exposed to other risks such as fires, and attacks from criminal elements.

Mitigation:

- All operations will be conducted in compliance with Tullow's EHS policy, international best practices and Kenya Government requirements (as set out in the Occupational Health and Safety Act and the Public Health Act; see also sections 4.3.11 and 4.3.10 of this report). Tullow Kenya B.V have already developed a draft Aerodrome Manual for the Paipai I airstrip;
- Appropriate and well-stocked first aid kits and fire fighting equipment should be available to all crew, and specific crew members should be trained on first aid administration and handling of fire fighting equipment (section 4.3.11);
- Job-specific personal protective equipment to be provided to the workers, training should be given, and their use made mandatory in designated areas (section 4.3.11);
- Environmental safety and health regulations and policies/plans must be adhered to (see sections 4.2.3 (Health Policy), 4.3.16 (Energy Act), 4.3.12 (Local Government Act), 4.3.13 (Physical Planning Act), 4.3.10 (Public Health Act), and 4.4 – NEMA Regulations);
- A Camp Clinic is to be provided, manned by suitably qualified field medical staff, licenced as appropriate to operate in-country, equipped with equipment and medication as appropriate, including ambulance vehicle(s) and which must be availed to the airstrip whenever a plane is to land or take off;
- Adequate warning or cautionary signage will be posted as required;
- Emergency landing lights must be provided in an event that a plane is to land or take off at night.
- Only properly trained, licenced and authorised employees shall operate equipment or machinery or vehicles around the Paipai campsite and the airstrip.

7.4.15 Security and Public Safety

There are quite a number of insecurity incidents within the project area due to recurrent conflicts over grazing land and watering points involving the Rendille and Gabra communities.

Mitigation:

- Ensure that all workers have staff uniform and badges and are accompanied by a local (tour guide) during operations so as to avoid going to forbidden areas that may bring about conflict;
- Adequate security measures should be provided, like perimeter fencing and manning at the campsites during the day and at night;
- The company should liaise with the Provincial Administration, the Kenya Police, Kenya Police Reservists and other agencies to provide adequate security during the exploratory drill operation.

7.5 CUMULATIVE IMPACTS

Cumulative impacts are those impacts which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

The areas soils and vegetation have been under pressure from the huge herds of livestock that are the main livelihood sources of the largely pastoralist communities. This is an activity that has been going on for centuries, but it is clear now that due to the rapid increase in human population in recent decades and concomitant increase in livestock populations, the carrying capacity of the land is steadily reducing due to the impacts of the pastoralist way of life. The small land area which will be temporarily modified in this project (<4.5 Ha) and the associated access road that will need to be constructed, are insignificant in relation to the local to regional scale of habitat and land use related changes that have taken place. There will be little impact to fauna due to the small spatial scale and short temporal duration of the project, in relation to the present human and environmental pressures that they are exposed to. No threatened species of flora was identified in the area during the field surveys, and the faunal species that were observed are highly motile avian and chiropteran species whose home range is significantly large. In the context of the seismic survey that had been carried out in the past, over a much larger spatial area and with no reported significant environmental impacts, the proposed Aerodrome will register a very small impact. Thus, the cumulative impacts on the soils, vegetation, habitat and biodiversity of the area are considered insignificant.

The water situation, in terms of quantity and quality, has always been dire in this region. It is one resource over which sporadic conflicts may occur due to its scarcity. There have been a number of governmental and NGO efforts to increase the water supply situation in the area through various water projects, but these still fall far short of the human and livestock water requirement for enhanced quality of life. The flora and fauna cope with the climate-driven changes in the hydrological balance, and there is currently no evidence that humans and livestock demand for water is competing with environmental demands for the same. A borehole drilled by the project proponent in Maikona during the seismic survey has improved on this situation at least for this town. The company has also done another borehole at the current campsite near the aerodrome proposed site which is also helping the communites especially

grazing animals. The water is sourced from deep aquifers that are generally not utilised in the area and that do not interact hydrologically with flora and fauna. Thus, no cumulative impacts are foreseen in relation to deep groundwater abstraction.

Due to the small and spatially restricted scale of the project, any inadvertent pollution arising from the operations would be localised and mostly site-specific, but it is expected that such incidents will not be much on the basis of the proposed mitigations. The scale of fugitive particulate material and gaseous emissions generation and their impacts on the surrounding environment will be negligible on account of the scale of the operation, its temporary nature, the strong dust-laden winds that characterise the area, and the mitigations that have been proposed.

The scope for cumulative impacts on items or sites of cultural heritage significance remain absent from the proposed activity. Consultation with available heritage databases indicates that no known sites of significance will be impacted by the proposed activity.

Table 7.1: Summary of impact evaluation and analysis from the proposed Development of Paipai Aerodrome on environmental and social factors in the project area (see Chapter 3, section 3.2 for impact assessment criteria and rating). Note: Project Operations includes - site preparation, Development, operation, decommissioning and rehabilitation.

Parameter assessed		Pressures/Impacts	Intensity	Extent	Duration	Probability	Status	Degree of confidence	Significance without mitigation	Significance with mitigation
Physiography and Geology	Baseline (Pre-project)	- Periodic flooding of the Chalbi playa - Active sand dune building and degradation - Periodic ponding of interdune areas	Medium	Regional	Permanent	Definite	Neutral	High	Low	Low
	Project Operations	- Access roads to the site leave long-lasting residual impacts (tracks and/or scarring on surface rocks)	Low	Site-specific	Long-term	Highly probable	Negative	High	Low	Low
Climate	Baseline (Pre-project)	- Climate change leading to higher frequency and intensity of droughts and floods	Medium	Regional	Permanent	Definite	Negative	Medium	Low	Low

Parameter assessed		Pressures/Impacts	Intensity	Extent	Duration	Probability	Status	Degree of confidence	Significance without mitigation	Significance with mitigation
	Project Operations	- None								
Air quality	Baseline (Pre-project)	- Dust generated by wind and enhanced by low vegetation cover - Natural wind and water erosion - Offensive odours from point sources e.g. pit latrines and garbage dumps	Medium	Local	Short-term	Definite	Negative	Low	Low	Low
	Project Operations	- Dust generated and enhanced by machinery and vehicular movement - Offensive odours from point sources e.g. pit latrines and garbage dumps - Air pollution from exhaust fumes all lowering the air quality	Medium	Local	Short-term	Definite	Negative	Medium	Medium	Low

Parameter assessed		Pressures/Impacts	Intensity	Extent	Duration	Probability	Status	Degree of confidence	Significance without mitigation	Significance with mitigation
Surface and groundwater	Baseline (Pre-project)	- Freshwater shortage - Uneven distribution of resource - High demand for water resources	High	Regional	Permanent	Highly probable	Negative	Medium	Low	Low
	Project Operations	- Compaction of near-surface aquifers such as springs, reducing yield - Downward draining of groundwater through well drilling - Contamination of water supply source for the camp	Low	Site-specific to local	Short-term	Improbable	Negative	Medium	Medium	Low
Soils	Baseline (Pre-project)	- Soil particulates erosion and deposition generated by wind and enhanced by low vegetation cover - Water ponding and erosion via runoff - Soil compaction by grazing animals and livestock	Medium	Regional	Long term	Highly probable	Negative	High	Medium	Low

Parameter assessed		Pressures/Impacts	Intensity	Extent	Duration	Probability	Status	Degree of confidence	Significance without mitigation	Significance with mitigation
	Project Operations	- Dust generated by vehicles/aeroplanes/machinery movement - Soil compaction by vehicles/machinery - Soil erosion via wind and water through runoff	medium	Local	medium	probable	Negative	High	Medium	Low
Terrestrial environment	Baseline (Pre-project)	- Land degradation from overgrazing - Desertification - Local extinction threat of species	Low	Local	Permanent	Probable	Negative	Low	Low	Low
	Project Operations	- Clearing of vegetation, thereby modifying habitats	Medium	Local	Long-term	Probable	Negative	Medium	Medium	Low
Water Quality	Baseline (Pre-project)	- High sediment loads in rivers - Point-source pollution of springs and wells from stock and locals	Low	Site-specific to local	Permanent	Probable	Negative	Medium	Low	Low
	Project Operations	- Contamination of water supply source for the waste disposal at support camp site	Low	Site-specific to local	Short-term	Probable	Negative	Medium	Low	Low

