GOVERNMENT OF KENYA

MINISTRY OF AGRICULTURE, LIVESTOCK AND FISHERIES
STATE DEPARTMENT OF LIVESTOCK

REGIONAL PASTORAL LIVELIHOODS RESILIENCE PROJECT (RPLRP)

FINAL DRAFT STUDY REPORT ON

ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF)

November 2013
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GLOSSARY OF TERMS

**Cumulative impacts/effects:** The total effects on the same aspect of the environment resulting from a number of activities or projects.

**Developer/Proponent/Sponsor:** the entity – person/ company/agency – proposing to develop/implement/install a new project/sub- project or expand an existing project under the RPLRP

**Direct impacts:** An effect on the environment brought about directly by the RPLRP

**Disclosure:** Information availability to all stakeholders at all stages of the development of projects.

**Environment:** physical, biological and social components and processes that define our surroundings.

**Environmental and Social Impact Assessment (ESIA):** A comprehensive analysis of the project and its effects (positive and negative) on the environment and a description of the mitigative actions that will be carried out in order to avoid or minimize these effects.

**Environmental Monitoring:** The process of examining a project on a regular basis to ensure that it is in compliance with an Environmental Management Plan (EMP), or the Government of Kenya (GoK) Environmental Impact Assessment (EIA) certification of approval conditions and / or environmental prescriptions.

**Impact:** A positive or negative effect that a project has on an aspect of the environment.

**Indirect impact:** A positive or negative effect that a project indirectly has on an aspect of the environment.

**Involuntary resettlement:** The forceful loss of land resources that requires individuals, families and / or groups to move and resettle elsewhere.

**Lead Agency:** The agency with primary responsibility for the protection of the environment. For instance, the lead agency for environment matters in Kenya is the National Environment Management Authority (NEMA).

**Mitigation measures:** The actions identified in an EIA to negate or minimize the negative environmental impact that a project may have on the environment.

**Project and sub-project:** a set of planned activities designed to achieve specific objectives within a given area and time frame.
**Project Brief:** The initial submitted document to NEMA to initiate the process that will lead to the issuance of the EIA certificate of approval.

**Scoping:** The initial stage in an environmental assessment that determines the likely major environmental parameters that will be affected and the aspects of the project that will bring upon these effects

**Screening:** An initial step when a project is being considered for environmental assessment. The screening is the determination of the level of assessment that will be conducted. In the case of GoK, screening will place project into one of three environmental categories (I, II or III).

**Significant effect:** An important impact on an aspect of the environment

Potential environmental and social impacts are defined as follows:-

**Positive Impact:** A change which improves the quality of the environment (for example by increasing species diversity; or improving the reproductive capacity of an ecosystem; or removing nuisances; or improving amenities)

**Neutral Impact:** A change which does not affect the quality of the environment

**Negative Impact:** A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem, or damaging health or property or by causing nuisance). The potential adverse impacts of the project fall under two broad categories of bio-physical (natural) and socio-economic environments

**Stakeholder:** Any person or group that has an interest in the project, and the environmental effects that the project may bring about
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EXECUTIVE SUMMARY

Brief Project Description
The Government of Kenya has received technical assistance from technical consortium of the development partners to finance the preparation of the proposed Regional Pastoral Livelihoods Resilience Project (RPLRP) that is to be implemented in Kenya, Uganda and Ethiopia. In Kenya, the project implementation will be under the overall responsibility of Ministry of Agriculture, Livestock and Fisheries (MALF).

The Project Development Objective (PDO) is to enhance livelihoods resilience of pastoral and agro-pastoral communities in drought prone areas through regional approaches. The project will be implemented in 14 Counties which are Lamu, Isiolo, Laikipia, Mandera, Marsabit, West Pokot, Turkana, Tana River, Garissa, Baringo, Samburu, Narok, Samburu and Wajir which have cross border activities and trans-boundary stock routes linking pastoral communities on either side of the borders.

1.1 Project Components

Component 1: Natural Resources Management - At the national and sub-regional levels, this component will support the mapping of major natural resources (water resources, rangelands), their full embedment in the policy design/review process and a better planning of interventions related to them. It will rehabilitate natural resources that are crucial for livestock productivity and resilience to droughts, such as major water points and pasture. The activities will empower communities in sustainable natural resources management by introducing collective rangeland management systems. For the purpose of the RFP this component focuses on eight (3) sub components namely; i) water resource development, ii) sustainable land management in pastoral and agro pastoral areas and iii) securing access to natural resources in the Arid and Semi Arid Lands (ASALs) and border countries.

Component 2: Market Access and Trade - this component will support market infrastructure with a focus on those that support regional trade and export. The objectives are both to facilitate intra-regional trade of animals and animal products. It will build the capacity in the national veterinary services, as well as promotion of increased collaboration among countries. It will improve the surveillance and control systems of trans-boundary animal disease that negatively impact trade. The component will finally assist the three countries and Inter Governmental Authority on Development (IGAD) in: (i) harmonizing their animal health and food safety standards as part of Sanitary and Phytosanitary Standards in compliance with international ones (set up by the World Organization for Animal Health and Codex Alimentarius); (ii) strengthening the national and regional market information systems; and (iii) establishing and improving regionally recognized animal identification and traceability systems.

Component 3: Livelihoods Support; Investments - Under this component will address trans-boundary issues related to improved livestock productivity (fodder/feed production, animal health and breed improvement) and diversification (processing, non-livestock...
products, etc.). This component will disseminate across participating countries existing and tested approaches and/or technologies developed through research for the dry lands. The component will be implemented under three key sub component namely; i) Livestock production and Health, ii) Food and Feed Production and productivity, iii) Livelihood diversification.

**Component 4: Pastoral Risk Management** - This component will strengthen existing national Early-Warning and Response Systems in the project districts and link them with a sub regional under the IGAD platform. It is aimed at helping pastoralists build resilience to drought and other climatic shocks. The activities will harmonize the response to disasters in communities and other stakeholders, including public institutions in charge of drought management, at the sub regional level. This will be done through organizing joint sub-regional training and disseminating recognized tools for drought response such as the “Livestock Emergency Guidelines and Standards”. The activities will also support conflict management with particular focus on cross-border issues, as livestock and access to natural resources (water and pasture), which are the major drivers behind conflicts and security in the pastoral areas.

Components 1, 2 and 3 will involve civil works in the development of infrastructure and thus trigger the environmental assessment policy (OP.4.01). The potential adverse impacts will be largely small scale and site specific associated with Environmental Category B or C projects of the World Bank.

**Objective of ESMF**

An Environmental and Social Management Framework (ESMF) remains the key instrument to ensure initial project safeguards at this stage principally because the exact locations, scope, designs and nature of sub projects remains unknown.

This ESMF is aimed at ensuring that implementing institutions in this project use it in order to ensure that the Bank’s environmental safeguard policies as outlined in Operational Policy OP 4.01 (Environmental Assessment) are adequately complied with.

This ESMF is expected to ensure that environmental and social management is integrated into the development and operation of sub projects to be financed under the RPLRP to ensure effective mitigation of potentially adverse impacts while enhancing accruing benefits.

The ESMF has been prepared in line with the relevant World Bank (WB) safeguard policies on social and environmental management and further taken into account the appropriate Government of Kenyan (GOK) policies, legal and institutional framework related to environmental and social assessment.

The ESMF seeks to establish a process of environmental and social screening, which will permit the institutions in charge of the implementation of the projects to identify, assess and mitigate the environmental and social impacts of sub projects. The ESMF also
The purpose of the ESMF is:
(i) To provide as much information as possible about environmental and social impacts (including possible land acquisition and resettlement) at the project’s current state of preparation;
(ii) To inform project planning and design process by comparing potential impacts of alternative locations, configurations, and construction techniques that are under consideration; and
(iii) To describe procedures for subsequent assessment of impacts and development of appropriate impact management instruments when the details of the sub project investments become available.

The process of preparing this ESMF entailed detailed desktop literature review coupled with broad strategic consultation and engagement of appropriate stakeholders.

Policy, Legal and Institutional Issues
The following legal instruments among others were reviewed in view of the fact that they provide guidance and regulations when implementing water related programs or projects. These are principally the GoK legislations that apply to this project and a comparative analysis has been made between some certain relevant regulations of the GoK and the bank safeguards.

- Environmental Management and Coordination Act (1999)
- Water Act
- Land Act
- Occupational Health and Safety Act
- Public Health Act
- Wildlife Act
- Forest Act
- Agriculture Act
- Pesticide Management Act

GOK has through the Ministry of Agriculture, Livestock and Fisheries (MALF) prepared this ESMF as the instrument which all the RPLRP investments environmental and social impacts will be identified, assessed, evaluated and appropriate mitigation, management and monitoring measures, designed and incorporated within the proposed investment itself.

There are three other safeguards instruments that will compliment this ESMF and they are: Resettlement Policy Framework (RPF) already prepared and provides standards and procedures for compensation for any land acquisition, assets, or restriction of access to resources that this project and associated investment may require, in accordance with World Bank OP 4.12 – Involuntary Resettlement. The other safeguards instruments are...
the Vulnerable and Marginalised Groups Framework (VMGF) in accordance with World Bank OP 4.10 and the Integrated Pest Management Framework (IPMF).

**Environmental and Social Requirements**

In order to reduce, minimise and mitigate adverse impacts and undue harm of its development projects to the environment, all bank, financed projects are guided by environmental and social policies and procedures commonly referred to as safeguards instruments. A number of banks’ policies\(^1\) have been triggered as a result of this project and they include:

1. OP 4.01 (Environmental Assessment),
2. OP 4.12 (Involuntary Resettlement),
3. OP 4.10 (Indigenous People),
4. OP 4.04 (Natural Habitats),
5. OP 4.09 (Pest Management),
6. OP 4.11 (Physical Cultural Resources),
7. OP 4.37 (Dam Safety).

All safeguards policies of the World Bank require that, before a project is appraised, an Environmental and Social Impact Assessment (ESIA) containing an Environmental Management Plan (ESMP), and if the project requires it, a Resettlement Action Plan (RAP), and Vulnerable and Marginalised Groups Plan (VMGP), Physical and Cultural Resources Plan, Integrated Pest Management Plan (IPMP) be made available for public review at a place accessible to local people (e.g. at a district council office, the project site, etc.) in a form, manner, and language they can understand. The public display of the documents should be advertised in a common local or regional newspaper.

All necessary safeguard documents that will be locally disclosed will also be forwarded to the Bank for disclosure at its Public Information Center (PIC) of the country and at the Bank’s Infoshop.

**Environmental and Social Impacts**

**Beneficial Impacts**

It is expected that RPLRP will be beneficial to communities and to the environment since environmentally and socially sound natural resource management activities (including rangeland), small scale and micro irrigation water resource development and management, water development for rural water supply and for livestock, market center development, livelihood development, pasture rehabilitation and incorporation of forage crops into pastures; development and compliance with grazing land management rules, etc. will be

implemented. If all of these are implemented and managed properly, they will bring environmental social and economic benefits to the community.

The RPLRP proposed sub project investments may have significant negative impacts on the environment from a project specific perspective and cumulatively. These impacts include:-

- Better and hygienic environment for livestock
- The project will put in place better cattle trading facilities for livestock;
- The cattle markets will be sources of income for the local governments;
- The cattle markets will be have better accessibility
- Positive Impacts in terms of creation of employment, improved accessibility to trade and open up of commerce opportunities, enhanced agricultural activities, social-economic change, and source of revenue to the local communities.
- Rehabilitation of valley dams and tanks for animal watering will improve production of livestock; and
- Rehabilitation of valley dams and irrigation ponds will provide water for the communities and this will make them settle in their areas thereby reduce their tendency to cross to neighbouring districts in search of water with attendant conflicts.

Potential Adverse Impacts
This ESMF has been designed to anticipate and address potential impacts at the planning stage of the sub projects targeted under the RPLRP.

The impacts identified are typical of the proposed sub project interventions, which are summarized as follows:

Component 1: Natural Resources Development
- Water facilities to be rehabilitated in the communities of the project districts;
- New water facilities to be constructed in the communities of the project districts;
- Watersheds for the existing shared water facilities to be rehabilitated/developed in the communities of the project districts;
- Pastoral and Agro-pastoral rangelands/field demonstration schools to be established in the communities of the project districts.

Component 2: Marketing and Trade
- Livestock Markets to be rehabilitated/Construction in the communities of the project districts;
- Border Check Points to be rehabilitated/Construction in the communities of the project districts;
- Laboratories to be rehabilitated/Construction in the communities of the project districts;
• Slaughter Facilities to be rehabilitated/Construction in the communities of the project districts;
• Holding/Auction Grounds to be rehabilitated/Construction in the communities of the project districts;
• Trading routes to be demarcated;
• Grazing and strategic livestock feed reserves to be demarcated; and
• Watering points to be demarcated.

Component 3: Livelihoods Support
• Communal demonstration permanent crushes (galvanized iron) to be constructed;
• Crushes - Construction in selected sites (on average 5 per district);
• Pasture improvement (degrade range rehabilitation/ reseeding, pasture seeds scheme);
• Field demonstration plots to be established; and
• Storage Facilities in the 12 districts to be constructed.

Identification of impacts includes positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts, unavoidable or irreversible impacts.

Project Impacts and Mitigations Measures
The proposed sub projects are likely to generate adverse impacts, which are summarized as follows:

Slaughterhouse projects impacts
Negative impacts
• Impacts from excavations for foundations works will generate dust which is to be mitigated through water sprinkling on exposed surfaces;
• Noise and emissions from vehicles transporting construction materials. The contractors to have tarpaulins on trucks to covers loose construction materials. Noise from trucks to mitigated through limiting hours of works from early morning to 5:00pm to avoid disturbing sleep hours for the community;
• Excavations will lead to soil disturbance and this is to be mitigated through limiting areas of excavations;
• Loss of vegetation cover through site clearance will be mitigated through limiting excavations and general grass planting;
• Management of construction wastes will be through application of good construction practices;
• During operation of slaughterhouses, there will be issues of public health. These impacts to be mitigated through involvement of public health inspectors in routine daily inspections of the slaughter houses to ensure good hygiene;
• Management of condemned meat should be through availing land for disposal of condemned carcasses;
• Potential transmission of livestock diseases through movements in and out of districts. Should be addressed through institution of quarantines to restrict such movements; and
• Waste disposal especially horns, hooves and bones can be a challenge in upcountry settings where by such wastes can accumulate and pose public health concerns. This is to be addressed through use of landfills in urban settings in the project areas.

Impacts relating to rehabilitation and operation of cattle markets

Negative impacts and their mitigation measures
• Site clearance works will lead to soil erosion, loss of vegetation and sedimentation of nearby water areas. This can be mitigated through restricting works to designated areas and planting vegetation after close of works;
• Accumulation and management of solid waste during operation of markets. This can be addressed through contracting out the operations and management of such markets by the area local governments;
• The cattle market can have issues of crime especially during its operations. The area police will be available to maintain law and order in such areas;
• HIV/AIDS is one of the potential concerns resulting from operations and consumption of alcohol. Livestock traders are associated with engaging in alcohol and prostitution whenever they sell livestock. HIV/AIDS service providers to provide condoms including education and awareness on behaviour change in strategic locations in the markets;
• Operation of the cattle markets can bring about transmission of livestock diseases. The area Veterinary staff will issue movement permits for cattle that are to be taken to the markets and this will done after inspection of the animals before issuance of such of authorization;

Access roads improvements
Negative Impacts and their mitigation measures
Issues of borrow pits, materials extraction sites (such as borrow pits) are potential concerns on the road projects and they can be mitigated through preparation and implementation of a restoration plan which should be initiated at the early stages of opening up borrow areas;

Dust concerns from rehabilitation works on the planned roads can produce dust loads on the road and can be a nuisance to the communities adjacent to the road. Water should be regularly sprinkled onto the road surface at scheduled intervals and as the dust levels and the weather may demand;
Soil erosion impacts that may arise from opening up of borrow pits, clearing vegetation, run-off, and other factors such as slope failures. Contractors should provide scour checks, planting of creeping grass at the road shoulders and at the edges of embankments to check run-off from loose soil materials to possible nearby water bodies;

Vegetation loss, the impact will arise during the clearing of the work sites and the preparation of the areas where materials will be extracted. The impact of vegetation loss will however be minimal in the implementation of the planned road project;

Mitre drains/culverts discharges may cause erosion and sedimentation in the nearby fields/gardens from run-off from the road. There is need to consult with the roadside owners on the locations of the mitre drains to ensure harmony of the developments;

Noise from road works can be a nuisance to the neighborhood is not properly dealt with. Noise will also arise from the workers, the equipment and during the operational phase of the project. During works, noise will be of short-term nature and restricted to day time duration;

Human health and safety during road works can have impacts on the safety and the health of the workers and the travelling public. The sources of concerns can be and may not be limited to the following; murram dust; air pollution; smoke from machines; noise; injuries from road accidents caused by poor management of the works process and the obstruction/unsafe conditions due to the presence of ditches; murram boulders; accidents caused by poor signage; markings, intersection layouts; poor road side access and improper parking; and unsafe conditions due to poor or inadequate provisions for pedestrians, cyclists and other non-motorized users. The contractor will ensure that all road workers are supplied with Personal Protection Equipment (PPEs) such as shoes, gloves, overalls, nose masks etc. Children will not be employed and in addition, a First-Aid Kit will always be available on-site.

HIV/AIDS concerns, the spread of sexually transmitted diseases, including HIV/AIDS may become a severe impact of the project. The mixing of workers and relationships with the local communities could lead to the escalation of the scourge in and around the areas of the projects. To mitigate the HIV/AIDS scourge, it is proposed that, the contractor should mainstream HIV/AIDS in the planned road rehabilitation process. Raising awareness and providing HIV/AIDS education to the workers and the surrounding communities and supply condoms to the workers and the communities would be useful to reduce this impact;
Dangers from unfinished pothole patching, in the process of rehabilitating the roads, sometimes the road workers abandon unfinished potholes without any barriers and motorists tend to fall into such potholes with attendant impacts. Unfinished potholes should be sealed off with barriers, which are reflective in case work on them is unfinished at the end of the day. Alternatively, warning signs for the traffic should be placed at safe distance to and from such potholes.

**Rehabilitation of dams and valleys tanks**

**Negative Impacts**

1. Excavation works will generate huge volumes of soils that can sit water sources;
2. Heaps of excavated soils will be a nuisance to livestock during watering;
3. In some communities, the local collect domestic water from valley dams and can risks of being knocked down by cattle during water collection process;
4. During the operation of valley dams, cattle can trample on vegetation in the vicinity of the dam.

**Safeguard Screening Procedures**

The RPLRP has been rated Category B under the World Bank Operational Policy on Environmental Assessment (OP4.01). This ESMF has been designed to include tools that will be used to screen each proposed sub project prior to implementation and contains recommendation on the mitigation measures that need to be adhered to in order to reduce the adverse impacts.

Through the screening process a determination on the safeguards policies triggered by a particular proposed investment will be made and the mitigation measures to put in place outlined. Further the screening and review process will also ensure that sub project investments are adequately categorized as **B or C**. Those projects categorized as B should develop an ESMP or an ESIA, depending on project activities, and those categorized as C be subjected to no environmental evaluation/study.

If identified as a requirement of the sub project through the screening process, a Resettlement Action Plan (RAP), Integrated Pest Management Plan (IPMP), a Vulnerable and Marginalised Groups Plan (VMGP) and/or a Physical Cultural Resources Management Plan or a combination of these, is prepared alongside or as an integrated part of the ESMP or ESIA.

**Procedure for screening and development of ESIA**

Using this ESMF which is in essence a guide, the development of sub project investment specific Environmental and Social Impact Assessment (ESIAs) will be required for each proposed sub project investment once the nature, scope and location among others of the investments are known in order to ensure compliance with the World Bank safeguards policies. All sub projects will be screened using the screening forms (**See section 7.1**) and...
a determination will be made using the forms whether an ESIA report is required or otherwise by the Bank. The screening for all sub projects will be undertaken by the RPLRP/PCU based environmental safeguards specialist.

In order to ensure compliance with the Government of Kenya (GoK) environmental regulatory requirements during the feasibility study stage of each sub project, project reports will be prepared for each sub project investment by the executing agency with the support of the RPLRP/PCU and submitted to NEMA for determination as to whether an ESIA is required or not. If National Environment Management Authority (NEMA) makes a determination that an ESIA is required based on the project report submitted, then NEMA will assist in the development of Terms of References (ToRs) for follow-up ESIA and Resettlement Action Plan (RAP) which will have to be prepared and submitted to NEMA and World Bank for approval before construction works commence.

All the ESIA’s or ESMP’s will be reviewed and approved by RPLRP/PCU and submitted to NEMA and the World Bank for further review and approval.

**Reporting and Performance Review Requirements**

The MALF through the RPLRP/Project Coordination Unit (PCU) that is already set up will prepare project specific quarterly environmental and social progress reports for submission to the Bank. The PCU will prepare project (through consultants) specific ESIA and Resettlement Action Plans (RAPs), Vulnerable and Marginalized Groups Plans (VMGPs) Integrated Pest Management Plans (IPMPs), Physical Cultural Resources Management Plan for identified investments during the feasibility study phase of the project following detailed screening. Environmental and social safeguards technical assistance to the RPLRP executing agencies will be provided by the RPLRP/PCU’s Social and Environmental specialists who will be recruited for this purpose. These reports will be submitted to the World Bank’s implementation support and review missions.

**Capacity Building and Training**

Capacity development and strengthening remains a crucial component in this ESMF and will be integrated all through the project implementation phase. Capacity building will be in the form of training seminars/ workshops and short courses for project implementing partner staff from the implementing agencies to be able to successfully implement environmental and social aspects of the RPLRP. The proposed training modules will cover among others:

- a) **World Bank safeguards policies and NEMA Environmental regulations, specifically covering including the ESMF/ RPF/VMGF**;
- b) **Subproject Screening Checklist**;
- c) **Environmental Monitoring**
- d) **Development of Terms of Reference for ESIAs**;
- e) **Environmental and Social Clauses in Contractors’ contract and bidding documents**.

The capacity building activities can be summarized as follows:
1. Training workshops/ seminars
2. Public awareness creation/ communication plans
3. Logistic support to the NEMA
4. Preparation of ESIA for the sub project investments
5. Monitoring and evaluation exercises

Public Consultations
The preparation of this ESMF was guided by stakeholder consultation and engagement targeting relevant government institutions, Non-Governmental Organisations (NGOs) and the local communities where the sub projects will be implemented. Further, this ESMF provides for the process and techniques to be followed once a sub project is designed and partners are known which will include stakeholder mapping and consultation. Annex A and B shows the institutions and stakeholders consulted thus far and the issues and responses from the consultation process. (Stakeholder Consultation Process is not finalised and is on going and thus the annex will be updated by the 18th November 2013 when consultation is completed.)

Project Implementation
Ministry of Agriculture, Livestock and Fisheries is the principal implementing institution for this project and a senior official in the Ministry will be the overall Project Coordinator. MALF via the PCU will also be responsible for day-to-day implementation (project management, financial management, procurement, disbursement, monitoring, including environmental and social aspects of the project etc.) for all components.

The project coordination unit will comprise of the National Coordinator, 4 project component heads, M&E officer, community development Specialist, procurement specialist and the project Financial Accountant as shown in the organizational structure in Figure 1. The PCU will oversee the project implementation by backstopping and facilitating the project implementation teams at counties and sub- counties to access the project resources based on the approved activities.

Cost implication of this ESMF
An estimated USD 4,250,000 Million is considered the amount that will be necessary for implementing the activities in this ESMF excluding the costs related to sub project specific feasibility studies or actual ESIA, which will be, handled on a case by case basis once the actual sites and locations are known. The ESMF report is organized as follows:

- Acronyms and abbreviations
- Executive summary
- Chapter 1-Introduction Chapter and description of the proposed project
- Chapter 2-Study Methodology
- Chapter 3-Baseline information
- Chapter 4-Description of National and International Regulatory Framework
- Chapter 5-World Bank Environmental and Social Safeguards Policies
- Chapter 6- Determination of Potential Environmental Impacts
- Chapter 7- Project Coordination and Implementation Arrangements
- Chapter 8 - Capacity building and training requirements
- Chapter 9 - Public Consultations and Disclosure
- Chapter 10 - Reference
- Technical annexes
2 INTRODUCTION

GoK has requested the World Bank’s support to prioritize, prepare, and finance development in ASALs and thus increase resilience. The proposed Regional Pastoral Livelihoods Resilience Project – which was agreed between the World Bank and the GoK, GoU and GoE, responds to this request.

The proposed Project is currently expected to be in the order of about US$ 180 million for the three participating countries of Kenya, Ethiopia and Uganda. The Kenyan portion of the project will cost US$ 75 million. The project will be implemented over a period of approximately seven years.

The proposed intervention areas under the RPLRP may have environmental and social as well as human health impacts mainly during construction and operation phase of the subprojects. The main subprojects that may result in these impacts include: (i) development and rehabilitation of water resources structures for crop, livestock production, and water supply (micro dam, diversion weir, hand dug well, manual well tubing, bore hole, sand dam, community water pans); (ii) construction of soil and water conservation structures (physical and biological SWC measures); (iii) establishment of a nursery sites and community cultivation of improved seeds (for forage linked to inputs into fodder bank and dry land forest development); (iv) construction/rehabilitation of sustainably managed fodder/seed banks; (v) construction of market centers (primary, secondary/terminal markets); (vi) refurbishing and upgrading existing quarantine systems and veterinary laboratories with drugs, reagents, vaccines, consumables; (vii) rangeland management; and (viii) household livelihood diversification enterprise such as livestock rearing/fattening, fish production, poultry, bee-keeping and honey production, mining, etc.

The above development activities will involve civil works that is construction and/ or rehabilitation of infrastructure and thus trigger the environmental assessment policy (OP 4.01). The impacts here will range from small scale and site specific projects that could be rated as Category C to larger infrastructure investment projects associated with Category B projects of the World Bank, as well as trigger the Environmental Assessment Regulations of the Kenya Environmental Management and Coordination Act (EMCA 1999).

2.1 Purpose of the ESMF

This ESMF seeks to establish a process of environmental and social screening, which will permit the institutions in charge of the implementation of the sub projects to identify, assess and mitigate the environmental and social impacts of sub project investments. The ESMF also determines the institutional measures to be taken during the program implementation, including those relating to capacity building.
2.2 **Rationale for the ESMF**

Specific sub projects including location and sizes have not been clearly identified at this stage, hence an ESMF provides a general impact identification framework to assist MALF to screen the projects and institute measures to address adverse environmental and social impacts.

This ESMF thus applies to all sub projects to be financed under the RPLRP and all potential sub projects will have to satisfy safeguards requirements during project implementation. An ESMF is thus necessary since the corresponding technical (hence environmental and social safeguards aspects), of these sub projects have not yet been finalised or appraised. Specific information on country-wide project locations, land requirements, bio-physical features etc., when known at a later stage will trigger the preparation of Environmental and Social Impact Assessment (ESIA) reports.

2.3 **Approach for the preparation of ESMF**

The ESMF has been prepared in accordance with applicable World Bank safeguard policies (OP 4.01), which involved the following activities, among others:

- Literature/ Data Gathering and Review;
- Public consultations and discussions with relevant sector institutions;
- Determination of potential impacts;
- Identification of impact mitigation measures;
- Preparation of an Environmental and Social Management Plan; and
- Preparation of sub-project guidelines.

2.4 **Project Description**

2.4.1 **Country and sector context/ Project Concept**

**The Kenya Vision 2030:** This is the overarching national development master plan that aims to move all Kenyans towards the future as one nation that respects and harnesses the diversity of its peoples’ values, traditions, and aspirations for the benefit of all. It re-affirms the Government’s commitment to addressing the particular priorities of Kenyans living in arid and semi-arid lands.

**Agriculture (comprising livestock, fisheries and crops, and related activities) remains a key sector in Kenya’s economy.** Agriculture is the mainstay of the Kenyan economy, directly contributing about 24% of the annual Gross Domestic Product (GDP), 65% of total exports and provides more than 60% of informal employment in the rural areas. Agriculture in Kenya, therefore, offers considerable options for economic growth and rural poverty reduction.

Livestock contributes more than 47% of the agriculture GDP, and 12% to the national

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2 A Kenya CPP - A framework to End Drought Emergencies in the HoA, October 2012
GDP in Kenya. The livestock sector in Kenya employs about 50% of the agricultural workforce and about 90% of the Arid and Semi-Arid Lands (ASALs) workforce. The ASALs occupy 89% of the Kenyan landmass of which 70% is arid (Northern Kenya) and 19% semi-arid lands dispersed all over the country. The ASALs are home to about 14 million people (of whom 4 million are pastoralists\(^3\)). Approximately 95% of ASAL households derive their income from the livestock subsector where 70% of livestock is produced.

The number of smallholder farmers and small-holders who are unable to sustain a living from agriculture is however increasing and yet, with concerted efforts these groups could benefit greatly from the country’s long experience in collective actions through cooperatives and producer associations as witnessed in the dairy and horticulture subsectors. The under-exploited potential of rangelands and fisheries subsectors could also offer the residents in the ASALs sustainable alternative livelihood options.

The ASALs have the lowest development indicators and the highest incidence of poverty in the country, partly because of past government policies put into effect following the Sessional Paper No. 10 of 1965 which advocated giving less priority to investing in less developed Counties.\(^4\) For many years this statement guided the direction of Government resources, with the result that the social and physical infrastructure of the arid districts was neglected. Many analysts also argued that the region’s main livelihood strategy, pastoralism, was irrational and environmentally destructive, and that the ASALs contributed little to the national economy.

The most obvious implication of the worsening situation and vulnerability of ASALs in Kenya were demonstrated during the severe droughts that afflicted Kenya and other IGAD countries between 1981 and 2011. The negative impact of the droughts was particularly evident among the pastoralist who lost major parts of their livestock, and in the increasing number of people receiving food aid\(^5\). For example the number people who received food aid as a proportion of the total affected by drought increased from 60% in 2006 to 88 % in 2010. The livestock subsector sustained significant losses as a result of the drought between 2008 and 2011 which was estimated at approximately Ksh 699,336 billion with Ksh 56,142 billion in damages and Ksh 643,194 billion in losses in income flows\(^6\).

### 2.5 Pastoral Livelihoods Resilience Issues and Challenges in the ASALs

Due to the drought in 2011 and high cost of farm inputs, the agriculture sector recorded a low growth of 1.5 per cent. The severe contraction of production in (ASALs) was the major contributory factor to the recorded reduction of national agricultural growth. In these areas, crop and livestock production declined significantly. There were also

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\(^3\) Kirbride and Grahn 2008  
\(^4\) ibid Government of Kenya Sessional Paper No 2 for 2008,
significant losses in livestock breeding herds and other assets that may reduce the productive capacity of these areas for years to come, if no outside intervention is taken to restore productive capacity quickly. In addition to the drought, crop and livestock farming was also adversely affected by fuel prices that has resulted to high inputs and transport costs during 2011/2012.

Over the past few decades, the ASALs have witnessed several transformations that impacted on the livelihoods of the pastoralists. Migration of the rural communities from the congested high-rainfall areas to the fragile low rainfall areas has contributed to change of land-use to non-pastoral activities such as cropping in grazing lands not well suited for that region. Also, large pastoral grazing areas have been converted to settlements, removed from communal use to conservation. The pastoral grazing areas have also been targeted by large government schemes such as Turkwell Electricity project and the Olkaria Geothermal project thereby reducing accessible communal grazing. In addition, records indicate that droughts in the arid and semi-arid parts of Kenya have become longer and more frequent. Over the past 8 years (2005–2012) Kenya has experienced four episodes of severe drought (2004/05, 2005/06, 2008/09, and 2010/11).

The negative impacts of shrinking pastoral grazing areas and drought manifest itself in accelerated ecological deterioration. This is characterized by increasing loss of vegetation cover, land degradation through soil erosion, fragmentation and deterioration of water sources. These has led to scarcity of livestock feed and water resources. The limited, overgrazed and degraded rangelands hamper herd growth, leading to reduction of stock numbers below economical thresholds, consequently driving many pastoralists to perpetual food insecurity. Increased competition for scarce grazing and water resources often leads to inter-communal conflicts, insecurity, limited access to markets and other basic services.

Drought forces livestock owners to sell animals facing imminent death at low sale prices, thus leading to depressed purchasing capacity of pastoralists (as food prices increase) increasing their vulnerability to starvation. Deteriorating livestock health, low crop yields, and rising food prices exacerbate food insecurity. In spite of the above prevents and transformations, pastoralism remains the most viable economic activity for most of the people of the ASAL region.

Besides pastoralism, the climatic and cultural diversity of the vast arid and semi-arid areas offers significant economic and livelihood opportunities that is hitherto untapped or underexploited. The ASALs are a landscape rich in biodiversity, both fauna and flora, there are untapped underground water resources as well as stretches of land that could be used for food and animal feed production. These vast resources and opportunities, if properly managed and exploited in the presence of reliable infrastructure and social services, could offer sustainable and prosperous livelihoods for the inhabitants and eventually spur significant economic growth for the whole nation.
Experience shows that livestock market access is an invaluable part of the livelihood of the pastoralist and agro-pastoralists. Markets inject money into the local economy on each market day even in times of stress. This money supports financial access to food. Livestock markets therefore serve as drivers of rural economies, in pastoral areas. So if markets collapse, it will result in the collapse of the local economy.

The RPLRP will address the concerns identified above which are the degradation of the rangeland, scarcity of livestock forage and water, access to market and trade, exploitation of alternative opportunities to ensure the livelihood of the ASAL communities is secure.

Implementation of natural resource management component aims at having prevailed access, management and utilization of shared resources. Development of well-planned water resources, with appropriate infrastructure and trained management capacities of local communities will ensure prevailed access, promote equity, ensure sustainable use and reduce user rights and access conflict. Water is recognized as a key constraint in ASAL that determines migratory nature of pastoralists. Migrations due to water scarcity are closely associated with livestock deaths, notifiable disease outbreaks, and increased incidence of waterborne human infections. Re-vegetation of degraded areas with grass and trees will be done to ensure that land regain its productivity. Strategic feed reserves (hay stores) will be constructed to store surplus, the reserves will be used as emergency feeds to reduce livestock mortalities in subsequent droughts. These activities will improve water and pasture availability in quantity and quality hence reducing resource based conflict and promoting resilience of the pastoral communities during dry seasons.