Parameter assessed		Pressures/Impacts	Intensity	Extent	Duration	Probability	Status	Degree of confidence	Significance without mitigation	Significance with mitigation
Land resources	Baseline (Pre-project)	- Overgrazing	High	Regional/ Local	Long-term	Highly probable	Negative	Medium	High	High
	Project Operations	- Loss of pasture	High	Local	Permanent	Probable	Negative	High	Medium	Low
Archaeological, Historical and Cultural Sites and graveyards	Baseline (Pre-project)	- Loss of cultural and heritage	Medium	Local	Permanent	Highly probable	Negative	High	Low	Low
	Project Operations	- Disturbance to cultural heritage.	Medium	Local	Permanent	Highly probable	Negative	High	Medium	Low
Visual aesthetics	Baseline (Pre-project)	- Land degradation	Medium	Local	Short-term	Probable	Negative	Low	Low	Low
	Project Operations	- Land degradation	Medium	Local	Short-term	Probable	Negative	Low	Medium	Low
Noise	Baseline (Pre-project)	- Natural strong winds - Anthropogenic (but not excessive) noise localised in small towns and centres	Medium	Local	Permanent	Definite	Negative	Low	Medium	Medium

Parameter assessed		Pressures/Impacts	Intensity	Extent	Duration	Probability	Status	Degree of confidence	Significance without mitigation	Significance with mitigation
	Project Operations	- Noise from machinery and vehicular movement	Medium	Local	Short-term	Definite	Negative	Low	Medium	Low
Liquid and Solid Wastes	Baseline (Pre-project)	- Poor liquid and solid waste management in major centres, e.g. in Maikona and Kargi	Low	Local	Long-term	Highly probable	Negative	Low	Low	Low
	Project Operations	- Poor solid waste management at the Development site and campsite.	Medium	Local	Short-term	Probable	Negative	Medium	Medium	Low
Social Characteristics	Baseline (Pre-project)	- Low education levels - Low literacy levels - Few health facilities (inadequate, understaffed and under-equipped)	Medium	Local	Long-term	Definite	Negative	Medium	Medium	Medium
	Project Operations	- No facilities will be provided by the proponent other than for its staff	NA	NA	NA	NA	NA	NA	NA	NA
Economic factors	Baseline (Pre-project)	- Few job opportunities - Slow economic growth rate	High	Local	Long-term	Definite	Negative	Low	High	High

Parameter assessed		Pressures/Impacts	Intensity	Extent	Duration	Probability	Status	Degree of confidence	Significance without mitigation	Significance with mitigation
	Project Operations	- Improved chances of employment - Improved economic growth rate	Medium	Local	Long-term	Probable	Positive	Low	High	Low
Occupational Health and Safety	Baseline (Pre-project)	- Not applicable as area is not inhabited	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Project Operations	- Accidents - Potential bird strikes - Health related problems	Medium	Local	Short- term	Probable	Negative	Medium	High	Low
Security and public safety	Baseline (Pre-project)	- Frequent cattle rustling - Illegal guns - Resource conflicts -	High	Regional	Long-term	Definite	Negative	High	High	Low
	Project Operations	- Resource conflicts - Attraction of criminal elements	Medium	Regional	Short-term	Improbable	Negative	Medium	High	Low

CHAPTER 8:

ENVIRONMENTAL MANAGEMENT PLAN

8.1 INTRODUCTION

The environmental and social aspects and concerns identified in this EIA study must be properly managed. The tool for achieving this is the Environmental Management Plan (EMP) which guides and ensures adherence and compliance with legislation, good environmental performance, and integration of environmental issues into the project management. The project proponent will monitor activities and assess the compliance of contractor parties with the provisions of the EMP through mutual contractual and supervisory mechanisms and management.

The project proponent is committed to provide the resources that are essential to the implementation of the EMP. The EMP outlined below provides all the details of project activities, impacts, mitigation measures, time schedules, responsibilities and commitments proposed to minimize the potential environmental and social impacts of the project, and includes monitoring and evaluation for the implementation, operational and decommissioning phases of the project.

The project proponent is also committed to identifying and mitigating against any environmental and/or social aspects which may arise during the project which may not have been identified during this study.

This Chapter is designed as a stand-alone Chapter that summarises all aspects of this EIA report and can thus be easily printed and shared amongst all persons responsible for supervising and monitoring the implementation of the EMP.

8.2 OBJECTIVES OF THE EMP

- Adhere to and address necessary legal frameworks and other requirements;
- Promote environmental management and communicate the aims and goals of the project EMP to all stakeholders;
- Incorporate environmental management into project design and operating procedures;
- Ensure all workers, contractors, sub-contractors and others involved in the project meet all legal and institutional requirements with regard to environmental management and adhere to the EMP developed for this project;
- Address issues and concerns raised in the EIA stakeholders' consultation process;
- Serve as an action plan for environmental management;
- Provide a framework for implementing commitments of the project (i.e. mitigation measures identified in the EIA);
- Prepare and maintain records of project environmental performance (i.e. monitoring, audits and compliance tracking); and
- Monitor the project phases to ensure that the negative environmental impacts identified in this Chapter 7 of this EIA are effectively mitigated against in design, construction, operation and decommissioning.

8.4 BRIEF PROJECT DESCRIPTION

The proponent, TKBV, is proposing to construct a Paipai Aerodrome measuring 1,500 m by 30 m designed to accommodate the Dornier 228-200/1 type of aircraft, which has a 19-passenger seat capacity with a maximum take-off weight of 6,600 Kilograms. There will be provision for future ground lighting, for emergency landings and night flying. The Paipai Aerodrome will service the drilling of an exploratory oil and natural gas well in Block 10A in northern Kenya. The exploratory drilling is a temporary and short duration activity that will be expected to take between 3 to 4 months under normal conditions.

The workforce, who will construct the Paipai Aerodrome, will reside in the separate fully-equipped Paipai base camp, with a staff compliment of 150 persons mostly engaged for the exploratory drilling exercise. The health and safety of the crew and the general public at large will be ensured by the Company in compliance with the relevant national legislation, its own in-house environmental health and safety (EHS) policies, international best practices for such activities, and this EMP. A close working relationship will be fostered with the local communities; and as far as is practicable, unskilled and semi-skilled workers shall be recruited locally from the existing compliment in the base camp.

8.5 Applicable Legislation and Regulations

The spectrums of legislation and regulations that apply to the aviation industry projects have been detailed in Chapter 4. Some of the key legislation that relate to the activity are the:

- Environmental Management and Co-ordination Act, 1999 and associated regulations and guidelines;
- Kenya Airports Authority Act, Cap. 395;
- The Civil Aviation Act, Cap. 394;
- The Civil Aviation (Aerodrome) Regulations, 2008;
- The Air Passenger Service Charge Act, Cap. 475;
- Energy Act, No. 12 of 2006;
- Radiation Protection Act, Cap. 243
- Wildlife (Conservation and Management) Act, Cap. 376;
- National Museums and Heritage Act, Cap. 216;
- Water Act, Cap. 372;
- Occupational Safety and Health Act, No. 15 of 2007 and;
- International Civil Aviation Organization (ICAO) rules

8.6 TKBV Policies and Procedures

Tullow has two key corporate policies namely, the Environmental, Health and Safety Policy, and the Corporate Social Responsibility Policy. These policies aim to: preserve biodiversity and promote sustainable development by protecting people, minimising harm to the environment and reducing disruption to its neighbouring communities; conduct all business operations to best industry standards and demonstrate socially responsible behaviour (i.e. behave ethically and with integrity in the communities where it works, and to respect cultural, national and religious diversity). Further details on these policies are in Chapter 4, section 4.2.