Protecting the pastoral economy from collapsing due to market failure in essence is building the resilience of the pastoralists. Activities under market access will ensure all year-round access to markets both local and regional by facilitating the physical markets and attendant infrastructure to remain functional. In addition the markets and trade access component proposes measures that will prevent collapse of livestock prices to ensure the target communities are not disadvantaged in the terms of trade with other food and consumer items. The component will also address measures to improve the ice accruing to livestock and livestock products marketed by the target communities.

Enhanced health of livestock will contribute to reduction of morbidity and mortality. This will result in increased livestock off-take and increased incomes. Breeding will result in animals that are more productive under the ASAL conditions. Drought tolerant crops will contribute to food security and crop by products will be utilized for animal feeding hence increasing availability of feed. Surplus pastures during the rainy seasons will be conserved for utilization during dry spells. This will ensure the productivity of livestock is not adversely affected. The irrigation schemes will further contribute to fodder and food availability for animal left in the homesteads when others migrate. Support will be provided to pastoralists who have lost their animals to start income generating activities.

Under the Pastoral Risk Management (PRM) component, the project will build the capacity of target communities and their service providers to anticipate and monitor
threats through early warning systems and respond appropriately. The anticipated state of preparedness will enhance the resilience of the community to shocks.

2.5.1 Proposed Development Objectives (PDOs)

The overall development objective of the RPLRP is to develop and implement regional approaches that enhance livelihoods resilience of pastoral and agro-pastoral communities in the drought prone areas of the ASALs of Kenya and its neighboring countries including Ethiopia and Uganda.

The project will contribute to the agreed response of Kenya along with other IGAD member states to address the regional priorities developed through the Country Programs Papers (CPP) in response to the IGAD drought disaster resilience and sustainability initiative (IDDRSI) in the Horn of Africa.

2.5.2 The aims of the project include:
- Mitigating droughts impact at the national level by introducing regional interventions in complement to the existing national initiatives such as Kenya Government Sessional Paper No 2 of 2008 on National Livestock Policy, and the Kenya Vision 2030.
- Building capacities in Kenya for pastoral and agro-pastoral communities from ASALs that will increase resilience to medium and long-term climate related vulnerabilities with a focus on livestock related livelihoods;
- Building and strengthening linkages with Ethiopia and Ugandan Governments to better tackle issues that affect communities in the ASALs.

2.5.3 Specific objectives under the components

1. The specific objective of the Natural Resource Management Component is to contribute to the development of a framework for the management and utilization of shared pastoral and agro-pastoral resources within the context of social stability and conflict prevention and, management. The outcome of this is to increase availability and equitable access to sustainably managed land, pasture and livestock water resources for cross border livestock and pastoralist movement.

2. The objectives of the Marketing Access and Trade Component is to harmonize trade policies regulatory framework to promote formal regional/cross border trade; streamline livestock movement requirements at border control points; address the constraints of cross-border trade services including infrastructure, certification, information, human capacity development and value chain development. The intended outcome of this component is improved access to markets and trade.

3. In the Livelihoods Support Component, the objective is to develop resilient livestock livelihoods and other supporting diversified livelihoods. This will result in increased adaptive capacities of households in drought prone communities.
4. The Pastoral Risk Management Component objective is to establish national infrastructure and capacity for implementing harmonious and effective early warning and response systems for management of droughts and other disasters. This will result in enhanced disaster (especially drought) preparedness, prevention, management and response.

5. The Project Management objective is to have a harmonized project management within the implementing counties in the country and between the implementing countries. The outcome of this will be effective and efficient utilization of resources for the drought resilience project in the target areas.

2.6 Project beneficiaries and targeting approach

The project direct beneficiaries estimated at 92,290\(^7\) are the pastoral and agro-pastoral communities susceptible to climate uncertainties and recurrent droughts. The beneficiaries will be targeted based on informed processes and innovative tools (e.g. PAPOLD, CMDRR, applying maps, GIS, remote sensing and ICT tools and resources) of defining the biophysical areas that have direct or indirect impact on the ASALs communities and ecosystems e.g. country, national and regional boundaries, trans-boundary water and land resources, trans-boundary animal movement and livestock trade areas, conflict areas and hotspots.

2.7 RPLRP Components:

2.7.1 Component 1: Natural Water Resources Management

At the national and sub-regional levels, this component will support the mapping of major natural resources (water resources, rangelands), their full embedment in the policy design/review process and a better planning of interventions related to them. It will rehabilitate natural resources that are crucial for livestock productivity and resilience to droughts, such as major water points and pasture. The activities will empower communities in sustainable natural resources management by introducing collective rangeland management systems. This component focuses on:

- New water facilities to be constructed
- Water facilities to be rehabilitated
- Water sheds for the existing shared water facilities to be rehabilitated/developed
- Pastoral and Agro-pastoral rangelands/field demonstration schools to established

Sub-component 1.1: Water Resources Development

The subcomponent will be implemented through the following outputs:

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\(^7\) The population has been estimated from the proportion of the project investment (KES 6 billion) relative to the requirement in the Kenya CPP (226 billion) which is multiplied by the proportion of people affected by major drought hazards (3.5 million)
Available regional/national mapping of water resources and issues users (including for investments) refined and disseminated

The project will refine, improve, assimilate and disseminate information of water resource from the existing maps and databases\(^8\) of the selected project areas. IGAD will coordinate the development of the legal framework as well as provide a platform for sharing the data and maps. They will facilitate the improvement of the maps resolution.

At the national activities will include;
- Develop legal framework for data and map sharing
- Carry out water resources, water use/users profiling. This will be achieved by: study availed data/maps on location of water resources, function of the resource and quality of water; Ground truthing and; Update profiles of water resources and access facilities (data collection, analysis, documentation, storage and production

The infrastructures for water access resources developed and rehabilitated

The project will develop surface water through appropriate community-owned water harvesting structures while harnessing ground water based on social and environmental sustainability criteria. IGAD will convene meeting to coordinate the siting of the water resource facilities. The following activities will be undertaken to achieve this output:

1. Identify and design water resources access facilities. This involves carrying out feasibility studies on identified water resources access facilities and survey and design water resources access facilities;
2. Rehabilitate water resource access facilities-water pans, earth dams and boreholes
3. Construct new water resource facilities- water pans, earth dams, rock catchment and boreholes.

The ministry of Environment, Water and Natural Resources, which possess the necessary technical knowhow and have the mandate, will be engaged in the process and to evaluate

The stakeholders’ capacities to manage the shared water resources through knowledge dissemination and sharing are strengthened

To achieve the output IGAD will support the setting up of integrated information system and support regional workshops to share best practices. At the country level activities to achieve this will include;

1. Set up integrated information system;
2. Build capacity for water user association. Where there none existence the project will establish water resources user committees for shared water resources; train on water management skills; hold workshops to share knowledge on best practices on water resources management at regional, country and county levels

\(^8\) Example from IGAD, NDMA WESCOORD ground water resources and WRMA
3. Build capacity for staff; the staff will be trained on operation and maintenance of water facilities; sponsor relevant short courses and exchange visit to enhance their capacities.

**Sub-component 1.2: Sustainable Land Management**

The subcomponent will be implemented through following outputs:

**Available regional/national mapping of land resources and use related issues refined and disseminated**

- To effectively manage the shared rangelands ecosystems (e.g. seasonal grazing areas, degraded pasture resource areas and forest cover). IGAD will coordinate the development of the legal framework as well as provide a platform for sharing the data and maps. They will facilitate the improvement of the maps resolution. At the national activities will include; Refine, improve, assimilate and disseminate information existing in maps and databases⁹ in the project areas, use the information to target intervention points. Concentration will be mainly in areas adjacent to borders and along key regional livestock corridors.

- Promote best practices for rangeland resources through: carry out needs assessment to identify gaps; hold knowledge sharing workshops to share best practices at county, national and regional levels; support exchanges visits and study tours.

**Rangeland ecosystems with trans-boundary implications including for livestock movements are rehabilitated**

- IGAD will convene meeting to coordinate the choice of intervention points. At the national level The following activities will be undertaken to achieve this output: Rehabilitate degraded areas through bush control, seed bulking, extensive reseeding and soil conservation; conservation of pasture seeds and forage will be promoted.

**Policies at regional level on rangeland management are harmonized.**

These will be achieved through the following activities: IGAD will convene joint meetings for the member state to review and harmonize policies on rangeland management. While at the national level the activities will include:

1. Collect, Identify gaps, review and harmonize relevant policies; disseminate the policies
2. Disseminate the AU land policy
3. Carry out a study on effectiveness of implementation of policy regulation

⁹. Example, Rangeland NDVI, Fewsnet, ICPAC, MET, RCMRD
Sub-component 1.3: Securing Access to Natural Resources in the ASALs and border countries

The subcomponent will be achieved through the implementation of the following outputs:

- **Conflict prevention, management and resolution strategies and approaches are harmonised**

  To realise this output, the following activities will be undertaken: IGAD will facilitate setting up platform for information sharing; they will also coordinate the development of a legal framework for information sharing.

  a) Form cross-boundary resilience platform; identify conflict hotspots and drivers; sensitize relevant stakeholders on the identified causes and mitigation options;

  b) Conflict resolution by: Set up a platform for accessing, disseminating and sharing information. Facilitate repeated joint meetings between communities to foster unity; Support joint activities; Train local government officials and security officials to enforce agreements; Facilitate signing of the shared agreement; facilitate exposure visits of community members

  **Policies at regional and national level on rangeland management including those on secured access to NR are harmonized and supported**

  a) To achieve the above the project will undertake the following activities; IGAD will facilitate and coordinate meetings to review and harmonize policies related to secure access to natural resources. At the national level activities will include:

  b) Support harmonization of decentralization policies and land use policies; hold regional and local policy consultations and harmonization meeting; support production and dissemination of the policies. A consultant will be engaged to drive the process.

  c) Strengthen traditional institution for implementation of policies by; mobilize community leaders; facilitate meeting that build on traditional conflict management; facilitate formal recognition of the institutions; facilitate the community to carry peace campaigns

  d) Operationalize existing policies through; Civic education, create awareness and network at county and regional level; Support formal cross border peace building negotiations and information sharing meetings.

2.7.2 Component 2: Market Access and Trade

This component will support market infrastructure with a focus on those that support regional trade and export. The objectives are both to facilitate intra-regional trade of animals and animal products. It will build the capacity in the national veterinary services, as well as promotion of increased collaboration among countries. It will improve the surveillance and control systems of trans-boundary animal diseases that negatively impact
trade. The component will finally assist the three countries and IGAD in: (i) harmonizing their animal health and food safety standards as part of Sanitary and Phytosanitary Standards in compliance with international ones (set up by the World Organization for Animal Health – OIE and Codex Alimentarius); (ii) strengthening the national and regional market information systems; and (iii) establishing and improving regionally recognized animal identification and traceability systems. Key subcomponent activities include:

- Livestock Markets to be rehabilitated/Construction
- Construction and rehabilitation of border check points to be rehabilitated/Construction
- Construction/rehabilitation of laboratories
- Construction/rehabilitation of slaughter facilities
- Construction/rehabilitation of holding/auction grounds
- Construction/rehabilitation of trading routes to be demarcated
- Grazing and strategic livestock feed reserves to be demarcated
- Watering points to be demarcated

**Sub-Component 2.1: Marketing Infrastructure and Information Systems**

This sub-component will facilitate access to markets and trade through the provision of physical infrastructure and marketing information to livestock market participants.

2.1.1: Livestock Marketing Infrastructure improved

Physical Markets are generally underdeveloped and poorly integrated locally and regionally. In several instances, poorly supported cross-border trade and mobility are major causes of health and security hazards. IGAD will coordinate mapping and gap analysis of cross-border market infrastructure to ascertain the adequacy of:

Holding grounds for animals to rest and recuperate after long period of trekking before being sold. The holding grounds services will include access to water and animal feed, livestock products processing facilities, testing and certification facilities and quarantine facilities.

Infrastructure improvement is expected to facilitate access to markets and trade through the improved physical infrastructure facilities such as, (i) construction of five sanitary slaughtering facilities in selected towns; (ii) the development of four and rehabilitation of 6 holding and auction yards/grounds in marketing towns and border trading points with Uganda and Ethiopia and providing veterinary services at these places, including inspection and certification services; and (iii) demarcating cross-border trading routes and providing services (watering and animal health) along these routes.

a) There specific objectives will be achieved through the following priority activities:

b) Mapping of existing and required infrastructure and harmonize the need for coordinated infrastructure in the region, and;
c) Identification of needs, renovation/construction of infrastructures and installing management models.

2.1.2 Establishment of a Market Information System

Limited access to market information (prices, sources, demands and objective standards for selling and buying animals, etc.) is a real constraint marketing livestock in the ASALs. Improving the information flows to local producers will be an important undertaking to improve market access. There are several market information systems including the voluntary widely adopted use of mobile phone systems. However, these systems lack approaches that assure clear and harmonized definition of data, access to reliable data and innovative ways of information dissemination and feeding systems.

The project will provide marketing information both nationally (Kenya) and at IGAD level to enhance informed decision-making. IGAD will develop regional market information platform that will enable the region to share marketing information. National priority activities include:

1. Upgrade and integrate the National Livestock Marketing Information System with the regional market information systems
2. Development of mechanisms for dissemination of the information through electronic, print and verbal media.
3. Capacity building of pastoral populations and relevant stakeholders on marketing information utilization and other aspects of livestock marketing and trade (auction system, grading and certification, taxation, and legal procedures for export).

Sub component 2.2: Livestock Marketing support and Value Chain Development

The transfer of animals from the farm gates to the terminal markets is the major value added activity along the value chain of the pastoral and agro-pastoral livestock systems. Livestock marketing channels are segmented into domestic and cross-border sections. Most of the producers market small quantities of livestock commodities and this happens seasonally. The phenomena become a barrier to their participation in domestic as well as the cross-border segments of the livestock markets.

Furthermore, while all traders (small, medium, and large-scale) participate in the domestic segment of the marketing chain, only large-scale traders get involved in the export segment due to the huge initial capital investment. In addition, there is very little presence of processors in the marketing channels, particularly the cross-border segment.

This project will address the value chain barriers through the following priority activities:

2.2.1: Model Cooperatives:

The project will develop model cooperatives capable of strengthening the sale and marketing power of the small herding communities by selling to the producer association
for onward sale to exporters and processors. To achieve this output the following activities will be undertaken:

1. Develop Organizations’ model for coordinating sales of livestock to major livestock buyers. Innovative approaches such as the experience of CARE in Marsabit where community bank approaches were set to link the producers with the market systems.
2. Build the capacity pastoralists on cooperative and contract marketing with other market actors (Major abattoirs and exporters) and sensitize producers on benefits of collective actions through cooperatives and producer associations.

2.2.2 Value Chain Development
Cross border Livestock Marketing Channels will be analyzed to isolate channels with good prospects for value chain development, and for the promotion of high value livestock commodities such as the “green livestock”. IGAD will commission a study on gap-analysis of regional value chains that would provide high impact on the livelihood of pastoralists. In addition, IGAD will develop a training programme for member states on cross-border value chains.

a) The following national activities will then be undertaken to achieve this output:
   b) Conduct livestock market research using value chain approach
   c) Develop value chains of selected cross border livestock products including specialty livestock products (Organic/green meat)
   d) Build capacities of market actors on cross-border value chains

2.2.3. Protection of pastoral assets
Livestock is both the principal asset and source of income for the vast majority of ASAL residents. Drought is the single greatest cause asset loses through body condition loss and livestock mortality. This imposes considerable economic and welfare costs on pastoralists.

Conversion of livestock assets into other asset forms and sustainable insurance can mitigate this risk and shock. This will support the food security strategy of the region by sensitizing communities to sell livestock and use the money received to purchase cereals/food at the most favorable terms of trade between livestock and cereals, and store cereals/food. The following activities will be implemented:
   a) Capacity building of pastoralists on alternative asset holding
   b) Scaling up of grain storage and warehouse receipt systems
   c) Popularizing and scaling up of the index based livestock insurance schemes

2.2.4 Financial systems to support livestock trade
Considering that lack of access to credit has been identified as major barrier to entry in livestock marketing, and particularly international trade, efforts will be put in place to provide a revolving fund where producers and traders can access financial capital. Support
financial service provision to small business particularly for women and young people will go a long way in enhancing resilience. The project will:

a) Review existing financial access schemes and products to pastoralists and livestock farmers and support improvement/up scaling of systems where relevant.
b) Improve access to financial products and services (banking and insurance) to low-income urban and rural communities, through micro-finance and micro-insurance initiatives.

Sub-component 2.3: Improving Livestock Mobility and Trade in Livestock and Livestock Product
The anticipated outcome of this subcomponent will be achieved through the implementation of the following output

2.3.1: Trade policies and Regulatory framework of the Governments and Region improved
IGAD will coordinate harmonization of regional trade policies for the member states to trade with each other and with the outside world. Then the country will achieve this output through the following activities:
   a) Review, ratification and implementation of regional trade policies and protocols.
   b) Review of national policies and regulations and aligning them with the regional policies and protocols
   c) Making the policy, legal and regulatory requirements accessible by livestock marketing and trade participants.
   d) Capacity building of relevant government officials and private sector people working in the livestock trade on basic legal and regulatory requirements

2.3.2: Cross border food safety control of livestock products Improved
Uncontrolled cross border movement of livestock is a major barrier to trade in the region, which could be overcome by harmonized legislation, regulation testing and certification systems condoned by the countries in the region. In addition certification is an important means of collection of valuable information to consumers about product quality and safety (e.g. food safety).

This output will be achieved by undertaking the following activities through the application and scaling up the available innovations and practices such as Digital Pen and Animal Identification and Traceability systems.

IGAD will Coordinate Setting and harmonizing cross-border trade SPS, and other trade-facilitating tools. It will also coordinate regional diseases surveillance and laboratory networks. In addition, IGAD, will coordinate development of harmonized livestock identification, certification and traceability system
a) Implementation of the harmonized cross-border trade SPS, and other trade-facilitating tools
b) Upgrading of veterinary laboratory services through provision of reagents, equipment and training
c) Implementation of harmonized animal identification system and traceability

2.7.3 **Component 3: Livelihoods Support**
This component will address trans-boundary issues related to improved livestock productivity (fodder/feed production, animal health and breed improvement) and diversification (processing, non-livestock products, etc.). This component will disseminate across participating countries existing and tested approaches and/or technologies developed through research for the dry lands. The component will be implemented under three key sub component namely; i) Livestock Production and Health, ii) Food and Feed Production and productivity, iii) Livelihood diversification. The component activities include:

- Construction/rehabilitation of communal demonstration permanent crushes
- Construction/rehabilitation of Crushes
- Pasture improvement (degrade range rehabilitation/ reseeding, pasture seeds scheme)
- Training and demonstration for households in different income generation activities
- Support appropriate alternative income generating enterprises for households
- Field demonstration plots to be established
- Construction/rehabilitation of Storage Facilities

**Sub-component 3.1: Livestock Production and Health**
The sub-component will be implemented through the following outputs:

3.1.1 **Disease and vector surveillance and control services strengthened and harmonized at national and regional levels**
IGAD will convene meetings for harmonisation of regional policies (AU policy and IGAD-LPI) and disease control protocols, vaccination programmes. IGAD will support research in camel diseases

Under this sub component significant investment will be made on the national activities including:

a) Aligning national policies with regional policies (AU policy, IGAD-LPI) and cascade to the county governments; developing and strengthening regional disease-surveillance (through work with FAO to scale up digital pen technology) to monitor disease prevalence and spread;
b) Synchronized regional vaccination campaigns for identified major diseases such as FMD, CBPP, CCPP and PPR in targeted areas;
c) Vector and pest control will be carried out through spraying, spot on or pour on, traps and targets
d) Identify research institutions to collaborate in the camel diseases research

3.1.2 Capacity of the pastoral Community to access sustainable Animal Health services enhanced

- IGAD will set up platform for information sharing on best practices, innovation on animal production and health delivery services
At the national level the following activities will be supported; (i) building the capacity of the pastoral communities and animal health service providers to identify and report occurrence of diseases; (ii) develop partnerships between the community, animal health service providers and other stakeholders in order to facilitate provision of inputs and services within the counties;

3.1.3 Indigenous Livestock Breeds Conserved
The ASAL areas are home to diverse and adapted livestock breeds, which can be used as foundation stock for breed improvement programs. The diverse breeds occupy different ecosystems and can be used to enhance resilience of pastoral communities

At the regional level IGAD will support harmonisation of breeding strategies for the countries. At the National level the program will establish four sub-regional breeding centres (SBC) to provide superior breeding material to individual pastoralists and the community breeding programmes;

a) Develop community based livestock breeding programmes (CBLBP) for cattle, camels, sheep and goats while incorporating indigenous knowledge);
b) Strengthen national focal point to develop breeding strategy; support breeder organization to enhance data collection and maintain breed standards
c) Build capacity of communities for improved productivity using platforms such as pastoral/farmer field days, schools (FFS/FPS) and farmer-farmer exchanges.

Sub-component 3.2: Food and Feed Production
The sub-component will be implemented at the national level through uptake of technologies and best practices for up scaling to achieve the following outputs:

3.2.1. Availability and utilization of drought tolerant fodder
a) Drought tolerant fodder offers an opportunity for communities to build reserves to combat drought. The sub-component will support the following activities:
b) Promote production, bulking and conservation of drought tolerant fodder for livestock feeding in the agro-pastoral areas;
c) Support development of a food security reporting system to assess the vulnerability of the communities; and
d) Construct model hay sheds and provide harvesting equipment at strategic locations.

3.2.2. Investments in irrigation and irrigated agriculture enhanced

The following activities will be implemented:

a) Enhancing irrigation technologies along permanent water sources in the pastoral areas for the cultivation of fodder crops to reduce vulnerability of communities especially during prolonged dry spells;
b) Support distribution of certified fodder crop seeds and other inputs to improve productivity, and
c) Establishment and capacity building of irrigation water users associations (IWUA) to manage and ensure sustainability of the irrigation schemes.

Sub-component 3.3: Livelihood Diversification

Viable value chains on pastoral and agro-pastoral alternative livelihoods promoted (e.g. hive products, Gums & Resins, Poultry, Medicinal plants, Fodder and Fish).

Under this component IGAD would facilitate the member states to carry out market survey and identify international markets for identified products under this component.

The following national priority activities will be undertaken to achieve this output

a) Value chain analysis of identified possible alternative livelihood sources (e.g. Honey, Gums and Resins, Poultry, Medicinal plants, fodder and fish) will be carried out in order to minimize inefficiencies/losses thereby maximizing returns for the different players involved.
b) Capacity building of communities on improved production using platforms such as pastoral/farmer field days, schools (PFS/FFS) and farmer-farmer exchanges,
c) Support cottage industries for selected enterprises to improve market access; develop training programs for communities on group dynamics and financial management, and promote linkages to existing micro-financing institutions
d) Support capacity building on wildlife conservancy, livestock tourism and eco-tourism.

2.7.4 Component 4: Pastoral Risk Management

This component will strengthen existing national early-warning and response systems in the project districts and link them with a sub-regional under the IGAD platform. It is aimed at helping pastoralists build resilience to drought and other climatic shocks. The activities will harmonize the response to disasters in communities and other stakeholders, including public institutions in charge of drought management, at the sub regional level.

This will be done by organizing joint sub-regional training and disseminating recognized tools for drought response such as the “Livestock Emergency Guidelines and Standards”. The activities will also support conflict management with particular focus on cross-border issues, as livestock and access to natural resources (water and pasture), which are the
major drivers behind conflicts and security in the pastoral areas. Key subcomponent activities include:

- Support conflict management with particular focus on cross-border issues, as livestock and access to natural resources (water and pasture), which are the major drivers behind conflicts and security in the pastoral areas.
- Readily avail, timely disseminate, and understood Early warning information
- Harmonized and strengthen Drought Resilience Mechanism policies
- Institutionalized effective responses to early warnings

**Sub-Component 4.1: Pastoral Risk Early Warning and Response Systems**

This subcomponent will aim at strengthening and harmonizing the EW and response systems at the national and regional levels through two outputs. The sub-component will involve institutions that have capacity in early warning on forage supply, water supply, livestock market prices/volume, livestock movement, disease control, conflict resolution and terms of trade – cereal prices. The institutions include technical departments such as Livestock, Agriculture and Meteorology, East African early warning system ([www.glews.tamu.edu](http://www.glews.tamu.edu)), National Livestock Marketing Information Center Kenya ([www.lmiske.net](http://www.lmiske.net)), waterhole monitoring for East Africa with NASA data ([www.watermon.tamu.edu](http://www.watermon.tamu.edu)), IGAD Climate Prediction and Application Centre ([www.icpac.igad.org](http://www.icpac.igad.org)) and our own National Drought Management Authority.

4.1.1 Early Warning Systems are strengthened and harmonized in the region; and capacities are built / developed to turn early warning into action

Strengthening and harmonizing early warning in the region, and capacity building to turn early warning into action. IGAD will coordinate, organize and facilitate capacity building (workshops, study tours, trainings etc.) for national experts and senior officials to enable knowledge and experience sharing to identify best practices, and develop a harmonized methodology for risk profiling at regional level and train member states in the use of the methodology, establish and operationalize a regional EWR platform to collect and analyze information for dissemination to relevant national authorities to guide action, and develop a harmonized methodology for risk profiling at regional level and train member states in the use of the methodology, establish and operationalize a regional EWR platform to collect and analyze information for dissemination to relevant national authorities to guide action. Interventions in national Early warning systems will be achieved through the implementation of the following activities:

a) Expand sentinel sites to cover 60% of Kenya
b) Establish National Rapid Response Systems, Livestock-insurance schemes / pilot projects for adoption in the region. Support and incorporate traditional EW information and coping systems and integrate with the conventional EWS
c) Best practices and interventions acquired from the regional capacity building will then be domesticated in the project area. Such innovations include financial risk transfers mechanisms (weather based Insurance) that has already been piloted and may need scaling up.
d) Undertake national risk profiling e.g. natural hazards vulnerability, climate, and institutional capacities and disseminated at all levels. IGAD to consolidate a regional risk profile.

e) Dissemination of EW information through traditional vernacular media, print media and website with the ultimate aim being linkage of early warning to action. Link national platform to Regional EW platform.

4.1.2 Building capacity of communities to develop Contingency plans
Developing and operationalization of contingency plans will be achieved through;

- IGAD to organise regional training of trainers in formulation of contingency plans and develop guidelines, training modules and capacity building trainers for contingency planning, assess existing national structures’ response capacity and build where gaps exist.

  a) Strengthening contingency planning capacities of communities and stakeholders by training different levels of implementers and beneficiaries at national level in contingency planning.
  b) Formulation and dissemination of contingency plans at all levels.
  c) The contingency plans will be submitted to IGAD for consideration and compilation of regional contingency plans.
  d) Internally assess existing national structures’ response capacity.
  e) The project will Support food security assessments and development of a livestock food commodity balance sheet.

Subcomponent 4.2: Disaster Risk Management (DRM)
The objective of the DRM is to operationalize effective disaster risks management policies and avail contingency funds. Three outputs are expected to be achieved namely;

4.2.1 Ex-ante risk reduction measures for effective disaster management developed and implemented
This will entail supporting the following activities:

  a) IGAD undertaking training of trainers (TOT) on DDRM-related key guidelines/standards such as Livestock Emergency Guidelines and Standards (LEGS)
  b) As part of the Regional-national activities, this will entail supporting the following activities:
  c) TOTs will cascade the trainings at national levels.
  d) Upscale disaster preparedness and mitigation measures through adopting research and innovations at all levels as well as developing human capacity (education – institutionalization of Livestock Emergency Guidelines and Standards (LEGS) and

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10 Systems and capacities for effective response
Community Managed Disaster Risk Reduction (CMDRR). This will help focus interventions to early warning.

e) Awareness creation of disaster risk management options among policy makers

4.2.2 DRM policies are harmonized, operationalized, mainstreamed and institutionalized at the central and line ministry levels

a) To harmonize, operationalize, mainstream and institutionalize DRM policies, the following activities will be undertaken;
b) Participate in regional workshops organized by IGAD for knowledge and experience sharing on DRM policies and harmonize where possible.
c) Harmonizing DRM policy at the national and county.
d) Mainstream DRM policies and strategies into all line ministries and institutions

4.2.3 Contingency Funds (regional & national) created and operationalized

a) Create mechanisms (fiduciary and administrative capacities) for receiving and disbursing contingency funds. IGAD to building countries capacities to access the IGAD regional DRM contingency fund (guidelines)
b) IGAD to support the development of DRM contingency fund guidelines and country criteria for assessing those funds

Sub-Component 4.3: Climate Risk Management

The following priority outputs will be achieved,

4.3.1 Readily available and accessible drought related weather and climate information (decision making processes to enhance resilience of livelihoods in the ASALs research and analytical work on climate change including climate outlook) are used in planning

Climate Risk Management strives to ensure that drought related weather and climate information is readily available and accessible to the stakeholders. The project will implement the following activities:

- Link to Global framework for climate services (GFCS)
- Facilitate workshops for identifying actionable elements from GFCS at the regional level.
- Implement climate change activities as identified at the regional forum at the country level.
- Adoption of research and innovations (advocate for conservation tillage, limited burning and promote reforestation and use organic fertilizers) at all levels (National)

4.3.2 Climate change management policies are incorporated into planning and investments for pastoralists

The project will incorporate climate change adaptation policies into national planning and budgeting in the various components in order to adapt and mitigate the effects of climate change. This output will be achieved through Integration of climate change information
into early warning and information systems with emphasis on improving the integration of climate change information into existing bottom-up and top-down early warning systems (e.g. CABLEWS, ALRMP, FEWSNET, LINKS, LEWS, ICPAC and FAO forecasts), and refining information formats and dissemination structures.

2.8 Project Institutional and Implementation Arrangements

Project activities are implemented at (i) regional and/or (ii) Country (national and county) levels.

The National Activities
In Kenya, the department responsible for livestock development will be the project-implementing agency at the national and county level. The department responsible for livestock development will designate a project coordinator for the entire period of the project. The project coordinator shall be responsible for the day-to-day coordination of the entire project. There will also be Component Coordinators for the four components of the project. And in line with Bank guidelines the GoK will also second an environmental specialist with requisite qualifications. The necessary support staff, including an accountant and a procurement specialist, will support the coordinator.

Project Steering Committees
The Project will be coordinated at the regional level through a regional coordination committee under the auspices of IGAD. At the Country level, a National Project Steering Committee will be established. It will be the technical coordination committee and will comprise of relevant stakeholders (e.g KCA, KARI, KWS, KLMC, KLBO ILRI and Universities) and other relevant NGOs. The NSC will meet quarterly and be responsible for approving: (i) the annual work plans and budgets before recommending their endorsement by the Inter-Ministerial Coordination Committee (ICC), and (ii) monitoring of the implementation progress and reporting. Membership of the committee will be derived from relevant institutions including NDMA, and Research institutions. The beneficiaries will be represented through pastoral associations and individuals identified.

The committee will be responsible for technical guidance for implementation of the Kenya-RPLRP. Relevant Sub-committees will be formed to handle specific issues on behalf of the Steering Committee. Decisions of the national steering committee will be implemented by a project secretariat headed by the national project coordinator.

Other key roles of the NSC will be to spearhead formation of county project teams; convene the project steering committee and other national meetings; Constitute the national project Secretariat, Facilitate implementation of relevant project interventions in the context of resilience to drought and sustainable livelihoods; and be the entry point for development partners and other funding agencies in this project.

Like the National Project Steering committee, there will a County steering Committee headed by and appointee of the Governor. A county project service committee (CPSC)
headed by a county project coordinator and comprising of all implementing agencies at county level will be established. Their role will be to plan, budget and monitor implementation of project activities at county level. The CPSC will link closely with existing County stakeholder forums (including the ASAL stakeholder forum in the respective county) for necessary input into project planning and re-planning. The Secretariat of the CSC will be the county project coordination unit headed by the county project coordinator (CPC).

The Agricultural Sector development project (ASDP) is spearheading establishment of stakeholder forums and steering committees in the Agricultural sector in all counties of the country including the project area. RPLRP will therefore utilize these committees and forums. The implementation of project activities at the sub county level will be done through sub-county service units (SCSU) coordinated by the County Project Coordinator.

2.9 Project Coordination Unit (PCU)

The project coordination unit will comprise of the National Coordinator, 4 project component heads, M&E officer, community development Specialist, procurement specialist and the project Financial Accountant as shown in the organizational structure in Figure 1 below. The PCU will oversee the project implementation by backstopping and facilitating the project implementation teams at counties and sub-counties to access the project resources based on the approved activities. Below is a flowchart showing the interactions of various players in the organization and implementation structure of the Kenya- RPLRP.

Implementation Arrangements
General Organizational/Coordination and Implementation Structure of RPLRP
2.9.1 Implementation Arrangements

Safeguards instruments preparation and implementation: - It is the responsibility of the PCU to prepare social and environmental assessments during the feasibility study and to submit to the World Bank the environmental and social impact assessment (ESIA), the resettlement action plan (RAP), and the vulnerable and marginal groups plan (VMGP) to be implemented with the sub-project and during its operation by the owner and operator. These documents are reviewed by the World Bank and NEMA and must receive a no-objection from the World Bank and approval of NEMA before the sub-project can be implemented. The implementation safeguards instruments requires competent staff, and if consultants are used to supplement appropriate sponsor staff they must be on NEMA’s approved list of qualified consultants.
3 METHODOLOGY AND CONSULTATION

3.1 Detailed & In-depth Literature Review

Review on the existing baseline information and literature material was undertaken and helped in gaining a further and deeper understanding of the proposed project. A desk review of the Kenyan legal framework and policies was also conducted in order to the relevant legislations and policy documents that should be considered during project implementation. Among the documents that were reviewed in order to familiarise and further understand the project included:

**World Bank Related Documents**
- Aide Memoire for the RPLRP
- World Bank RPLRP Draft Project Appraisal Document (PAD)
- World Bank Safeguards Policies

**Kenyan Legislative Documents**
- Constitution of Kenya
- Environmental Management and Coordination Act (1999)
- Water Act
- Energy Act
- Land Act
- Public Health Act
- Wildlife Act
- Forest Act
- Agriculture Act

3.2 Interactive Discussions

Stakeholder consultation formed part of the methodology in preparing this ESMF where the project interested and affected stakeholders who could be identified at this early stage were consulted. The issues raised and concerns expressed including possible mechanisms of addressing these issues and concerns are appended as Annex B of this document. The stakeholder consultation was significant to the preparation of this ESMF and formed the basis for the determination of potential project impacts and design of viable mitigation measures.