8.7 ROLES, RESPONSIBILITIES AND TRAINING

TKBV will be responsible for the overall implementation, monitoring and quality assurance/quality control of this EMP. It will be responsible for ensuring that the policies, management plans and actions to be implemented to avoid, reduce, mitigate, or compensate for adverse environmental and social impacts are adhered to. TKBV shall develop a clear command chain framework for employee responsibilities, reporting and incident management, and shall ensure that all employees understand it.

TKBV may sub-contract certain aspects of the activities. In such cases, the contractor will be responsible for the implementation and monitoring of the EMP in their related work contract activity (and this condition should be built into the terms of reference for tendered work and the contract document), but the oversight on compliance will rest with TKBV. Each contractor will also be responsible for the occupational health and safety of the workers and others who may be carrying out both related and un-related activities within and around the work sites. With respect to its oversight role, TKBV will be responsible for periodic environmental inspections of the work and camp sites in general. The contractors will also be responsible for implementing corrective actions that may be required by TKBV as a result of these inspections.

TKBV will train its employees in order to equip them to carry out their duties under the scope of the EMP. Contractors will likewise be required to do the same for their employees and in relation to the work component that they have been given to carry out (see the EMP below). The workers shall be regularly informed on, and assessed for, their understanding of the various policies and plans that relate to their work environment. TKBV will constitute a competent and effective workforce, taking into account the skills required for each work component, and giving priority to the locals for employment opportunities in the semi-skilled and unskilled work categories. Suitable training and skill transfer will be provided, where required.

Specific training requirements are mentioned under the relevant sections of the EMP below.

8.8 COMMUNICATION WITH STAKEHOLDERS AND GRIEVANCE MECHANISM

TKBV will develop and maintain a formal procedure for communication with various stakeholders to inform on the various stages of project activities, as well as to receive their views and concerns, if any. TKBV should maintain a written register of its interactions and discussions with the various stakeholders so that issues that require to be followed up are clear and well-understood, and the outputs can be assessed.

TKBV will also establish a grievance mechanism to handle complaints from the stakeholders/residents of the area, as well as for its own and contracted workers. This mechanism will also include procedures for assessing any project-related damages to persons and properties and levels of compensation. Such a mechanism will be best established in consultation with officials from Government (Ministry of Energy, Ministry of Forestry and Wildlife Resources, Community Leaders, and Stakeholder Group Representatives).

8.9 AUDITING

It is a requirement by law that any project activity being undertaken be audited each year. The proposed exploratory drilling project is, however, of a much shorter duration. Auditing will, therefore, be done upon completion of the project activities.

Besides the regulatory framework, TKBV and the contractor (if appointed) will conduct regular internal audits covering all aspects of the EMP during the course of the project operations. The audits shall be performed by qualified staff and communicated to TKBV's relevant departments.

8.10 THE ENVIRONMENTAL (AND SOCIAL) MANAGEMENT PLAN (EMP) FOR THE PROPOSED PAIPAI AERODROME DEVELOPMENT

The EMP for the Paipai Aerodrome development addresses the following components:

- Physiography and Geology
- Soils
- Air Quality
- Surface and Groundwater Resources
- Water Quality
- Terrestrial Environment (Habitats, Flora, and Fauna)
- Land Resources and National Parks
- Archaeological, Historical and Cultural Sites
- Visual Aesthetics
- Noise and Vibrations
- Solid and Liquid Wastes
- Social Characteristics
- Economic Characteristics
- Occupational Health and Safety
- Security and Public Safety

The structure of the Environmental Management Plan adopted for each of the environmental and social components addressed in it (below) is as follows:

- Potential Impacts and Mitigations: These outline the impacts and mitigations that have been identified and that are peculiar to the project area (see Chapter 7).
- Identification of Desired Outcomes: The desired outcomes reflect what the project proponent and stakeholders would like to see once the operation has been completed.
- Objective Indicators: The objective indicators indicate how the desired outcomes can be measured, and their success determined (either qualitatively, quantitatively, or both).
- Monitoring: The monitoring aspect is based on assessment of project operations *vis à vis* the Objective Indicators and the Desired Outcome, Responsibilities and Management.

8.10.1 Physiography and Geology

The impact sources from the project operations will include the mobilization of vehicles, and civil works equipment related to the Paipai Aerodrome development.

Potential Impacts	Mitigation
• The runway leaves a long-lasting residual impact (scarring of the surface) • Access roads to the site leave long-lasting residual impacts (tracks and/or scarring on surface rocks) • Transfer of geological materials, mainly sand, from other areas to the Paipai Aerodrome site	• Plan for a tree nursery with local varieties at the Paipai base camp that can be used to revegetate the Paipai Aerodrome on decommissioning if no further use is feasible. • Use existing access roads to the Paipai Aerodrome site to the extent possible; • Pre-survey possible access routes, and use the selected route(s) rather than accessing the work site through free-ranging driving across the open country; • Movement of the crews and the vehicles should be restricted to the existing roads and within the operation site to avoid creating unnecessary tracks and trampling of pasture around the drilling site; • Avoid oases in the Chalbi Desert by at least a 500m detour to avoid compaction of the shallow aquifers that feed them so as not to impact on their yield. • Employ shallow excavation and scooping of sand techniques to forestall surface scarring

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with mitigation (High, Medium, or Low)**
▪ Impacts of new access roads minimized to the extent possible ▪ Landslips, rock topples and dune interference do not occur in the course of development of Paipai Aerodrome	▪ 100% pre-survey of existing access roads on the ground ▪ Actions taken to minimise new access roads, impacts are recorded ▪ No project-related landslips, dune interference or rock topples recorded	▪ Continuous, daily. ▪ Onetime assessment and site selection	▪ The field operations supervisor will be responsible for the day-to-day monitoring and management, and will report to the Civil Engineer on a weekly basis, or immediately in case of an incident occurring	▪ Low

8.10.2 Soils

The impact sources from the project operations will include civil works equipment and transport vehicles. Other sources will be oil or chemical leaks from vehicles, aeroplanes, machinery, and temporary repair yard and storage areas.

Potential Impacts	Mitigation
▪ Compaction of soils in the working area and access ways changing percolation rates and drainage patterns ▪ Disturbance of soil through development and excavations ▪ Possibility of enhanced gulleying and erosion (wind and water) in constructed area and access roads ▪ Rutting in loose soils ▪ Contamination of soils	• Construct drainage channels on access ways where natural drainage may be affected; • Vehicles should steer away from natural drains and waterways as is practicable, but a buffer zone of 20m should be maintained except at crossing points; • Minimize vegetation clearance as much as possible when clearing the area for Paipai Aerodrome development save on the runway site. • Topsoil that is stripped and removed for development should be preserved for rehabilitation of the constructed (Paipai Aerodrome) area at the end of the project; • The PI3 soil mapping unit is of moderate soil depth and has impeded drainage. Construction water could easily overflow and pond and contaminate the surface soils and shallow groundwater table. Control water application rate during compaction. Use clean water only. • Ensure that all vehicles and machinery do not have any oil leaks that could contaminate the soils; • Ensure that any in-field refuelling or maintenance is performed while using a drip tray with a spill-kit available; • All fuels and other non-aqueous fluids to be stored in suitable bunded enclosures; • Ensure that all drivers and technicians are familiar with drip-tray and spill-kit use through daily tool-box talks; and • Workers should use the base camp sanitation facilities.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with mitigation (High, Medium, or Low)**
▪ Minimal, (if any) , compaction of soils where applicable ▪ Minimal disturbance of soils especially on waterways and natural drains ▪ Protection of surface soil from gulleying ▪ Zero spillage of oils, chemicals and hazardous material on soils	▪ 100% of existing routes and possible alternatives pre-surveyed on the ground ▪ Soils characterized and pre-surveyed on the ground ▪ Appropriate Paipai Aerodrome site surveyed and selected	▪ Continuous, duration of pre-survey route checking, adjusting and opening bypasses where appropriate ▪ Pre-survey checking and actual Paipai Aerodrome site ground truthing ▪ Continuous monitoring and safeguard mechanisms established to check spillage	▪ TKBV EHS field representative will be responsible for the day-to-day monitoring and management, and will report to TKBV civil engineer on a weekly basis, or immediately in case of an incident occurring.	▪ Low

8.10.3 Air Quality

The impact sources from the project operations will include vehicles and machinery, sanitary systems and waste disposal points.

Potential Impacts	Mitigation
▪ Pollution from exhaust emissions ▪ Fugitive dust generation from traffic ▪ Offensive odours ▪ Health risks ▪ GHG	• Limit traffic speed and restrict movement of vehicles as is reasonable to minimize dust generation; • Water the runway periodically when not in use • Field vehicles, trucks and any other machinery should be switched off when not in use; • Regular servicing of all trucks, service vehicles, and any other machinery should be carried out to ensure efficient combustion and minimisation of exhaust emissions; • Use low sulphur fuels if available and where suitable; • Employees working in dusty conditions must use appropriate PPE; • If litter is to be burned, it should be done at a time of low wind movement, and preferably in areas shielded from wind by vegetation; • Use of camp sanitation facilities during development and operational phases.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with mitigation (High, Medium, Low)**
▪ Minimal pollution from exhaust emissions ▪ Minimal dust generation from traffic ▪ No offensive odours ▪ No health risks	▪ Number of equipment with low emissions ▪ Use of low sulphur versus other fuels ▪ Adherence to equipment maintenance schedule ▪ Set speed limits are not exceeded (record exceedence incidents) ▪ No offensive odours recorded ▪ No violation of OHS requirements for dust impact mitigation (violations recorded).	▪ Malfunctioning equipment removed immediately from operations for repair ▪ Compliance with use of low sulphur fuel (fuel supply tenders) ▪ Speed limit violations based on speed-tracking devices in vehicles, monitored at base camp ▪ Daily inspection of sanitary facilities and waste disposal points ▪	▪ The field operations supervisor will be responsible for the day-to-day monitoring and management of air quality issues in the field. The field operations supervisor will report to the Civil engineer on a weekly basis, and will immediately report on health risk incidents.	▪ Low

8.10.4 Surface and Groundwater Resources

The impact sources from the project operations will include water supply source for the development site, trucks and machinery

Potential Impacts	Mitigation
▪ Conflict with neighbouring communities if water source is shared ▪ Compaction of near-surface aquifers hence reducing yield ▪ Liquid effluent discharges from sanitation systems at the campsite ▪ Oil or chemical leaks from repair yard and storage areas, vehicles and machinery	▪ The company should use its own water supply from the Paipai camp borehole and hand this over to the community once the project is completed. ▪ It is recommended that an efficient water-use policy be adopted by the project proponent at the camp base and development site and other work areas (section 4.3.18) ▪ An efficient sanitation system should be put in place in the base camp site to handle effluents (section.4.4.88) ▪ Buffer zones of 300m will be maintained between access ways to the Paipai Aerodrome and water sources such as wells and springs (sections 4.3.17, 4.3.18) ▪ Ensure proper spill control and management at site ▪ All chemical and fuel should be stored at the base camp. The storage areas will have proper bunds so that contaminated run-off cannot meet the storm-water drainage system ▪ Luggas should be crossed at road-crossings, where such crossings exist to avoid drainage contamination particularly during rainy seasons • Hazardous and toxic waste material should be managed according to international protocols and practices (the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989) and must comply with the Environment Management and Coordination (Waste Management) Regulations. • The storm water system will be efficiently designed and maintained. • The Company should ensure proper spill control and management at site. • Efforts will be made to reduce water requirement, and recycling will be practiced wherever possible. • TKBV will carry out proper designing of on-site storage disposal for processing wastes in accordance with Central Pollution Control Board (CPCB) guidelines and with proper liner systems. • Ensure that all vehicles and machinery operating at the development sites do not have any oil leaks that could contaminate the soils.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with mitigation (High, Medium, or Low)**
▪ No conflict over water use with neighbouring communities ▪ No compaction of near surface aquifers ▪ No oil or chemical leaks from repair yard and storage	▪ TKBV has its own water borehole or other independent water source ▪ Identification of nearby surface and groundwater resources ▪ No violation of buffer zone limits	▪ Not applicable ▪ Continuous, during development ▪ Compliance with buffer zone requirements ▪ Weekly monitoring of	▪ The field operations supervisor will be responsible for the day-to-day monitoring and management of surface and groundwater resources in the field, and will report	▪ Low

areas, vehicles and machineries.	around groundwater sources ▪ Water yields do not decrease	yields ▪ Continuous, during line survey ▪ Compliance with buffer zone requirements ▪ Weekly monitoring of yields for a period of 4 weeks	to the civil engineer on a weekly basis, and will immediately report on incidents of concern.	

8.10.5 Water Quality

The impact sources from the project operations will include: liquid effluent discharges from sanitation systems at the base camp and development site; oil or chemical leaks from repair yard and storage areas, vehicles and machinery operating in the camp and field.

Potential Impacts	Mitigation
▪ Contamination of water supply source for the camp ▪ Contamination of underlying aquifers ▪ Contamination of surface water at development site	• An efficient sanitation system should be put in place for camp workers to eliminate or minimise the levels potential water pollutants from domestic effluents (section 4.3.18); • All chemical and fuel storage areas should be bunded; • Ensure that all vehicles and machinery operating in the field (and in the campsite) do not have any oil leaks that could contaminate the soils (section 4.3.17); • Fuelling will take place in a designated area; • use sanitation system in the campsite to handle effluents (section.4.3.8); • Hazardous and toxic waste material should be managed according to international protocols and best practices and in compliance with Kenyan legislation, specifically the Environment Management and Coordination (Waste Management) Regulations; • Ensure that all vehicles and machinery operating in the development sites do not have any oil leaks; • Refuelling areas must be underlain with spill-proof hard-standing or bund, with spill kits readily available and operatives trained in their use; • All refuelling operations to be carefully overseen and managed; • Ensure that all drivers and technicians are familiar with drip-tray and spill-kit use through daily tool-box talks.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with mitigation (High, Medium, Low)**
▪ No contamination of water supply source for the camp ▪ No contamination of underlying aquifers in the project area	▪ Camp water supply source is fit for human consumption ▪ Camp water supply source is protected ▪ Zero spillage of chemicals and hazardous material on soils that may lead to surface/groundwater pollution ▪ Waste pits and landfills are professionally sited ▪ Buffer zones are observed	▪ Physico-chemical and microbiological testing, weekly ▪ Compliance with buffer zone requirements	▪ The field operations supervisor will be responsible for the day-to-day monitoring and management of actions to protect water quality in the field. The field operations supervisor will report to the civil engineer on a weekly basis, and will immediately report on incidents of concern.	▪ Low

8.10.6 Terrestrial Environment (Habitats, Flora, and Fauna)

The impact sources from the project operations will include: Construction equipment, transport vehicles, aeroplanes and physical presence of the workforce.