3.3 Preparation of ESMF

Preparation of the ESMF included the following stages:
- Collation of baseline data on the environmental conditions of the country in general;
- Identification of positive and negative environmental and social impacts of sub projects investments;
- Identification of environmental and social mitigation measures;
- Preparation of screening procedures to be for sub project proposals;
- Formulation of environmental and social monitoring plans.
4 BASELINE DATA

This section describes the overall baseline condition of the 14 Counties as well as the Arid and Semi-Arid Lands in Kenya in terms of bio-physical environment, as well as the socio-economic.

4.1 Marsabit, Samburu, Laikipia, Counties

Physical Environment
At the border of Ethiopia and Kenya lies Marsabit County. Most of the county is mainly low-lying at 400 and 700 masl. The main land use in the district is livestock rearing and nomadic pastoralism is the major way of life. The area is interspersed with several mountain ranges and hills including the Ndoto Mountains (2,660 m) to the west, and Marsabit Mountain (1,545 m) within Marsabit Town. The county is home to the Burji, Boran, Ariaal and Rendille communities who are mainly traders, pastoralists and also carry out some irrigation farming. The county borders Samburu County to the south.

Samburu County can be categorized into three agro-ecological zones with different climatic zones, landform and soils, and having a specific range of potentials and constraints for land use:

- Zone IV, covering 5% of the district area is suitable for small-scale crop production and receives rainfall of 400 - 650 mm/pa.

- Zone V covers 30% of the district, has annual rainfall ranging between 300 - 350 mm which can only support a variety of grasses and some shrubs. Livestock keeping is the main occupation.

- Zone VI covers Merti and Kericho divisions, approximately 65% of the district. It experiences an annual precipitation of 150 - 250 mm. This zone is mainly barren with scanty vegetation and mainly supports browsing animals.

Samburu County lies between 1,600 and 2,300 masl but less than 1% of its total land mass is arable. There are no gazetted forests in this county, but the hills cover an area of approximately 9,933 ha and covered by dense vegetation which provides potential for wildlife conservation. The county is vulnerable to natural hazards such as drought and floods along the Ewaso Ng’iro River and human confrontations for pasture and water. Recurring drought has resulted in loss of range biodiversity with a result of low vegetation cover. Constant migrations by the pastoral communities in search of water and pasture have enhanced environmental degradation as new tracts of land are cleared to provide temporary settlements. Another factor that has enhanced environmental degradation is exploitation of the scarce vegetation for fuel. The county borders Laikipia County to the south and extends in the semi-arid up to the high-altitude Laikipia Plateau to the northwest of Mount Kenya.
Geology
The geology of Marsabit and Samburu Counties belongs to the Sub-Area I of the Mozambique Belt System, which covers most of north-central Kenya and constitutes a vast exposure of the Mozambique Belt south of Lake Turkana within the Samburu-Marsabit area of north-central Kenya. The lithostratigraphy of the Samburu-Marsabit area consists of the Basalt *Mukogodo Migmatites* which are unconformably overlain by metasediments such as banded gneisses, into which the *migmatites* have been thrust as subconcordant sheets.

Central sub-area II of the Eastern Mozambique Belt System in Kenya covers the Laisamis-Isiolo area. The geology of this sub-area is composed of mainly mica (*biotite, muscovite*) and/or *hornblende schists* and gneisses that occasionally show the presence of *staurolite, almandine garnet, kyanite* and *sillimanite*. Present also are amphibolites (± garnets), *migmatites, granitoid gneisses* and granites, intrusive and meta-intrusive mafic and ultramafic rocks that include diorites, gabbros, *anorthosites, peridotites* and *picrites*.

The geology of Laikipia County is composed of mainly mica (*biotite, muscovite*) and/or *hornblende schists* and gneisses that occasionally show the presence of *staurolite, almandine garnet, kyanite* and *sillimanite*. The districts were created by vulcanicity and faulting which gave rise to two major landforms, the Great Rift Valley to the west and Aberdare Ranges to the east. Between the two physiographic features lies Kinangop and Ol Kalou Salient plateau.

The Aberdares are an isolated volcanic range that forms the eastern wall of the Great Rift Valley. This escapement stretches for roughly 100 km in a north-southerly direction between Nairobi and Nyahururu. The Aberdare Ranges run across Laikipia County. The proposed transmission line route is expected to cross the slopes of the Aberdare Ranges near Shamata settlement area. The soils in the area are red and of volcanic origin and rich in organic matter.
Soil
The soil distribution in the project area is complex and is influenced by intensive variation in relief, climate, past volcanic activities and the underlying rocks. The main soil types are calcic gleysols, andohaplic pheozems, gleyic cambisols, ando-calcic regosols, lithosols, and calcic xerosols, from the lacustrine plain through the volcanic plain to the volcanic hills respectively. Generally, the soils in the study area have high phosphorus, calcium, magnesium and potassium concentrations but are low in respect of nitrogen and carbon.

Pyroclastics-ashes, agglomerates and tuffs cover a considerable proportion of the area over the entire volcanic plain southerly of lake Nairashe. During the eruptions of the Longonot volcano, easterly winds caused the heaviest accumulations of the ejected ashes to occur in and around the study area. More recent pyroclastics are acidic in composition. The ashes are usually interbedded with other volcanic soils. The most recent eruptions are reported to be approximately 2000 years ago.
8.1.4 Climate
Marsabit County is arid with low and unreliable rainfall ranging between 75 and 400 mm annually. The average temperatures range between 26 and 32°C. These temperatures are higher within the Chalbi Desert. The desert is rocky and devoid of any vegetation, except for few scattered Acacia species. The county is arid and largely inhabited. It has a mean annual rainfall of 200 mm in the lowlands and 800 mm in the highlands.

Samburu County is dry almost throughout the year and rainfall is generally scarce and unreliable. Rainfall is distributed within two seasons in a year with an average of approx. 580 mm. The county lies astride the equator which gives it two distinct seasons: wet and dry. The district is mainly semi-arid with rainfall varying significantly from one year to another. The rainfall in the region is influenced by three distinct rain periods in Kenya, the ‘long’ rains which are usually experienced from April to May, the ‘short’ rains in November and the ‘continental’ rains which fall sporadically from July to September. December, January and February are generally the driest months. Rainfall is associated with heavy thunderstorms in most cases. The rainfall varies as the north receives less rainfall than the south. The average annual rainfall distribution ranges from less than 500 mm in the dry areas to over 800 mm in the wet areas.

Laikipia County experiences two rainy seasons per year. The long rains are typical between March and May, and the short rains between September and November. The annual average rainfall is about 800 mm, which supports agriculture. Agriculture is important in the county, as it is the main occupation of the residents, and crops of this region are delivered to the nearby urban centres like Nairobi, Nakuru and Gilgil and over larger distances to cities like Mombasa and Kisumu.
**Water (Surface and Groundwater Resources)**

The northern part of Marsabit County is mainly dominated by the Chalbi Desert. There are no perennial rivers in the county, except seasonal rivers which are water-bearing when rare and usually torrential rain falls in the desert. Marsabit County has also no permanent rivers although mountain run-offs provide temporary surface water in the lowlands mainly through Milgis and Merille Rivers. The highlands are interspersed with several permanent lakes, including Lake Paradise and several water-filled craters on Mount Marsabit. The only permanent water bodies in the entire Chalbi Desert region, besides Mount Marsabit, are Lake Turkana to the West and Uaso Ng’iro River in Samburu County to the South. Uaso Ng’iro River plays an important role in supporting pastoral livelihood and is currently utilized by the pastoralist Samburu, Ariaal, Rendille, Somali, and Boran tribes.

![Figure 4: Partially wet lagga across the proposed TL](image)

Samburu County has potential for both surface and sub-surface water sources. It has four perennial rivers: Ewaso Ng’iro, Isiolo, Kama and Bisanadi Rivers. Isiolo River is extensively used and is the main water source for Isiolo Town while the irrigation potential of the other rivers is yet to be determined. Preliminary assessments indicate that ground water and surface water potential in the region is limited. Boreholes sunk in some areas have shown low yields in parts of Oldonyiro and Kinna Divisions.

Other areas such as Sericho Division have poor quality water due to high salinity, except for areas where volcanic rocks dominate. Such areas cover approximately 10% of the district. Water is scarce due to few reliable water sources (dams, springs and pans) and this often a source of conflict, which leads to persistent insecurity in the district. Only 43.5% of households in the region have access to tab water, and only 18% of households have access to good quality water sources within a distance of 5 km. Water shortages are particularly common in Sericho and Merti Divisions.
The Laikipia Plateau is a zone of transition from the wetter to drier part of the eastern highlands. A large portion of the central region is utilized for large scale ranching, while wheat and barley are grown on the wet high altitudes. Small scale subsistence farming settlements continues to spread out. Pastoralists inhabit the northern region, which experiences a harsh and fragile environment. In those areas where overgrazing is widespread, it gives rise to soil erosion and general land degradation.

**Landscape**

**Shrubs/thickets on adulating terrain.**

This type vegetation and land formation continues to Turbi. Marsabit County is dominated by a desert landscape with few undulating hills especially in Turbi Division; the rest of the landscape fits the description of Marsabit landscapes. The county is characterized by diverse landscapes including dry valleys, hilltops and inter-hill depressions. The landscape is dominated by Mount Marsabit which is characterized by morning mist and fog. The uplands landscapes with altitude ranging from 1,300 to 1,358 masl are a generally cool environment with higher woody canopy cover. The soil is dominantly brown loam with moderate drainage, which is mostly used as dry season grazing, but currently much of it is used for crop cultivation and settlements. Low-lying landscape at altitudes ranging from 1079 to 1,296 masl are warm and mostly covered with low scrub vegetation, used mainly as grazing area especially for goats and camels. Hilly topography in the surrounding of farms and settlements is mostly reserved as pasture for calves and weak animals (Kalo).

![Figure 5: Typical landscape of areas north of Marsabit Town](image)

The section from Bubisa to Marsabit is fairly flat with disintegrated rock boulders. From Marsabit southwards the proposed route runs close to the main road, the terrain is flat with several residual hills. The vegetation is bushy and covers the rest of the route to Logololo and on to Laisamis. It continues southwards adjacent to the main road at a distance of up to 8 km from the road to Merille where it slightly westwards running east of the Wamba Mountains. It then continues through a stretch of fairly flat land covered by thorny shrubs.
and bushes. The route then turns southwards into the Ngorbit plateaus, over the ridges, descends into Laikipia West the cuts through the extreme western section of Impala Ranch, an area mainly covered by fairly scattered thickets and bushes. It then crosses Mutara River and east of the diminished Pesi Swamps into Ndaragwa on the western edge of the Aberdare Forest. In this region the terrain is fairly undulating and well serviced by access roads.

The region has red soils of volcanic origin but rich in organic matter. The ranges have two main peaks: Ol Donyo Lesatima (3,999 masl) and Kinangop (3,906 masl) which are separated by a long saddle of alpine moorland which rises to an altitude of over 3,000 masl. The topography is diverse with deep ravines cutting through the forested eastern and western slopes through which many clear streams flow forming cascading waterfalls on their way to the low-lying plains. The section to Maragishu has the highest population density of the entire Kenyan section of the project. The route continues to the top ridge of Shamata and then sharply descends to the flat plains of Ol Bolossat approximately 2 km south-east of Lake Ol Bolossat.

**BIOLOGICAL ENVIRONMENT**

**Vegetation**
The vegetation in Marsabit and Samburu Counties can be described in four categories: woodland, dwarf shrub bushland, shrubland and thickets. Woodland can only develop with subsidiary water supply along channels and permanent rivers.

The differentiation of bushland and shrubland is correlated with soil properties. While bushland covers loamy and sandy sites, shrubland is confined to clay soils which are characterized by low infiltration rates. Thicket formation especially occurs on eroded valley sediments.

The bushland is characterized by *Acacia tortilisis*, *Commiphora africana*, *Grewia* species and dwarf shrubs such as *Lippia carviodora* and *Vernonia cinerascens*. There are indications that the present high coverage of *Acacia tortilisis* is as a result of an increase in herbivore pressure during recent years. Similar conclusions are drawn in the case of thickets which are mainly composed of *Acacia horrida* and *Acacia reficiens*.

In contrast, there is no evidence of an impact of livestock on the structure of the shrubland which is characterized by *Acacia mellifera*, *A. Paolii* and several species of the *Capparaceae* family. Exotic trees or shrubs have not invaded the area due to low rainfall. Compared to the ground layer, the effects of livestock on the bush and tree layer are low. The vegetation within the Marsabit and Samburu Counties traversed by the proposed transmission line can further be classified as follows:

**Bushland** consists of woody vegetation, which often has multiple stems; most of them do not exceed 10 m in height. Vegetation crowns often interlock and canopy cover is above 20%. Trees are scattered but conspicuous. The herbaceous understorey is usually sparse.
Land use and natural vegetation types in the Upper Ewaso Ng’iro basin depend on the altitude, climate and soils. On mountain slopes, moist montane forests dominate. There are also riverine forests especially in higher altitude, and dry forests in the drier highlands such as Matthews Range. Shrub grasslands and bush grasslands occupy much of the Laikipia Plateau area, while in the plains of Isiolo and Samburu, shrubland is dominant.

Except in Laikipia – Samburu ecosystem, accurate estimates of wildlife populations are unavailable in the wider project area. However, regular ground counts and aerial surveys indicate long-term population changes. Most authorities agree that the number of small stock in various districts is increasing. Wild herbivores have been surveyed frequently and their populations appear to be more stable than those of domestic herbivores. Wild herbivores are however unevenly distributed over the project area.

Laikipia – Samburu ecosystem, although a semi-arid district, is very rich in biodiversity. The tourism industry is based not only on the wildlife but also on the adverse avifauna and an abundance of dry-land plant species.

Figure 6: Typical landscape of Samburu County showing short Acacia trees
Outside the gazetted parks of all districts in Kenya, Laikipia-Samburu has the largest diversity and population of wildlife, which are mainly found in private ranches and the communal lands. Below is a summary of the 2008 population estimates for some of the species that are counted regularly using sample survey techniques by the Department of Resource Surveys and Remote Sensing (DRSRS) in partnership with Mpala Research Centre (Kinnaird and Ojwang 2008).

The biodiversity value and ecosystem integrity within the Laikipia-Samburu ecosystem can be summarized as follows:

- Second largest functional ecosystem after Tsavo.
- Second highest wildlife densities after the Mara.
- Highest wildlife diversity in the country.
- More threatened and endangered mammals than anywhere else in Kenya.
- 50% of Kenya’s black rhino population.
- Largest elephant population outside Tsavo (5,400 in the ecosystem in 2002)
- Increasing overall wildlife populations, in contrast to most of the country has been witnessed in this region.

Some species of wildlife that occur in Laikipia-Samburu ecosystem are of conservation concern both nationally and internationally.

**Protected Areas**
The wider project area has some protected areas, mainly national parks and game reserves, both protected under Wildlife Conservation and Management Act, Cap 376, and forest reserves which are protected under Forest Act No. 7 of 2005 and Forest Act, Cap 387. **Table 1** below gives the list of protected areas in relation to the line.
<table>
<thead>
<tr>
<th>Protected Area</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBA Dida Galgalu Desert</td>
<td>Not officially recognized as protected area, but has abundant avifauna</td>
</tr>
<tr>
<td>Marsabit National Reserve</td>
<td>Protected area</td>
</tr>
<tr>
<td>Losai National Reserve</td>
<td>IUCN Category 6, community managed with technical support of KWS</td>
</tr>
<tr>
<td>Aberdare national Park</td>
<td>Recognized protected area</td>
</tr>
<tr>
<td>Lake Ol Bolossat</td>
<td>Not officially recognized as protected area, but rich in avifauna</td>
</tr>
<tr>
<td>Buffalo Springs and Samburu National Parks</td>
<td>Officially recognized protected areas</td>
</tr>
</tbody>
</table>

**National Parks**

Three areas of the IUCN Category II (National Park) were identified in the region of the Kenyan project area, namely Marsabit National Park, Aberdare National Park and Longonot National Park.

Category II protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational

**Marsabit National Reserve**

The Marsabit National Park is located in the Marsabit County and managed by the Kenya Wildlife Service. There is also the Marsabit Forest Reserve, which is contiguous with the park but this is managed separately by the Kenya Forest Service. The reserve covers an area of 1,600 km. in the middle of the desert wilderness, and includes a Forest Reserve on the forested Mount Marsabit, from which the protection area derives its name. The mountain was born out of volcanic activity and characterized by morning mist, creating its own ambient climate. Although the lower slopes are scorched and dry, above them are richly wooded zones of crater lakes and swamps, towering cliffs and giant trees, providing habitats for a large range of wildlife. The region surrounding the reserve is of dry and barren semi-desert character. Due to the presence of the mountain, a rainfall rate is induced, feeding streams and lakes such as Lake Paradise and sustaining the vegetation necessary for the ruminant animal. The reserve is protective area for large mammals such as buffalo, zebra, giraffe, cheetah, antelope, oryx, greater kudu, elephants, rhinoceroses, lions, leopard and numerous species of birds.

**Aberdare National Park**
The Aberdare National Park was established in 1950 and consists of the Aberdare Range, a mountain chain of volcanic origin, stretching from north to south and of the tight forested foreland located in the east.