Potential Impacts	**Mitigation**
▪ Reduced vegetation cover ▪ Disturbance of wildlife (physical presence and noise) ▪ Disturbance of birdlife during development and operational phase and potential bird strike is deemed high ▪ Introduced weeds and pests	▪ Avoid clearing/altering any land unless necessary, e.g. un-vegetated patches can be used for siting of Paipai Aerodrome site and associated facilities; if unavoidable, use best practices that minimise disturbance of the land resources, flora and fauna; ▪ In areas where vegetation clearing is unavoidable for Paipai Aerodrome facility development (estimated to be a coverage of not more than 4.5 Ha), the area should be levelled and restored where appropriate; ▪ Ensure that equipment is in perfect working order and cause minimal or no noise/air pollution nuisance to fauna. ▪ Hunting, fishing, trapping and gathering of food resources by workers, when on and off duty should be strictly prohibited. All workers to be briefed regularly on this issue; ▪ Form bird strike task force that will study the birds' species and flight patterns and recommend appropriate action. ▪ The risk of introduction of weed and pest species to the region via contaminated vehicles and equipment will be mitigated by the wash-down of all vehicles and ancillary equipment at a designated location prior to mobilisation of vehicles and equipment to the project site.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with mitigation (High, Medium, or Low)**
▪ Minimal cutting of vegetation for development purposes ▪ Minimal disturbance of wildlife ▪ Minimum disturbance of birdlife and zero bird strike incidences ▪ No weeds or pests introduced into the area ▪ Minimal contamination of the environment	▪ Development of Paipai Aerodrome where minimal or no vegetation clearance is required. ▪ Number of wildlife encounters and actions taken recorded ▪ Birds in immediate environment inventory documented, bird strike incidences recorded ▪ A safety data sheet should be maintained for all potentially hazardous materials, as well as supporting documentation for the transport, use and disposal of such materials ▪ A safety data sheet should be maintained for all flight schedules and potential bird strike incidences	▪ Continuous, during development and operational phases. ▪ Continuous, during development ▪ Inspection and certification	▪ An ecologist may be designated to be in charge of the management and monitoring of the terrestrial environment, and would liaise closely with and advise the field operations supervisor on a day-to-day basis.	▪ Medium

8.10.7 Land Resources

The impact sources from the project operations will include: runway development, access roads, communication facilities (e.g. antennas), and meteorological facilities (windsock).

Potential Impacts	**Mitigation**
▪ Man made structures may lower aesthetic value of landscape ▪ Disturbance of animals and flora	▪ Refer to sections 8.10.1 (Physiography and Geology), 8.10.2 (soils), 8.10.5 (Surface and ground water) and 8.1.6 (Terrestrial Environment).

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with mitigation (High, Medium, or Low)**
▪ Animal encounters	▪ No animal encounters	▪ Monitoring of animal presence along runway	▪ The Field Security Advisor (FSA) should secure the	▪ Low

minimised ▪ Pastoralist activities are only minimally disrupted ▪ Other desired outcomes relate to the following sections: Soils (8.10.2), Terrestrial Environment (8.10.6)	recorded ▪ No complaints from pastoralists ▪ Objective indicators for Soils and Terrestrial Environment are met	and accessways ▪ Information outflow to the affected communities on landing and takeoff schedules where applicable and hence exclusion time periods ▪ Adhering to the use of existing routes and road network ▪ Enforcing policy against hunting and gathering through training and direct supervision where applicable	Paipai Aerodrome during landings and takeoffs by assigning security officers to guard the Paipai Aerodrome perimeter to avoid possible incidences with livestock and pastoralists (follow the airstrip security procedures as stipulated in the Paipai Aerodrome manual)	

8.10.8 Archaeological, Historical and Cultural Sites

The impact sources from the project operations will include: runway development, access roads, communication facilities (e.g. antennas) and meteorological facilities (windsock).

Potential Impacts	**Mitigation**
▪ Compaction by heavy vehicles and machinery may damage or deface cultural sites and graveyards	• Consultations should be undertaken with local elders to help in identifying and avoiding any sensitive cultural sites during the exploration programme in order to prevent conflict with the community; • All project field workers must be informed, before commencement of operations, that any disturbance to, defacement of, or removal of historical, or sacred material will not be permitted.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with Mitigation (High, Medium or Low)**
▪ Negligible interference, if any, with historical cultural sites and graveyards ▪ Desired Outcomes for Soils (section 8.10.2) apply	▪ No violations of buffer zone restrictions ▪ The sites are flagged for avoidance ▪ Objective indicators for section 8.10.2 are met	▪ Buffer zones are adhered to ▪ Flagging is done and cleared once the work is completed ▪ Cultural sites and graveyards are not interfered with	▪ The field operations supervisor shall be responsible for ensuring that cultural sites and graveyards are not disturbed, and that all the workers are aware of the locations of the site.	▪ Low

8.10.9 Visual Aesthetics

The impact sources from the project operations will include Paipai Aerodrome design.

Potential Impacts	Mitigation
▪ Paipai Aerodrome design does not blend in with the environmental ▪ Vegetation cover removal lowers aesthetic value of landscape	▪ Paipai Aerodrome design should take into consideration the aesthetics of the selected area.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with Mitigation (High, Medium or Low)**
▪ Paipai Aerodrome design blends well with environment ▪ Visual aesthetics maintained by minimising vegetation removal and proper design of access roads	▪ Paipai Aerodrome design is aesthetic ▪ Residual impacts of access road and vegetation clearing minimized (sections 8.10.1, 8.10.2 and 8.10.6 apply)	▪ Paipai Aerodrome constructed according to design ▪ Physiography and Geology, Soils and Vegetation sections apply (sections 8.10.1, 8.10.2 and 8.10.6)	▪ Maintenance of visual aesthetics will be the responsibility of the Civil Engineer. The Paipai Aerodrome design and architecture should incorporate “green” principles and eco-friendly technologies where applicable	▪ Low

8.10.10 Noise

The impact sources from the project operations will include: civil works equipment, support vehicles and aeroplanes (operational phase).

Potential Impacts	Mitigation
▪ Disturbance to humans, birds, animals and livestock ▪ Disturbance to workers ▪ Health risks	• Ensure that equipment such as graders, rollers, transport trucks and other civil works machinery have working silencers to muffle noise and effect a noise mitigation policy for all operations for all operations in accordance with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations; • Provide full personal protective gear to workers as appropriate (e.g. helmets and ear muffs/plugs) and as specified in the Occupational Safety and Health Act; • Workers should be sensitized on noise-related and other hazards likely to be encountered in such a work environment, and trained accordingly; and • Engage local leaders in sensitising the communities in the vicinity about the Paipai Aerodrome project and the use thereof and its possible noise impacts.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with Mitigation (High, Medium or Low)**
▪ Ambient noise levels maintained	▪ Equipment installed to monitor noise (e.g. dosimeter) ▪ Regularly serviced and efficient vehicle engines ▪ "Quiet" support machinery e.g. generators, compressors purchased	▪ Review of design parameters, as needed ▪ Monitor installed equipment ▪ Servicing work and schedules ▪ Requirement embedded in tendering of equipment documents, inspect as needed	▪ The Civil engineer will be responsible for checking noise abation during the development phase while the operations manager will take over the responsibility during the operational phase.	▪ Low

8.10.11 Solid and Liquid Wastes

The impact sources from the project operations will include: campsite and workplaces in the field.

Potential Impacts	**Mitigation**
▪ Pollution of surface soils, waters and ground waters ▪ Offensive odours ▪ Health risks ▪ Litter	• Mitigations relating to section 7.4.5 apply, and in addition; • A waste management plan (based on the principles of the Waste Management Hierarchy [section 2.7.2]) documenting the waste strategy, storage (including facilities and locations), handling procedures and means of disposal should be developed and should include a clear waste-tracking mechanism to track waste consignments from the originating location to the final waste treatment and disposal location in compliance with the Environmental Management and Coordination (Waste Management) Regulations (section 4.4.8); • Waste materials should be segregated into non-hazardous and hazardous waste, and consideration given to re-use, recycling, or disposal (section 4.4.8) as appropriate; • A Hazardous Materials Management Plan (HMMP) will be developed for the project, and a safety data sheet should be maintained for all potentially hazardous materials, as well as supporting documentation for the transport, use and disposal of such materials; • Used motor oil and filters from vehicles and generators should be removed from the area for proper disposal. Used motor oil should not be used from dust suppression on access roads. Disposal of chemicals and motor oil should be documented, including quantities involved and disposal locations; • A plan should be prepared to prevent and contain accidental oil discharges or fuel spillages. All equipment should be fitted with drip trays and stationary fuel storage facilities should have secondary containment; • Hygienic sanitation and disposal of grey and blackwater will be covered in the waste management plan in order to protect the general health of the workers and the general public; • Ensure that solid waste is removed from site for recycling/disposal only by an

	authorised waste handler, ideally a handler licensed under the Waste Management Regulations, 2006; • Servicing of equipment should be carried out in a designated garage area which has regularly maintained oil drainage traps and readily available spill kits. Workers in this area will be regularly briefed on spill prevention; • Sound sanitation, solid and liquid waste management will be ensured to influence prevention of outbreak of diseases detrimental to the general health of the workers and the general public; and • The EHS officer shall consult with the local authorities in Maikona, Kargi and Marsabit to determine where and how the different types of wastes that will be generated during the project can be disposed of.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with Mitigation (High, Medium or Low**
▪ No pollution of surface soils, water and groundwater ▪ No offensive odours ▪ No health risks	▪ No leakages of oils, chemicals or sewage and other domestic effluents reported ▪ Sanitary systems are working and no breakdowns reported ▪ Hazardous wastes (e.g. medical and chemical wastes) are properly disposed of ▪ Appropriate use of personal protective equipment when and where mandatory	▪ Storage rooms are secure and accessed only by authorised personnel, daily ▪ Work areas are secure and accessed only by authorised personnel, daily ▪ Material storage containers checked for leaks daily ▪ Daily checks on sanitary systems ▪ Adherence to OHS policy and use of PPEs	▪ An EHS officer will be responsible for management of solid and liquid waste at the drilling rig and camp site.	▪ Low

8.10.12 Social Characteristics

The impact sources from the project operations will include workforce influx and activities around the drilling sites.

Potential Impacts	**Mitigation**
▪ Possibility that the area will attract criminal element ▪ Conflict between community and immigrants ▪ Increased pollution: waste and air ▪ May interfere with grazing lands	▪ Ensure that the environmental integrity of the site is assured by strictly adhering to the recommended mitigation measures; ▪ Employ a Community Liaison Officer to keep the community informed prior to project mobilisation and on an ongoing, continual basis to ensure sensitization of the community and stakeholders *vis à vis* the project objectives, activities and scheduling, potential impacts; ▪ The communities should be informed well in advance of the start of project and should also be informed through the DC to avoid the area when planes are landing or taking off. ▪ Continued working relationship with the security enforcing agencies in the area

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with Mitigation (High, Medium or Low)**
▪ Preservation of cultural and social values ▪ Protection of grazing lands and watering points ▪ No conflicts over water supply ▪ Harmonious relationship between drilling crew and local community	▪ No violations of Tullow CSR policy ▪ No complaints from the locals on cultural or social values, concerns relating to the workers ▪ Relates to Soils (8.10.2) and Surface and Groundwater Resources (8.10.4) sections	▪ Awareness of Tullow CSR policies by workforce ▪ Register of incidents, daily ▪ Related monitoring aspects are being undertaken	▪ The project management team should ensure community involvement in establishment of recruitment and tender committees to check on recruitment procedures, gender balance and potential conflict areas. ▪ A liaison officer should be responsible for implementation of the grievance mechanism.	▪ Low

8.10.13 Economic Characteristics

The impact sources from the project operations will include: employment opportunities, tenders, and supplies.

Potential Impacts	**Mitigation**
▪ Improved short-term business opportunities for the locals ▪ Boost economy ▪ Potential CSR project benefits* ▪ Influx of cash into low-cash rural economies*	• Liaise with local community leaders during the recruitment process; • A proportion of unskilled and semi-skilled manpower to be sourced locally for the main project; • Gender should be factored into the employment criteria; and • Sustained public awareness and sensitization about the proposed project should be continued throughout the project lifespan.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with Mitigation (High, Medium or Low)**
▪ Improved economy and living standards	▪ Number of locals recruited ▪ Number and type of CSR projects that TKBV commits to ▪ Establishment of recruitment and tender committees	▪ As needed	▪ The project management should ensure community involvement in the establishment of recruitment and committees to check on work influx, gender balance and potential conflict areas.	▪ Low

8.10.14 Occupational Health and Safety

The impact sources from the project operations will include the drill rig and campsite.

Potential Impacts	Mitigation
▪ Injuries to workers, visitors and area residents arising from project operations ▪ Fire hazard ▪ Other health risks such as respiratory diseases due to dust and airborne disease ▪ Accidents at the airstrip	• All operations will be conducted in compliance with Tullow's EHS policy, international best practices and Kenya Government requirements (as set out in the Occupational Health and Safety Act and the Public Health Act; see also sections 4.3.11 and 4.3.10 of this report); • All hazardous materials and equipment will be properly labelled and handled only by trained and certified personnel using appropriate and approved safety gear – the contractor shall ensure that the use of such materials and/or equipment is licensed by the relevant Authority, and that all necessary legislation and regulations (both national and international) are adhered to with respect to the import, export, handling and disposal of the materials or equipment; • Appropriate and well-stocked first aid kits and fire fighting equipment should be available to all crew, and specific crew members should be trained on first aid administration and handling of fire fighting equipment (section 4.3.11); • Job-specific personal protective equipment to be provided to the workers, training should be given, and their use made mandatory in designated areas (section 4.3.11); • Environmental safety and health regulations and policies/plans must be adhered to (see sections 4.2.3 (Health Policy), 4.3.16 (Energy Act), 4.3.12 (Local Government Act), 4.3.13 (Physical Planning Act), 4.3.10 (Public Health Act), and 4.4 – NEMA Regulations); • A Camp Clinic is to be provided, manned by suitably qualified field medical staff, licensed as appropriate to operate in-country, equipped with equipment and medication as appropriate, including ambulance vehicle(s); • Adequate warning or cautionary signage will be posted as required; • An ambulance, fire fighting equipments and emergency medical services be provided at the airstrip whenever a plane is landing or taking off • Only properly trained, licensed and authorised employees shall operate equipment or machinery or vehicles.

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with Mitigation (High, Medium or Low)**
▪ Prevent workers and/or visitors from possible injuries/harm and health-related risks ▪ Minimise damages if an accident occurs	▪ 100% use of personal protective equipment (PPE) when and where required ▪ Caution signage placed visibly in required places ▪ Training and drills on health and safety issues in the workplace, including fire-fighting	▪ Continuous monitoring and recording of incidences under each work component section	▪ The project management should ensure all the protocols relating to environmental health and safety, and occupational health and safety policies are adhered to. Frequent training programs on first aid fire-drills and other related health issues should be a prerequisite.	▪ Low

8.10.15 Security and Public Safety

The impact sources from the project operations will be related to the workforce security needs.

Potential Impacts	Mitigation
▪ Petty crimes ▪ Improvement in security due to security enhancement for project activities ▪ Acquisition of skills ▪ Targeting of planes by criminals	• Ensure that all workers have staff uniform and badges and are accompanied by a local (tour guide) during operations so as to avoid going to forbidden areas that may bring about conflict; • Adequate security measures should be provided, like perimeter fencing and manning at the campsites during the day and at night; • The company should liaise with the Provincial Administration, the Kenya Police, Kenya Police Reservists and other agencies to provide adequate security during the exploratory drill operation, the campsite operations and the Aerodrome. • Ensure that the airstrip and its surroundings are protected from outsiders

Desired Outcomes, Objective Indicators and Monitoring				
Desired Outcomes	**Objective Indicators**	**Monitoring**	**Responsibility and Management**	**Risk with Mitigation (High, Medium or Low)**
▪ No security-related incidents ▪ Adequate security for the workforce and the Aerodrome	▪ Number of security-related incidents recorded	▪ Continuous monitoring and recording of incidences	▪ The involvement of government agencies during the project operations may enhance long-term security initiatives from the concerned parties, hence improving the security situation in the area. Security issues should be the overall responsibility of the exploration manager, and should be delegated to the company security head.	▪ Low

8.11 OTHER GENERAL REQUIREMENTS AND TRAINING ISSUES

8.11.1 Occupational Health and Safety Plan

TKBV will develop an Occupational Health and Safety Plan (OHSP), based on Tullow's EHS and CSR policies, prior to commencement of the project operations. The OHSP will uphold TKBV's commitment to a safe environment for employees, contractors and visitors. The plan will also address all applicable legal requirements relating to health and safety. The OHSP will set out the framework under which health and safety on the project site, and to and from the site, will be managed. The roles and responsibilities of the Company, manager, supervisors and workers will be set out under this plan.