The park contains a wide range of landscapes, including mountain peaks that rise to 4,300 masl, their deep, v-shaped valleys intersected by streams, rivers, and waterfalls to the east and west, feeding the Tana and Athi River. Between the elevation of Ol Donyo Lesatima (3,999 m) and of Kinangop (3,906 m), an anticline of alpine heath lands stretches in a height of 3,000 m. Aberdare National Park and the ambient surrounding is characterized through forests zones dominated by indigenous vegetation types such as moorland, bamboo forests and rainforests, found at lower altitudes.

The sanctuary and its variety of habitats is home for lion, leopard, serval, golden cat, baboon, black and white colobus monkey, Sykes monkey, bongo and for black rhino. Beside the mammals also the avifauna is presented with up to 250 species, including the endangered Aberdare Cisticola, Jackson's Francolin, sparry hawk, goshawk eagles, sunbirds and plovers. The route will not pass the Aberdare National Park.

**Game Reserve**

**Losai Game Reserve**

The Losai Game Reserve is classified as IUCN category VI and considered as critical natural habitat as described in WB OP 4.04. Protected areas with this status conserve ecosystems and habitats, together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level nonindustrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area. The primary objective of such areas is to protect natural ecosystems and use natural resources sustainably, when conservation and sustainable use can be mutually beneficial.

The Losai National Reserve is located to the south-west of the Marsabit County, across the Kaisut Desert. It is accessed via the Isiolo–Marsabit road which passes through the sanctuary. The Losai National Reserve is flanked on the west by the Ol Doinyo Lenkiyo and Ndoto Mountains. The Ndoto Forest is one of Kenya's largest virgin forests and borders the park on the west. The reserve is characterized by a semi-desert landscape with rugged terrains, seasonal rivers, a lava plateau with scattered volcanic plugs covered with thorn bushes, and a zone of impenetrable mountain forest on the north-eastern edge of the central highlands.

Losai National Reserve opened in January, 1976 as a single reserve and managed by the community with technical support from the KWS but the management by the county council and communities has been rather lax, thus it is heavily degraded by livestock grazing. KWS is supposed to provide technical support to the management but this is yet to materialize. Nonetheless the reserve is known for having formerly been a habitat for
black rhino and elephants. The reserve is planned for the protection of large mammals such as elephant, greater and lesser kudu, gerenuk and Grants gazelle.

**ENVIRONMENTALLY SENSITIVE SITES OTHER THAN PROTECTED AREAS**

Environmentally sensitive areas were identified based on their conservation values and/or the vulnerability of the areas to environmental degradation. The sites must either be close enough that the project alignment can have at least some indirect impacts or the alignment actually crosses the area. Using these criteria, the following areas were identified:

1. Dida Galgalu Important Bird Area
2. Laikipia – Samburu Ecosystem
3. Lake Ol Bolossat

Dida Galgalu and Lake Ol Bollosat are important bird areas that are recognized as such by Birdlife International. This implies that the two areas host avian diversity of significant conservation values. On the other hand, Marsabit National Park and Losai National Reserve are gazette protected areas of importance to conservation.

The Laikipia – Samburu ecosystem as a whole cannot be considered a ‘biodiversity hot-spot’ in the sense of having a wide diversity of endemic and/or endangered species. The main conservation significance of the ecosystem is that it is large area of relatively natural habitat, which is still large enough to contain large wide-ranging species, and thus can sustain a full range of ecosystem processes. Further, the ecosystem hosts some globally endangered species whose populations have declined over recent years. Laikipia-Samburu is of particular significance for lions, wild dogs, Grevy’s zebra, eland, elephants, reticulated giraffes and patas monkeys. The Longonot-Suswa area is prone to soil erosion and is currently under pressure from human activities.

**The Laikipia – Samburu Ecosystem**

The Laikipia-Samburu ecosystem spans approximately 25,000 square kilometers and is defined by the Ewaso N’giro river watershed. The proposed transmission line crosses this ecosystem from around Rumuruti to around Logologo.

Private and communal ranches account for about 70% of land use in the ecosystem. The other 30% is home to the Mukogodo Masai and, in the north, the Samburu pastoralists. Protected areas are few--only Aberdare National Park and the Samburu and Shaba Game Reserves.

**Vegetation**

The main type of vegetation in the ecosystem is considered a rangeland type (Taiti, 1992) with the higher grounds being characterized by upland dry forests while some of the lowland areas are wetlands. Close to 40 families and 170 species of plants can be found in the ecosystem. About 52,300 ha of the area is under timber plantation. A total of 6 vegetation communities have been identified and mapped in Laikipia-Samburu ecosystem (Pratt, 1996). Based on location and/or type, they were categorized as:
• Urban and Built up areas (Nanyuki/Nyahururu/Rumuruti)
• Upland/Riverine and Degenerated Dry Upland Forests (Rumuruti, Ngare Ndare)
• Bushland Vegetation Communities which is the dominant community in the ecosystem
• Grassland Vegetation Communities (northern parts of Sosian, Il Digi, Mumonyot, Dol Dol; central regions of Segera/Sirima and the southern parts of Lamuria and Naro Moru)
• Barerock, Escarpment and Kopje Communities (Ol Moran)
• Plantation Forests

The vegetation of the area is largely Acacia bushland, dominated by *Acacia reficiens, A.mellifera, A.drepanolobium* (which accounts for close to 80% of tree cover), *A.seyal*, and *A.brevispica* and *Aristida* annual grass species.

![Figure 8: Typical vegetation cover of the Laikipia – Samburu wilderness](image)

The bushland vegetation communities form a transition between upland forest and the Acacia dominated associations in the lowlands. Chikamai et al, (1999) list two of such associations as *Combretum-Tarchonathus-Hyparrhenia* and *Euphorbia-Croton-Aristida*. *Acacia drepanolobium* is the most widespread species found on poorly drained and seasonally waterlogged soils at altitudes (1000-1800 m.a.s.l), mostly in the central areas of the complex. It is also the major species being cleared for charcoal. *Acacia mellifera* association is confined to the drier northern parts of Mukogodo and the lower valleys of Ewaso Narok and Ewaso Ng’iro Rivers.

Degraded or unstable ecosystem in the area is indicated by the presence of *Acacia bravispica*, and is confined to the drier steep, well drained sites with rocky or shallow soils.
(Chikamai et al, 1999). *Euphorbia candelabrum, A.bravispica, Croton dichogamus, Aloe londetia* and *Hyparrhenia* spp are the dominant species on the bare rock, escarpment where they help in the rehabilitation of the degraded lands.

The main crops grown include maize (*Zea mays*) estimated at 51% of the plated area, bean (*Phaseolus vulgaris*), potato (*Solanum tuberosum*) and horticultural crops like kale, cabbage, tomato, onion and spinach. Wheat and barley are the main cash crops. The opportunity to grow them has been successfully seized by large scale farmers. Coffee, pyrethrum, pineapples, and castor oil are produced in small scale in Ngarua, Nyahururu and Rumuruti. Millet (*Pennisetum typhoides*), sorghum (guinea corn) and sunflower are on trial in the county.

**Lake Ol Bolossat**
The Lake Ol Bolossat is located to the east of Aberdare ranges in Nyandarua County. The lake and its surroundings is rich in flora and fauna, with over 200 plant species, over 180 bird species and over 15 species of mammals recorded. Due to this rich biodiversity, the lake has been listed as an Important Bird Area by Birdlife International. This implies that the lake has a rich avian diversity and population. There also species of fish, reptiles and amphibians. The lake is currently under heavy human pressure with most of its catchment heavily degraded by settlements, agriculture and reduction of forest cover on the Aberdare escarpment.

**Flora**
Lake basin and its catchment has six general categories of natural vegetation comprising of montane open grassland, montane acacia forest, cedar forest with thick under growth, reed and swamp grass, *Themeda pennisetum* grassland mixture and aquatic floating macrophytes. There are human induced changes in the structure and composition in the natural vegetation.

The Aberdare escarpment is currently dominated by grassed and shrubs such *Grewia* spp., *Rhus nalatensis* and *Buddleia polystachya* which has replaced the natural vegetation. Frequent burning of the escarpment has reduced the density of shrubs and grasses are dominant in certain parts, especially in the north and south.
Tall trees of indigenous species are sparse. The main tree species still standing are *Juniperus procera*, *Cussonia spicata*, *Dombeya goezenii*, *Euphorbia candelabrum*, *Albizia gummifera*, *Acacia tortilis* and *Croton megalocarpus* which are often cut for fuel wood (charcoal) and other domestic uses by the local farmers. Except for the gallery forests much of the escarpment is devoid of trees. A few exotic tree species such as *Eucalyptus*, *Cupressus* and *Grevillea robusta* have been planted on farmlands at the bottom of the escarpment.

Montane and Themeda-pennisetum grassland are well differentiated into short and tall grassland sections. The dominant tall grasses consist of *Pennisetum sphacelata*, *Themeda triandra*, *Sporobolus spp* and *Pannicum spp*. The short grass zone, next to the marshes, is dominated by *Pennisetum clandestinum*. *Eragrostis ciliaris*, *Chloria virgata* and *Setaria Spp.*
Swamp vegetation include, *Phalaria arudinacca*, *Cyperus rigidifolia*, *C. immensus* and *C. Papyrus*, *Cirsium vulgare*, *Cyperus latifolia* and *Cyperus papyrus*. These form important grazing land in the marshes. The open water has a wide range of floating and submergent macrophytes. Water lilies *Nymphaea caeruleae*, *Ludwiga stolonifera*, and *Najas pectitus*. Nitritus aquatic weeds such as Salvinia molesta and pistia stratiformes, have invaded the lake. Submergent macrophytes such as *Najas pectincta* and *Ceratophylum demersum* occur in areas of the lake with clear water.

**Fauna**

The Lake and entire surrounding areas including Satima Escarpment, Aberdare Forests and National Park, Marmanet Forest Reserve, agricultural lands and urban centres has over 350 species of birds.

Water birds are the most conspicuous wildlife on the lake where over 87 species of water birds have been recorded. Among the waterfowls, the most abundant groups are Afro tropical ducks and geese, Rails, Gallinules and Coats and Ibis and spoonbills, while the most abundant species are Red-Knobbed Coat, Egyptian Goose, Sacred Ibis and Yellow-billed Duck. Several Palaearctic and Afro tropical migrant species have also been recorded. A majority of the water birds recorded are listed by the Africa-Eurasian Water bird Agreement (AEWA) under the Bonn Convention on Migratory Species.

A bird survey carried out in seven sites (Kianjata North, Kianjata South, Manguo/Kibathi, Kanguo, Gatumbiro, Kasuku and Rurii), on the western riparian grasslands on terrestrial species confirmed the presence of Kenyan endemic and endangered Sharpe’s Longclaw Macronyx Sharpei and the east African endemic and near threatened Jackson’s Widowbird Euplectes Jacksoni (Birdlife International).

**Land Use**
Land is principally under farming, range, conservancy, settlement and business premises. Most of the farming households are in Nyandarua and Nakuru Counties. Conservancy land parcels are in Laikipia Isiolo, Samburu and Marsabit counties.
4.2 **Kajiado County**

**Physical environment Topography**
The main physical features in the district are plains, and occasional hills and valleys. Several valleys dissect the plains and its physiography is influenced by geology. The land rises from 500m asl around L.Magadi to 2500m asl in the Ngong hills area. The County’s topography can be aptly outlined into four areas, viz;

1. Rift Valley, which is predominantly made of volcanic, landscapes and comprise of a low depression in the western part of the district. Important features found here include Mt. Suswa, L. Magadi and L. Natron.
2. Kaputiei plains consisting of volcanic rolling plains e.g. Ngong hills (2460m asl) as well as being a source of Athi River.
3. Central broken ground, which is a wide stretch of basement system and erosional landscape with several hills e.g. Chyulu and Maparasha. The area has permanent and dry riverbeds as important sources of sand and water for the community.

Amboseli Plains characterised by erosional and depositional features resulting to deep reddish brown clay loams and poorly drained cotton soil. Amboseli National Park is within this basin.

**Geology and Soils**
The geology of an area gives rise to soil types in the County, viz;

- Quaternary sediments of mainly alluvium that occur along river valleys and lakebeds around Namanga area, L.Magadi and Nguruman areas. Arising from this sediments include, solonet, fluvisols, solonchaks, cambisols and vertisols. These soils offer little opportunity for agricultural production.

- Quaternary volcanic found in the western side of the district, south-eastern and Chyulu hills area. Tertiary volcanic is found around Ngong, Magadi and Kajiado town. Rock developments include Olivine basalts, phonolites, pyroclastics, volcanic ash, tuffs and trachytes. The soils developed include Leptosols, Luvisols, Andosols, Nitisols, Vertisols, Cambisols and phaeozems. The soils are generally fertile and of medium to high productivity potential for crops and livestock.

- Basement system rocks comprise of various gneiss, schist, quartzite and crystalline limestone. Soils such as Ferralsols, Luvisols, Arenasols, Regosols, Leptosols, Lixisols, Cambisols and Vertisols in the low-lying areas. The soils are of poor agricultural productivity unless high input levels are added. (Soil Map of the World – FAO,1990)

**Mineral Development**
There are various minerals developed in the district of economic importance. Gypsum is mined in Isinya and is used as an ingredient in cement manufacture at Athi River. Limestone for cement is found in Kibini, Toroka, and Ngatakaek areas. Soda ash is found in L. Magadi in large deposits, as trona accumulation process is self-regulating. Quarrying of building stone is scattered all over the district with major areas being Ngong, Kitengela and Ongata Rongai. Sand harvesting is very rampant as an economic activity along riverbeds.

**Climate Rainfall**
The district has a bimodal rainfall pattern. The short rains fall between October and December while the long rains fall between March and May. Heavy rains occur around Ngong Hills, Chyulu Hills, Nguruman escarpment and the foothills of Mt. Kilimanjaro. This is because the rainfall in the district is strongly influenced by altitude.

The temperatures in the district also vary according to altitude. Mean maximum of 34°C around L. Magadi and a mean minimum of 10°C on the foothills of Kilimanjaro have been recorded. Moisture deficit is also observed in the greater part of the year. This gives the district a dry season of between 7-9 months.

The climate scenario in the district indicates that the bulk of the area (with annual rainfall of 700-850mm), is suitable for ranching. Very small strips near Ngong, Sultan Hamud, Namanga and Chyulu Hills and a larger one on the foothills of Mt. Kilimanjaro, however, have potential for rain-fed agriculture.

**Drainage**
It is noted from the outset that the greater part of the County depends on ground water reserves. Limited surface water resources exist for livestock and domestic use. The major rivers in the district include; Athi, Ewaso Ngiro, Olkejuado and Noolturushe. In this case construction of water dams and pans, boreholes and shallow wells are important means of accessing water in the district. Ground water yields vary throughout the district from 0.01 to 35.77 cubic metres per hour.

**Vegetation**
The main vegetation type in the district is determined by altitude, soil type and rainfall received in the different parts of the district. However, anthropogenic and animal causes have modified the status significantly. Overgrazing, charcoal burning, extraction of fuel wood, forest fires and quarrying activities are some of the leading causes of this trend. Ground cover in the district varies according to seasons while the canopy cover ranges from 1% on the densely populated areas to 30% on the steep slopes. For grazers there is need to move over large areas in order to have enough grass for the animals while subdivision of land continue to restrict grazing capacity considerably. Browsers have more potential particularly in the northern part of the district.

Presence of invader species to vegetation has been noticed in Central division (Ipomea Kituensis) and in Namanga – Olkiramatian area (prosopis). These species not only
colonises the vegetation but also reduce the grazing potential available to the livestock and wildlife.

The main vegetation types in the district comprise wooded grassland, open grassland, wooded bush land, bushed grassland and forest. Woody species include; *Acacia tortilis, Acacia xanthopholea, Acacia mellifera, Commifora scheperi, Balnites aegyptiaca, Balanites gabra, and Salvadoria persica*. Grasses include; *Pennisetum mezianum, Pennisetum stramineum, Chorris roxburghiana* and *sporobulus angustifolia, Chloris guyana* and *Cenchrus ciliaris*. *Pennisetum mezium* is good grazing grass when young but becomes stemmy and unpalatable as it grows.

### 4.2.1 Agriculture

The total area of the district with arable potential is about 171,000 hectares (8.1% of the total area of the district). The actual area under cultivation is about 88,000 hectares (51.3% of total acreage of arable land). The main agricultural areas are found in lances with relatively high average annual rainfall (ACZ II-IV). This includes:

- Ngong hills area
- Loitokitok area on the foot slopes of Mt. Kilimanjaro
- Slopes of Nguruman escarpment (rain fed and irrigated)
- Slopes of Oldonyo Orok hill in Namanga
- Western foot slopes of the Chyulu hills
- Scattered patches in Central and Mashuru divisions
- Scattered irrigation areas in parts of Loitokitok

Farming is carried out mainly by immigrants (non-Maasai) but recently the Maasai are also taking up farming more seriously than in the past.

The production systems range from subsistence to commercial. The commercial system is practised in only 1.5% of total farmed land in the district. It is mainly for horticulture and is oriented towards the market. Under this system extensive use of inputs such as chemical fertilizer, certified seeds and pesticides are applied.

As for the trend, crop production has fluctuated over the past ten years due to weather uncertainties. In 1991, the production declined due to drought and in 1992-1995 the production improved and again declined due to unreliable rainfall.

The horticultural farming in the area between Kitengela and Isinya is becoming prominent and a major source of income and employment. The horticultural crops grown include onions, tomatoes and Asian vegetables.