A health and safety training programme will also be implemented at the site. The objectives of this training programme will be to:

- provide appropriate orientation and support to all employees, contractors and visitors on site so that they can act in an appropriately safe manner;
- provide ongoing training to workers
- Inform at-risk workers to help attain a positive and safe work environment.

8.11.2 Vehicle Traffic Plan

The following guidelines will apply mainly to vehicular traffic:

- All drivers will be properly licensed and trained according to specific vehicle type and operating conditions;
- Vehicle use will be determined by local ground conditions and access requirements;
- All local traffic laws and speed limits will be obeyed;
- Traffic on the rights-of-way will follow the posted speed limits, which might vary depending on site-specific conditions;
- All vehicular traffic will be confined to approved rights-of-way, workspace and access roads or trails; and
- Site-specific features of concern (e.g., archaeological sites, sensitive wildlife habitat) will be flagged, or otherwise designated, so that subsequent traffic can avoid these areas.
- Air control warnings must be placed at site

8.11.3 Hazardous Materials Management Plan

A Hazardous Materials Management Plan (HMMP) will be developed for the project that will identify potentially hazardous materials to be used and provide a system for monitoring them. Transportation, storage, use and ultimate disposal will be considered. Safety of the workers and the surrounding communities will be taken into account for all stages of materials handling during all project phases. The EHS officer shall consult with the local authorities to determine where and how the different types of wastes that will be generated during the project can be disposed of.

Hazardous materials and wastes require special handling and training procedures. All employees will be provided with basic training so that, at a minimum, they can: identify hazardous materials; know how to obtain appropriate information on special handling procedures required; know what precautions and protective equipment are required; know how to label and package hazardous materials and wastes; know where and how hazardous wastes are to be stored; and know how wastes are to be disposed of. Employees who are tasked with receiving, off-loading and storing potentially hazardous materials or involved in the storage and shipment off-site of hazardous wastes should receive hazardous materials handling training.

8.11.4 Spills Prevention and Response Plan

Before development of the project commences, a Spill Prevention and Response Plan (SPRP) will be developed for use by TKBV and contracted personnel in the event of a deleterious material spill. The objective of the spill response measures will be to ensure that where accidental spills occur, all available resources are used appropriately to minimize the extent and severity of effect on the environment. All spills occurring on the project site will be responded to in a way that will uphold the following priorities: protection of human life and health; protection of the environment; protection of property; and minimized disruption to operational activities. At all times, applicable regulations will be used to guide response and cleanup activities.

At locations where the potential for spillage of hazardous material is highest, such as at the wellbore, fuelling points, spill control and containment means will be incorporated into the infrastructure during development. The storage of materials will be tied in with the HMMP.

Spill response kits appropriate to the types and volumes of materials that will be used during the project operations will be specified, including the types of equipment that will handle or transport contaminant materials (including fuel). Spill response kits will be located at appropriate material handling and storage locations. The contents of the kits will be based on the potential risk associated with the material, volume of material, and environmental sensitivity of the area. General kit contents could include: oil absorbent pas; absorbent socks; granular absorbents; and protective equipment such as gloves, goggles and protective suits. All kits will be stored in a visible location, and in appropriate weather-resistant containers. Regular inspections of the kits will be performed to ensure that they are complete and all materials remain functional.

All TKBV employees and contractors will undergo, as part of their orientation to the site, a training programme on spill-prevention and hazard-identification, as well as spill-response, containment and reporting procedures. Other aspects of the training will include education on the:

- SPRP
- Applicable legislation
- Potentially affected environmental receptors (e.g. soil, surface and groundwater)
- Field application of appropriate spill-response techniques.

8.11.5 Emergency Response Plan

A more general plan that will deal with emergencies such as those related to accidents and personal injury, medical evacuations, fires, and escalating insecurity shall be put in place before the commencement of project operations. Issues to be addressed would include the capacity for response and management, and the support agencies that can be called in to assist (e.g. Kenya Police, Hospital staff, KWS, etc). Tullow Kenya B.V have already developed the Aerodrome manual and airstrip security policy that will be used in response to any incidents/accidents

8.11.6 Environmental Awareness Plan

On appointment, all contracting companies and employees will receive a copy of the EMP and will be trained in the relevant categories of the EMP that are outlined in sections 8.9 and 8.10 above. In addition, a detailed environmental awareness plan will be developed prior to commencement of the seismic survey activities. The plan will address the following items:

- Basic workforce environmental awareness;
- Sensitivity of the site
- Personnel environmental training needs; and
- Resources available for use in personnel environmental awareness training

Ongoing monitoring and auditing will also assist in continually improving the environmental awareness of the project team. TKBV will also target the community leaders and government administrators for awareness-building on the project components. these leaders and

administrators will, thereafter, be able to explain the project components, the environmental issues, and mitigation measures that are being undertaken, to the community at large.

8.12 COST OF THE EMP AND TIMEFRAME FOR THE ACTIVITY

It is estimated that the cost for implementing this project is Ksh. 1,913,520. The costs of implementing the EMP will largely be borne through salaried employees who will be tasked to carry out the various EMP monitoring and evaluation activities, therefore the EMP will not incur significant additional costs, over and above those already budgeted for in the project.

CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS

9.1 SUMMARY OF THE PROJECT COMPONENTS

Tullow Kenya B.V. is a wholly owned subsidiary of Tullow Oil PLC, one of the largest international oil and gas exploration companies with over 80 licences in more than 20 countries in Africa, Europe, South Asia and South America.

The initial Production Sharing Contract (PSC) with the Government of Kenya was awarded to Africa Oil B.V. with the aim of exploring in detail, the assigned block area of 14747.57 km^2, in accordance with its contractual obligations under the PSC, in order to: (a) delineate potential hydrocarbon prospects, (b) carry out exploratory drilling within the identified potential prospect areas, and (c) carry out well appraisal and production of oil and/or gas if the prospects turn out to be economically viable.

TKBV has since acquired a majority shareholding in Block 10A (project area) and is now the operator of the block with Africa Oil Corporation and EAX (Afren) as its partners. In this regard, TKBV is undertaking exploration drilling of an oil and natural gas well to a depth of 4,200 m in the project area having obtained a license issued by NEMA.

To service the exploratory drilling TKBV intends to develop a Paipai Aerodrome based at the Paipai base camp to facilitate efficient flow of goods and services. Further, the Paipai Aerodrome will increase operational efficiency and link specialized personnel to the project site in a timely fashion. The Paipai Aerodrome will aid in emergency services and evacuations where need be. It is anticipated that the Paipai Aerodrome will also aid in security operations within the project area and its environs.

The EIA assessment approach included, with respect to the proposed Paipai Aerodrome development the following:

- Scaling and work evaluation (determination of geographical and other boundaries; preliminary assessment);
- Detailed assessment based on: project design and technologies *vis-à-vis* environment, social, cultural and economic considerations of the project area; evaluation of pre-existing environmental, social, cultural and economic conditions, pressures and impacts; identification and evaluation of potential environmental, social, cultural and economic impacts that may arise from the proposed project; public consultations to explain what the project is all about and to receive their views, perceptions, concerns and local expert knowledge and advice with respect to the proposed project;
- Determination/evaluation of the significance of the potential project impacts and recommendation of mitigation measures; development of an Environmental Management Plan and Monitoring Programme; and decommissioning of the project.
- Preparation of the EIA Study Report.

The EIA covers the legislative and legal framework that, when properly implemented, will ensure environmental sustainability while allowing the project to proceed. It also provides the description of the current environmental and socio-economic situation against which the potential impacts of the proposed well can be assessed and future changes monitored and

rectified. It presents an overview of the environmental aspects related to the well site and the surrounding areas in which the operations will take place, and which may bear the impacts of the proposed activities directly or indirectly.

The impacts and mitigation measures to be put in place to ensure that those impacts are minimised or eliminated where possible are discussed in Chapter 7. It can be concluded that the project is viable and will not adversely affect the environment or the local community if the EMP in Chapter 8 outlined in this document is strictly adhered to.