In the recent past, there has been an increased interest in commercial farming especially of cu- flowers in Isinya division. Production of Asian vegetables also has been
increasing in Magadi as well as increase in production of vegetables in Loitokitok division. Drip irrigation is gaining popularity among small scale farmers who have sunk boreholes. The ministry of agriculture continues to be at the forefront in the management of agricultural production in the County as it offers extension and agricultural mechanization services. It also collaborates with other institutions and agencies in enhancing agricultural productivity geared towards ensuring food security for the district.

Key environmental issues include land degradation where good agricultural practices are not followed. Others include land clearing, soil erosion, air and water pollution and misuse of agrochemicals. Interventions include training farmers on good agricultural practices, ensuring that farmers practise safe and effective use of pesticides, promotion of soil and water conservation and agro forestry and collaboration with the provincial administration in curbing charcoal burning and sand harvesting.

**Livestock**
Traditionally, Kajiado district’s major economic activity is Semi-nomadic pastoralism. Over 75% of the population derives its livelihood from livestock production, which account for about 60% of the total labour force. The lifestyle of the majority of the population depends on livestock and livestock products for subsistence.

Three livestock production systems are identified, namely: the group ranches, individual ranches and individual parcels, being the individual parcels that emerge from the dissolution of group ranches. The group ranches range from 3,000 to 15,000 hectares in size while individual ranches average 800 hectares. The livestock reared are cattle and shoats (sheep and goats).

**Water Resources**
Kajiado district entirely depend on groundwater reserves due to limited number of permanent rivers and reliable rainfall regimes. Boreholes and shallow wells remain the most widespread methods of accessing water in the district. Water supplied to the district is far short of the estimated demand for the district.

**Forest and Wildlife Resources**
The forest resources in the County largely comprise of the indigenous cover. Forested areas are found in Ngong, Loitokitok and Namanga hills. Exotic afforestation programmes are gaining ground within homes and build-up areas e.g, Kajiado town. Tree farms for commercial exploitation are undertaken in Isinya and Ngong divisions. Due to the shallow soils and high rock pan, this venture may prove experimental.

Forestry activities are being practised in the district. This is mainly a combination of indigenous and exotic tree species. Afforestation programmes are limited to Ngong and Loitokitok. Agro forestry activities are being undertaken in areas where agriculture is practised. Forested areas are found in Ngong, Loitokitok and Namanga hills. These areas also act as water catchments.


Table 2. Forest Resources in Kajiado County

<table>
<thead>
<tr>
<th>Name</th>
<th>Area (H)</th>
<th>Type of Vegetation</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ngong Hills</td>
<td>3077.0</td>
<td>Indigenous/Exotic</td>
<td>Gazetted (For Game)</td>
</tr>
<tr>
<td>Namanga</td>
<td>11784.0</td>
<td>Indigenous</td>
<td>Gazetted (As a Forest)</td>
</tr>
<tr>
<td>Loitokitok</td>
<td>765.8</td>
<td>Indigenous/Exotic</td>
<td>Gazetted (As a Forest)</td>
</tr>
<tr>
<td>Embakasi</td>
<td>573.0</td>
<td>Indigenous/Exotic</td>
<td>Gazetted (For Game)</td>
</tr>
<tr>
<td>Ololua</td>
<td>661.6</td>
<td>Indigenous/Exotic</td>
<td>Gazetted (As a Forest)</td>
</tr>
<tr>
<td>Total</td>
<td>16861.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Forest Department 2003.

Major threats to forest in the district include human encroachment for habitation, fuel wood, charcoal burning and illegal tree felling for curving.

Wildlife

Wildlife habitat is a major land occupation in the district. The areas designated for game reserves include Amboseli 392Km square and Chyulu conservation area 445Km square which are within the range lands.

This is one of County’s richest natural endowments. The district is rich in wildlife of all types including elephants, buffalo, zebra, rhino, cheetah, gazelles, hyenas, wildebeests, warthogs, giraffes, lions, leopards and elands. High concentrations of wildlife are found around the swamps in Amboseli and Chyulu areas.

The wildlife dispersal areas in the County include:
- Dry dispersal grazing zones habited in the dry season
- Wet season grazing and is extensive due to park boundaries
- Arable potential areas and have been encroached by cultivation.

Migratory routes are:
- Kaputiei plains to Nairobi National Park through Kitengela area
- Amboseli National Park to Tsavo West National Park through either Kuku Group Ranch or Chyulu Game Conservation area
- Amboseli National Park to Kilimanjaro area in Tanzania
In the dry season, the game migrates to higher areas and swamps where forage is still available. Although wildlife density and foraging consumption are not available, it is assumed that the density of wild animals is lower and less damaging to the environment than livestock. Apart from the Amboseli National Park where land degradation is high due to the larger number of wildlife (Elephants) leading to vegetation degradation, soil erosion and compaction. Common wildlife found in the district include; wildebeest, Gazelles, Zebras, Warthogs, Hyenas, Giraffes, Elephants, Lions, Leopards and Elands.

The Kenya Wildlife Service is mandated under the Wildlife (Conservation and Management) Act, Cap 376 to manage wildlife since this resource has both monetary and aesthetic values. Wildlife is faced with challenges related to human/wildlife conflict, encroachment of protected areas, transmission of wildlife diseases to man and livestock (zoonoses), land use changes, habitat fragmentation and degradation and poaching.

Apart from the common free movement of wildlife in the County, there are also dispersal zones, which are dictated by climate. This increase has caused pressure on the existing grazing areas, which has caused problems in degradation of vegetation cover.

The kind of wildlife found in the County includes Elephants, Buffaloes, Giraffe, Thomson Gazelle’s Warthogs, Ostrich, Impala, Kongoni, and Wildebeest among others.

### 4.3 Lamu County

#### Geology and Geomorphology

The coastal environment of Kenya is set in a passive continental margin, whose evolution was initiated by the breakup of mega continent Gondwanaland in the Lower Mesozoic era. The initial opening of the Indian Ocean was preceded by extensive faulting and down-warping, similar to that observed in the Modern Great Rift Valley of East Africa. These tectonic movements formed a North–South trending depositional basin. During the Mesozoic era, this marine basin was exposed to numerous marine incursions and by the Jurassic period, purely marine conditions are thought to have existed (UNEP, 1998).

Throughout the Tertiary era, the coastal areas experienced further faulting and extensive continental erosion. In many areas the older Cretaceous deposits were totally removed. The present coastal configuration, however, evolved during the Pleistocene to Recent times, a period marked by numerous fluctuations in sea level. Because of its evolutionary history, the principal rocks observed along the coastal area are sedimentary in origin, and range in age from Triassic to Recent (UNEP, 1998).

The upper Mesozoic is represented by marine limestone and shales, with occasional horizons of sandstones and early limestone. Recent rocks comprise mostly limestone, and are represented by the sandstone, clay, conglomerates and gravels such as those found in
the Marafa beds. This well-developed reef complex, consisting of coral reefs, coral rubble and sandstone, is extensively exploited by the building industry.

**Mangrove Forests**

Lamu County has the largest area of mangrove in Kenya. Although on a straight line basis, the district extends only 138 km southwest from the Somali border, its irregularity and numerous islands gives it a total coastline length of 650 km. The three biggest islands are Lamu, Pate and Manda. Except for the south coast of the Islands of Lamu and the southeast coast of Manda directly exposed to the Indian Ocean, most of the coastal areas are covered with mangrove forests of varying widths (FAO fisheries and aquaculture department, 1986).

Mangrove forests are the cradles of various marine lives and the local communities make use of the mangrove forests for fishing ground but cutting of mangrove trees is still licensed to the local communities. These facts imply that the local communities have a right to use the mangrove forest as their property based on the law/regulations and will request compensatory measures as a part of compensation issues if mangrove habitats are destroyed. The mangrove trees are of economic value and traded around the area as timber for use in various construction activities. The common species found in the Lamu Archipelago are *Sonneratia Alba, Rhizophora mucronata, Avicennia Marina* and *Ceriops Tagar*.

**National Reserves (Dodori/Boni and Kiunga) and UNESCO Biosphere Reserve (Kiunga)**

**Kiunga Marine National Reserve**, a designated UNESCO Biosphere Reserve, consists of about 50 offshore islands and coral reefs in the Lamu Archipelago. The larger and more sheltered inner islands are covered with tangled thorny vegetation including grass, aloes and creepers. The small outer islands provide nesting sites for migratory seabirds. The reserve conserves valuable coral reefs, sea grass and extensive mangrove forests and is also a refuge for sea turtles and dugong that are on the IUCN Red List e.g. Hawksbill (CR: Critically Endangered).

Major wildlife includes Reptiles, Sea turtles, Reef Fish, Lobsters, Sea Urchins and Sea Star. It is also an important site for marine sports such as wind surfing, diving and snorkeling, water skiing and sunbathing. The World Wildlife Fund (WWF) and the Kenya Wildlife Service (KWS) have been collaborating to enhance the management of the Kiunga Marine Reserve since 1996 with full participation of local communities.

**Dodori National Reserve** located adjacent to Kiunga Marine National Reserve was established to preserve a breeding ground for the East Lamu Topi, Pelicans and other local wildlife. It covers 877 sq. km with views of Dodori River and creek outlet with the most dense and most varied species of mangrove forest in Kenya. Lion, Lesser Kudu, Giraffe and Hippo which are on the IUCN Red List, are also common to this Reserve. Birds already noted are Palmnut Vulture, Southern Branded Harrier Eagle, Honey Buzzard, Brown Hooded Kingfisher, European and Carmine Bee-Eaters, Brown Breasted Barbet and Violet Breasted Sunbird. According to the IUCN and
Biodiversity Hotspots web sites, Ader’s Duiker is a well-known critically endangered animal living only in the coastal forests of Eastern Africa.

**Coral Reef**
Coral reefs are among the most productive of all marine ecosystems providing a habitat for numerous species, including turtles, dugongs, whale, sharks and others. Their essential ecosystem services, such as protecting the coastline from ocean waves, and high biodiversity and productivity make them the target of many uses, but also numerous threats (State of the Coast report, NEMA 2009).

Coral reefs in Kenya are managed as Marine Protected Areas (MPAs) under the Wildlife Act. Coral reef fisheries outside protected areas are under the jurisdictions of the Fisheries Department, while only the traditional fishing methods are allowed in Marine Reserves.

**Sea Grass**
Sea grass beds are important foraging grounds for endangered species such as dugongs and marine turtles and important habitats for various fish species.

**Sea Turtle**
The Lamu Archipelago is one of the most important feeding and nesting grounds for Sea Turtles in Kenya. Five out of the seven species of sea turtles feed/nest in Kenya waters. All five species are categorized as endangered or critically endangered listed on the IUCN Red list. Female turtles always return to the beach where they were born and lay eggs on the beaches. Most common three turtles found in the Lamu Archipelago are:

- Green Turtle (*Chelonia mydas*)
- Hawksbill Turtle (*Eretmochelys imbricata*)
- Olive Ridley (*Lepidochelys olivacea*)

The other two kinds are:
- Loggerhead (*Caretta caretta*)
- Leatherback (*Dermochelys coriacea*)

The main areas of concentration are said to be Kiunga, Manda Island and Shela.

**Dugong (Dugong dugon)**
The dugong is a large marine mammal categorized vulnerable on the IUCN Red list and designated in the Wildlife (Conservation and Management) Act, Cap 376 as a protected species. They are referred to as "sea cows" because their diet consists mainly of sea-grass.

They are particular about their diets, with certain "fields" of sea-grass being regularly cropped. Dugongs are exclusively benthic, or bottom feeders. Their primary feeding
mechanism is uprooting sea-grass by digging furrows in the seafloor with their snouts. Though the dugongs are one of the species found in Kiunga National Reserve, there is no information about this species around the project site so far.

In Kenya large dugong herds were commonly reported before the 1960s and a herd of 500 was seen in 1967 off the South Coast. The exact number of dugong in Kenya is currently not known (WWF, 2004). The most important dugong habitats in Kenya are considered to be the Kiunga Marine National Reserve (KMNR) (Nature’s Benefits in Kenya, World Resource Institute).

**Wildlife**
For animals around the area, located near the ecologically significant area, Manda Bay area is rich in biodiversity habitats consisted of shrubs, swamps, tidal-flat and so on. The area is considered Biodiversity Important Area and by KWS.

**Vegetation**
Lamu district is located in a semi-arid area with sandy soils. Coastal forests and bushland vegetation is seen around the Kenya Navy Naval base. There are also some ponds where wetland plants such as Lotus species are naturally growing. Those ponds are used as water source for animals that inhabit the area. There exist two wetlands on the mainland of Lamu that are the source of drinkable water, supplied by pipelines to the local settlements. Beside the Mangrove forests, on the terrestrial side the vegetation consists of indigenous and planted tree species. Key indigenous plants include Doum Palm (*Hyphaena spp.*) and Mkingiri (*Dichrostachys spp.*).

**Tana River Delta**
The Tana River Delta is the only estuary that comes under a consistent management umbrella, as it falls under KWS. It has high conservation and biodiversity value. The legal status of estuaries and deltas remain controversial, as they cut across several jurisdictions (riparian, forest, marine and coastal zone). The Ramsar Convention could be a primary instrument for the conservation of the ecosystem at the national level. An application for appropriate Ramsar designation of the Tana River Delta is under preparation.

**Social Conditions**

**Land Tenure**
By the end of the 18th century there were three main population groups at the Kenya coast, namely Arabs, Swahili and Mijikenda. The first two were mainly concentrated in towns and areas near the coast. The Mijikenda majority were living more inland or working as labourers on the Arab-Swahili plantations.

At independence in 1963, there was no action by the government to resettle the local people who had settled on these lands but were regarded as squatters, even though some had lived there for more than a generation. However, the policy of the government
has changed to resettle the landless through settlement schemes to cope with the problem of squatters and this process is still on-going.

**Land Use and Settlements**
Part of the land along the shoreline of the proposed port area is used as Naval Base and private ranch. Along the road D568, a settlement scheme of Hindi-Magogoni area is on-going and the land has been plotted and allocated by the government. The scheme started as the German Assisted Settlement Programmes (GASP) in 1974. GASP provided the necessary infrastructure such as road, water and so on. According to “Lamu District Regional Physical Development Plan”, the progress of the scheme is as shown below as of 2007.

- Size of the scheme: 7,700ha
- Total number of plots: 795
- Occupied plots: 676
- Population: 5,800

**Fishery**
Fishing is one of the main sources of income around the project site. Centers playing the functions as fishing villages are Faza, Kizingitini, Kiunga etc. Those villages also serve the tourist industry. The fishermen in Lamu Island are said to fish individually and sell their catches to the local market or traders who transport them to Mombasa and Malindi.

In Lamu district, the main fish species of catch are rabbit fish, scavenger, snapper, cat fish, cavalla jacks, mackerel, blackskins, barracuda, mullets, queen fish, sail fish, tuna, prawns, lobsters, crabs, and sharks/rays in dried form, sardines, oysters and octopus. Prawns are caught in areas like Dodori creek, exploited by fishermen from Kipungani and Matondoni. Lobster and crab, which represent some of the best in the world, are caught in places like Kizingitini, Faza and Kiwayuu. Kiwayuu also produces sharks and rays for the dry fish market while places like Kiunga produce shells, lobster, crab and fin fish (Sarah Heddon,2006). The shallow water within the numerous creeks is notable for a very high incidence of Black Tiger Shrimp (*Penaeus Monodon*). Whereas in all other areas of Kenya as well as the Indo-Pacific region, Black Tiger Shrimp would rarely constitute more than five percent of catch, in Lamu the proportion of Black Tiger Shrimp can be as high as 80 percent according to information supplied by project KEN/80/018 staff (FAO Fisheries and aquaculture department, 1986).

**Timber Production and Trade**
Mangrove forests in Kenya provide many direct products – both timber and non- timber. Timber products include firewood, building poles and charcoal used in urban and rural areas. Poles used in construction are normally graded into different utilization classes depending on their uses. Other uses of mangrove poles include boat masts and fish traps/stakes. Larger logs of mangroves, especially of *A. Marina*, are used in traditional boat construction. Aerial roots of S. Alba are also used as floaters for fishing nets.
Mangrove wood is also utilized by the local communities for furniture. Among the non-timber products derived from mangrove forests include honey harvesting, medicinal values, crabs and fish caught inside the forest (Joseph K. S. et al.).

Historical records show that as early as 200BC mangrove poles were an important item of commerce between East Africa and the desert countries of Arabia. By the 1970’s, Kenya was exporting some 34,000 scores of mangrove poles to Somalia, Iran, Iraq, Kuwait and Saudi Arabia, until this export was stopped in 1982 by a presidential ban aimed at stemming overexploitation. As a result, mangrove pole production fell significantly from 1990 (State of the Coast report, NEMA 2009).

Local communities are still allowed to cut mangrove trees thus there is a timber industry that supports the livelihood of the local people. There are some shops that sell mangrove polls in Lamu Island and others are transported to the main land through Mokowe.

**Limestone**

Extensive limestone deposits occur along the coastal area from the Tanzania border in the South to Malindi in the north. A 70-m-thick and 4-8 km-wide band of limestone runs parallel to the coast. Older limestone units occur further inland in the north of Malindi but only a few isolated exposures of limestone are found between Malindi and Lamu. The Coral Rock deposits in the north of Lamu have not been mapped. Exploitation of limestone is already widespread and depends on local variation in the limestone’s texture, composition and market demand.
Coral rocks that are excavated and shaped into coral blocks for building are available in large quantities in Manda Island of Lamu County. The production of coral blocks meets local demand in Lamu district, providing a livelihood to many people employed as excavators of building blocks and stone masons in the construction industry.