9.2 RECOMMENDATIONS

From the EIA report it can be concluded that the project will have only a minimal impact on the environment, and that measures will be put in place that will minimise any impacts that may occur. However, we would recommend that the EMP developed be strictly followed in order to ensure that such impacts do not occur. Some of the measures in Chapter 8 to be closely monitored include, but are not limited to, the following:

- Pre-survey possible access routes, and use the selected routes rather than accessing work sites through free-ranging driving across the open country;
- Minimize vegetation clearance as much as possible when clearing the area for Paipai Aerodrome development;
- Topsoil that is stripped and removed for development should be preserved for rehabilitation of the developed (Paipai Aerodrome) area at the end of the project;
- The PI3 soil mapping unit, where the proposed Paipai Aerodrome will be developed, is of moderate soil depth and has impeded drainage. Construction water could easily overflow, pond and contaminate the surface soils and shallow groundwater table. Control water application rate during compaction. Use clean water only;
- Enforce use of the sanitation system at the Paipai base camp to eliminate or minimise the levels of potential water pollutants from domestic effluents;
- Hazardous and toxic waste material should be managed according to international protocols and best practices and in compliance with Kenyan legislation, specifically the Environment Management and Coordination (Waste Management) Regulations;
- Regular servicing of all trucks, service vehicles, and any other machinery powered using fossil fuels to ensure efficient combustion and minimisation of exhaust emissions;
- A waste management plan documenting the waste strategy, storage (including facilities and locations) and handling procedures should be developed and should include a clear waste-tracking mechanism to track waste consignments from the originating location to the final waste treatment and disposal location;
- Form bird strike task force that will study the birds' species and flight patterns and recommend appropriate action.
- Enforce good housekeeping practices by providing auto-shut plastic bins to dispose of food waste to avoid attracting birds within the project site and at the base camp. Cover the wastewater pit to prevent birds from flocking while drinking water.
- Hunting, fishing, trapping and gathering of food resources by workers, when on and off duty should be strictly prohibited. All workers to be briefed regularly on this issue;
- The risk of introduction of weed and pest species to the region via contaminated vehicles and equipment will be mitigated by the wash-down of all vehicles and ancillary equipment at a designated location prior to mobilisation of vehicles and equipment to the project site.

- Provide full personal protective gear to workers as appropriate (e.g. helmets and ear muffs/plugs) and as specified in the Occupational Safety and Health Act;
- A Hazardous Materials Management Plan (HMMP) will be developed for the project, and a safety data sheet should be maintained for all potentially hazardous materials, as well as supporting documentation for the transport, use and disposal of such materials;
- Consultations should be undertaken with local elders to help in identifying and avoiding any sensitive cultural sites and graveyards during the development programme in order to prevent conflict with the community;
- Have an ongoing, continual, sensitization of the community on the project objectives, activities and scheduling, potential impacts; communication will be essential in carrying out the project activities;
- Environmental safety and health regulations and policies/plans must be adhered to;
- Adequate warning or cautionary signs will be posted as required;
- The Company should liaise with the Provincial Administration, the Kenya Police, Kenya Police Reservists and other agencies to provide adequate security during the test drill operation; and
- Personal protective equipment to be provided to the workers and their use made mandatory in designated areas.

In summary, it can be concluded that with the measures put in place in the EMP the project will have minimal impact on the environment.

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APPENDICES

1. Minutes of the meeting
2. Licenses
3. Other relevant documents

MINUTES OF THE MEETING HELD IN THE DISTRICT COMMISSIONER'S OFFICE, MAIKONA DIVISION IN MARSABIT NORTH DISTRICT, MAIKONA TOWN

Attendance

1. Mr. Ole Nkoye – D.C Marsabit North
2. Stanley Langat – D.O Maikona
3. Peter Marua – S.S.P
4. Guyo Isako – Chief Maikona
5. Kombola Dido – Assistant Chief Medate
6. Guyo Turra – Elder
7. Woto Sori – Youth Representative
8. Elema Bitacha – Councilor Maikona
9. Haro Yatami – Environmental Committee Maikona
10. Molu Watu – Environmental Committee Maikona
11. Mrs. Bokayo Isacko – Women Representative
12. Muro Orto – Peace Committee Elder
13. Diba Okotu – Environmental Committee Chair
14. Gindole Katelo – Nominated Councilor
15. Sori Abudo – Business Man Maikona
16. Isacko Galagalo – Community Development Liaison Officer
17. Nicholas Aketch - Earthview Geoconsultants Ltd
18. Joseph Nganga – Earthview Geoconsultants Ltd
19. Peter Muriuki - Tullow Kenya B.V

The meeting was chaired by Mr. Ole Nkoye, The District Commissioner (D.C) Marsabit North. He called the meeting to order at 11:00 a.m with a word of prayer. He welcomed and thanked all the members present and requested the EIA team to introduce themselves and address the community members.

Mr. Nicholas Aketch then gave a brief overview of the proposed activity that is the proposed Aerodrome to be built by Tuloow Kenya B.V. near its base camp at Paipai I well site that is to be drilled soon. It was noted that during this exercise, the proponent had already communicated to the D.C and the local leaders and that they had given their consent to the proposed project. He told the community that the main purpose of the meeting was to collect their opinions concerning the proposed project

He also emphasized that since the number of people available at the meeting were few i.e mainly the leaders in Maikona town, more views of those that could not come for the meeting will be captured through a questionnaire. A youth leader representative was selected to distribute the questionnaires and collect them once the community members have filled them.

The community members raised a number of issues such as:

- If the noise emanating from the aeroplanes will affect them

- They were concerned of their grazing lands locally. They therefore, asked whether they will be affected during the projects operation.
- They agreed that indeed they are aware of the ongoing project as the project proponent had undertaken the seismic surveys and that some locals were employed during the exercise.
- They suggested that the community should be educated and awareness created on the environment and the activities that the proponent will be undertaking before and during project operation.
- They were concerned about the influx of people into the area as this may spread diseases such as HIV and AIDs to the area.
- They expressed fear of accidents caused by the Airplanes, vehicles and machines during project operations.
- They expressed fear that where the project is located is a vast land with wildlife and that during the exercise, the noise may drive away the wild animals towards the centre causing human-wildlife conflicts
- They expressed concern over the destruction of the ecosystem in that particular area where the project will be undertaken
- They want the community to be involved in project activities in terms of employment. They said that some of the jobs were given to the locals during the seismic activity which was a good thing for the youth. They further said that recruitment should be equal, transparent and gender sensitive and that their leaders should be involved.
- They wanted to know how the community will benefit from the proposed project.
- They urged EIA team to take into considerations the community views.
- They were happy that the project proponent has drilled a borehole which is currently helping their animals and the proponent will leave it for them once the project is complete. They emphasised that the area suffers from acute shortage of water as the only source of water.
- They were also concerned about a potential population increase around the water point once the borehole is left to them. Animal diseases were also a concern since it was thought that many animals would come to the watering point.
- They were concerned that the cost of living will go up with the influx of people from outside.

Mr. Nicholas Aketch then responded to the issues raised and assured the community that their interests, views, concerns and suggestions will be taken into consideration. He emphasized that the project has minimal and transient pollution to the environment and that any envisaged impact would be mitigated at site. He said that the proponent has put a lot of emphasis on Health and Safety of both its workers and locals and that there will be a continuous review and enhancement of safety measures to ensure no accidents or incidents occur during the project execution.

He emphasized that there will be creation of awareness and community will be educated before the project operation commences in the area. He told the community members that the project activities will be governed by the relevant laws and policies related to such projects. Lastly, he assured them that there will be community involvement in project activities through consultative meetings which will be held with both the community members and the leaders.

Mr. Ole Nkoye, The D.C of Marsbit North made the closing remarks by thanking the members who attended the meeting and urged the community to cooperate with the proponent during the project operations. He said that the proposed project had been ongoing in that particular area and that they have no problem with the project activities.