![Coral rocks](image)

**Figure 13. Limestone Extraction** (Source: JPC)
Sand and limestone are currently being mined without supporting legislation. Both are non-renewable resources, and if their mining continues unabated, environmental degradation of a wide area is likely to occur. Already, sand exploitation has had detrimental effects, including endangering indigenous forests and depredating ecosystem (State of the Coast report, NEMA 2009).

**World (Cultural) Heritage**
Lamu is the oldest and the best-preserved living settlement among the Swahili towns along the East African coast. Its buildings and applied architecture are the best preserved and carries a long history that represents the development of Swahili technology. The old town is thus a unique and rare historical living heritage with more than 700 years of continuous settlement. It was once the most important trade center in East Africa before other towns such as Zanzibar took over.

Since the 19th century, Lamu has been regarded as an important religious center in East and Central Africa due to the ‘Tarika’ (The Way of the Prophet). It is said that there are many descendants of the Prophet in Lamu. Their presence has kept up the tradition, which continues to the present day Lamu in form of annual festival known as ‘Maulidi’. These festivals are endemic to Lamu and draw the Muslim community from all over East and Central Africa as well as the Gulf. Lamu is an Islamic and Swahili education center in East Africa. Researchers and scholars of Islamic religion and Swahili language come to Lamu to study this cultural heritage, which is relatively
unchanged. The island town has adopted very little modern technology due to its isolation (UNESCO Nomination Dossier, 2000).

**Other main Gazetted Historical Sites**
There are some gazette historical monuments within and around the project site. Most of them have not been checked well and need archaeological assessment before construction. The relevant monuments to port development are Mkokoni, Mashundwani, Ungu, Kililana, Manda, Takwa, Pate, Shanga and Siyu. Of those, Takwa and Siyu fort are well-known historical sites as well as a tourism spot where the magnificent scenery of mangrove forests and Indian Ocean can be seen at the same time.

**Water Supply**
Some areas in the larger Lamu County are water insecure while other areas have adequate water supplies. Lamu Town has adequate fresh water supplies from the sand dunes which are located on the southern side of the town. In addition, there are boreholes in the mainland that also provide fresh water to the residents.

**Livelihoods and economy**
Fishing and farming are the main economic activities in the Lamu County and the project area in particular. At the Mokowe-Hindi-Kililana-Baragoni stretch, agriculture is the most dominant occupation. The same applies to Pate village. On the other hand, at Amu, Matondoni, Faza, Kizingitini, Kiwayu, Shanga and Kiunga artisanal fishing is the main occupation. Other important occupations are small scale business, mangrove cutting, tourism, pastoralism and casual labour. Mangrove cutting is mainly practiced by the inhabitants of Pate and Ndau.

It is estimated that Lamu County has five main livelihood zones namely; mixed farming (cash crops/food crops/horticulture), mixed farming (food crops/cash crops), livestock farming, fishing and formal employment (casual waged labor/Business), the predominant being mixed farming: food crops / cash crop (Long Rains Food Security Report, WFP). High levels of poverty among the population which is manifested in a large population size living below the poverty line in Lamu and the increasing drug problem have made the population highly vulnerable to HIV/AIDS infection. However, it is worth noting that the HIV/AIDS prevalence in 2009 was relatively low (3.4%) compared to the national rate of 7.3%. According to World Health Organization the top 5 diseases in the general population were malaria, upper respiratory tract infections (URTI), diarrhea, skin disease and urinary tract infections (UTI) (Long Rains Food Security Report, WFP).

**Demographic and Population Profile**
Lamu had a population of 101,539 people in 2009 with a population density of 16 persons per square kilometer (Republic of Kenya, 2010). The project area is sparsely populated with the highest concentration of the population found in Amu have relatively higher population densities of 224 persons per sq. km. Population density is higher in
areas that depend mainly on fisheries and other marine resources for livelihoods and income. Most of the people in Lamu County live in Lamu island, Faza, Pata and Kiwayu. Due to the cultural and historical nature of the district, tourism has been very dominant over recent years.

**Health**
The most prevalent diseases in Lamu County are malaria, respiratory tract infections and skin diseases. The county has 42 health facilities which are spread in different levels as follows: one (1) district hospital, two (2) sub-district hospitals, twenty (20) dispensaries, five (5) health centres, thirteen (13) medical clinics, and one (1) nursing home. Besides, there is a very low doctor to population ratio (1:36, 343) but very high infant mortality rates (72/1000) and an even higher under five mortality rate of 123/1000. These high figures could be attributed to few deliveries in health centers (29.6%), and even fewer qualified medical assistants during births (27.2%). However, most children within the county have undergone all vaccinations (80.5%).

**Education**
The project area is generally characterized by low levels of education and a significant disparity in levels of education exists between men and women. The socio-economic assessments revealed that women dominated the section of population who never attended school as well as those who only acquired basic literacy and madrassa while the section of population that had attained secondary, tertiary, university and youth polytechnic levels of education were dominated by men. Lamu County has a total of 70 primary schools with 22,633 pupils, 11 secondary schools with 972 students, less than 5 tertiary learning institutions which include a youth polytechnic and some commercial colleges and adult literacy classes with no credible enrollment statistics available.

However, a high rate (73.2%) of the entire population is literate in spite of little formal education, a fact that is attributed to the vast influence of the prominent Islamic religion (over 70%) which imposes mandatory religious classes during childhood–usually referred to as madrassa.

**Demographic Characteristics Lamu County**
The available and most detailed demographic information on Lamu County which houses the project area is from the national population and housing census of 2009. This census is consistently conducted after every ten years and the results just came out in 2010.

According to the 2009 census results, the number of households in the larger Lamu County has risen from 15,006 households in 1999 to 22,184 households in 2009 and population has increased from 72,686 people in 1999 to 101,539 people in 2009. The population density has also increased from 12 persons per square kilometer in 1999 to 16 persons per square kilometer in 2009. W
While it may appear that this population density is way below the national population density of 66 persons per sq. km, some divisions such as Amu have relatively higher population densities of 224 persons per sq. km. It is worth noting that population density is higher in areas that depend mainly on fisheries and other marine resources for livelihoods and income.

This implies that population pressure in the Lamu County impacts more heavily on fisheries and other marine resources than on terrestrial resources. It is worth noting that the population size and density has changed significantly between 1999 and 2009.

**Bird Life**
Lamu County is very rich in a diverse number of bird species. During a field survey, the following birds were spotted. Figures below show the birds within the project site. It shows that the area is very rich in bird species. Monitoring of ecological richness will use these baseline species to determine effect of development of the area.
<table>
<thead>
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<th>Spur-winged Lapwing</th>
<th>Common Tern</th>
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<tbody>
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<table>
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<th>Little Swift</th>
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<tbody>
<tr>
<td><img src="image3" alt="Common Tern 2" /></td>
<td><img src="image4" alt="Little Swift" /></td>
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<table>
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<th>Black-chested Snake-Eagle</th>
<th>Little Egret</th>
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<tr>
<td><img src="image5" alt="Black-chested Snake-Eagle" /></td>
<td><img src="image6" alt="Little Egret" /></td>
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</table>
Cultural and Heritage Sites
Lamu Old Town
Lamu is the oldest and the best-preserved living settlement among the Swahili towns along the East African coast. Its buildings and applied architecture are the best preserved and carries a long history that represents the development of Swahili technology. The old town is thus a unique and rare historical living heritage with more than 700 years of continuous settlement. It was once the most important trade center in East Africa before other towns such as Zanzibar took over.

Figure 14. A cultural property in Siyu

Since the 19th century, Lamu has been regarded as an important religious center in East and Central Africa due to the ‘Tarika’ (The Way of the Prophet) activities introduced by Habib Swaleh, a Sharif descendant of Prophet Mohamed (P.B.A.H). It is said that there are many descendants of the Prophet in Lamu. Their presence has kept up the tradition, which continues to the present day Lamu in form of annual festival known as ‘Maulidi’. These festivals are endemic to Lamu and draw the Muslim community from all over East and Central Africa as well as the Gulf. Lamu is an Islamic and Swahili education center in East Africa. Researchers and scholars of Islamic religion and Swahili language come to Lamu to study this cultural heritage, which is relatively unchanged. The island town has adopted very little modern technology due to its isolation (UNESCO Nomination Dossier, 2000). UNESCO inscribed Lamu Old Town on the World Heritage List in 2001.

4.4 Turkana County
Geographical Aspects and Boundaries
The County is up to 90% arid while the remaining 10% is semi-arid. The area is thinly populated with pastoralism being the main livelihood, and fishing a secondary one for those living close to the lake. The rainfall is low, normally less than 255mm/yr. The annual mean maximum temperature range is 30 C to 34 C, while the annual mean minimum temperature is 23.7°C.
Physiography and Geology
The landform/topography is a kaleidoscope of mountains, hills, uplands, foot slopes, piedmont plains, sedimentary plains, lacustrine plains and floodplains. The expansive plains have elevations ranging between 437-768 m asl. Lava flows, which generally occur in a north-south direction, form the major central mountains and hills, including Auwerwer, Hadukhungele, Lokhoriokho and Nakuangale. The sedimentary plains on the western side of these mountains and hills break into piedmont plains of various parent materials.

Other mountains and hills are found towards the north-eastern and south-eastern parts and they give way to lacustrine plains bordering Lake Turkana, the largest water body in the area. Denudation has been active within the study area and the once volcanic capped hills now reveal exposures of basement system rocks.

Lake Turkana receives runoff and sediment from a wide geographical area. The Omo River provides about 90% of the water that flows into the basin (Cerling, 1986), draining southward from the Ethiopian plateau where mid-year monsoonal rainfall exceeds 1500mm (Halfman and Johnson, 1988). The seasonal Turkwel and Kerio rivers contribute most of the remaining fluvial input; other water sources are insignificant in the lake’s water budget (Yuretich and Cerling, 1983).

The two main rivers that traverse County area are the Kerio and Turkwel rivers. There are also numerous seasonal as well as ephemeral streams (referred to locally as luggas) that flow for only a few hours or days after the rains (Walsh and Dodson, 1969). The flows are often torrential and flooding outside the shallow stream/river channels is a common phenomenon.

The Turkwel River carries water into the lake for several months in a normal year. The river is approximately 300km long, rising from the slopes of Mt. Elgon (Dodson, 1971). For much of its length it runs from south to north and then swings eastwards at lower altitudes, finally to run from west to east into Lake Turkana, its mouth forming an extensive delta.

The Turkwel and Kerio rivers have deposited a wide and expansive alluvium cover close to the lake shore; Rivers draining the eastern slopes of the mountain ranges bordering the lake have west-east alignments, flowing directly into the lake. Most of the lake shoreline in the southern part is rocky, consisting of layers of lava boulders or minor cliff faces where recent lava flows have extended to the water line. In the south-west corner of the lake, however, the shoreline opens out to form a gently curving arc with sandy and shingle beaches. The internal drainage system in southern Lake Turkana is due largely to the rainfall runoff west of Nyiro mountain and around the lake shore. Most rivers flowing into Lake Turkana have been forced to cut courses through a series of lava flows or pyroclastic accumulations.
Geology and Structures
The Kenya Rift, which is topographically well-defined throughout most of Kenya, splays out into a broader, less distinct zone of rifting within the vicinity of Lake Turkana. The Turkana Depression has generally been regarded as a diffuse zone of faulting, linking the rift segments to the north and to the south (Dunkelman et al., 1988).

The geology of the area is dominated by rocks ranging from Precambrian (Neo-Proterozoic) to Recent age. These include:

1. The Precambrian (Neo-Proterozoic) basement rocks consisting of a variety of gneisses and undifferentiated brecciated rocks;
2. Tertiary metamorphics such as quartzites and Tertiary lavas mainly basalts, phonolites, nephelinites, trachytes, andesites and overlying tuffs and gritty tuffs;
3. Pleistocene to recent deposits.

The general stratigraphic succession of the Lokichar basin is described by Morley et al. (1992) as consisting, in ascending order; of the Precambrian basement rocks, Turkana (Loperot) grits, volcanic rocks and Pliocene to Recent sediments.

The Precambrian metamorphic basement system rocks of Turkana south consists of a stratiform sequence of successive layers of differing lithology that represents a sedimentary succession which has been subjected to granitization and metamorphism of a high degree. These are comprised of an upper fine-grained pelitic series with crystalline limestones and quartzites overlying a series of course gneisses, migmatites and a variety of undifferentiated brecciated rocks.

The gneisses are marked by an increase in granularity and are lighter in overall color. Localized bands of crystalline limestone and highly weathered quartzites are common. Due to the overlying thick sediment and volcanic cover of approximately 4-8 km (Wescott et al., 1999) the basement rocks are of no hydrogeological significance in Turkana south. Localized exposures of the basement rocks occur in river channels and on hills where they have been exposed due to erosion of the overlying volcanic cover.
Figure 15. Geology of Turkana County

The Turkana grits occur in the eastern parts of Loperot area where they are overlain by Tertiary lavas. However, exposures of Turkana grits are poor and consist of more resistant calcareous rocks, while others occur along the escarpments where gullies are carved into talus of the retreating scarps. Faulting and gentle folding are characteristic and repetition of beds due to successive sediments of similar nature as well as strike faulting are a common occurrence.

Basalts overlie the Turkana grits and form the foundation of the hills in Turkana south. The hills are either flow remnants, denuded volcanic cones or, in most cases, intruded by large dyke-like bodies along major faults. The basalts are presumed to have covered most the eastern part where Turkana grits are now exposed but are overlain by thick alluvium cover to the west. Borehole logs and outcrops show that basalts are the dominant rock types within the intra- montane plains within the region. The basalts are highly resistant to weathering and this gives rise to their rugged and steep-sided topography. Their appearance varies little throughout the area: they are of medium to coarse porphyritic texture, with phenocrysts up to 0.5 cm of pyroxene (augite), olivine and plagioclase. The color varies from blue-grey to black. Most of the outcropping rocks are intensively fractured and borehole logs indicate that such fissured and fractured basalts are the most important local aquifer.
The phonolites overlie the basaltic sequences in the area and appear as remnants especially on the Auwerwer and Hadukhungale hills. The phonolites are somewhat fissile with typical platy jointing and usually have greenish grey aphanitic matrix containing occasional small anorthoclase phenocrysts. The phonolites outcrop locally at Katilia, Kachodin and Kerio areas among others.

Intra-montane plains are common and are underlain by moderately thick (10 to 40 m) layers of largely clayey sands, sandy clays and clayey alluvium, which in most cases covers a complex of fractured, weathered and fresh volcanics mainly basalts and phonolites. Records of borehole logs indicate that the sediments of the intra-montane plains usually extend to a depth of 10 to 35 metres, and within the Lokichar/Loperot sedimentary basin, the alluvium extends to over 50 m (Groundwater Survey (K) Ltd., 2001).

The texture is generally clayey, although local sand lenses occur near the major river courses (luggas). Weathered volcanic sequences are suspected to underlie most of the plain at intermediate depths. The maximum thickness of the sediments in the Lokichar/Loperot basin ranges from 4-8 km and the stratigraphy is characterized by clayey alluvium, tuffs and gritty tuff, pyroclastics deposits, inter-bedded basalts, phonolites, nephelinites and sedimentary rocks, sub-volcanic sedimentary rocks and Precambrian basement rocks (Wescott et al., 1999; Mariita, 2003).

**Soils**

The soil varies from none saline to slightly saline. The cation exchange capacity for topsoil is 21.0 me%, rated as a moderate value (Landon, 1984). For B horizon, sodium (3.5 me %) is the second dominant cation after calcium (26.6 me %), with a CEC value of 22.8 me%, making the soils slightly saline and moderately sodic. The soils classify as *haplic Solonetz*. 


**Climate**

The area is classified as semi arid and arid land (ASAL) and is characterized by harsh climatic conditions for most of the year. Temperatures range between 29°C and 41°C, depending on the time of the year (Somboek et al. 1982). The area is hot and dry for most part of the year and this explains why the vegetation cover is relatively low. Wind speeds range from 22-28 m/s measured at 50m height. Though low compared to Lodwar with 44-48 m/s wind speeds, the wind in the study area causes windblown erosion especially around Nakaalei where there are sand dunes.

The agro-climatic zones in Kenya have been subdivided into seven parts ranging from humid (ACZ I) to very arid (ACZ-VII), based on annual temperature, rainfall and evaporation (Somboek et al., 1982). Accordingly, the agro-climatic zone classification boundaries are based on moisture availability zones, a ratio based on average annual rainfall and average annual potential evaporation (r/E0). Since temperature is also considered, the ACZ’s are further given a temperature classification based on altitude and mean annual temperature. Thus, ACZ VII (moisture-based classification) is further classified as ACZ VII-1; the last digit classifies the temperature.
In this case, meaning, fairly hot to very hot (mean annual temperature range--24 °C-30 °C, and an altitude of 0-900 m). Most of the study area is in Agro-climatic zone VII (ACZ V11-1) and a small unit in Agro-climatic zone VI, [(ACZ VI-2) around Loriu plateau.

These classify as very arid (rainfall of 150 to 300 mm per year) and arid (rainfall of 300 to 550 mm per year) respectively. ACZ V11 covers the area from Lodwar and most of the study area and only varies at the southwestern and southeastern parts which are in ACZ V1-2 towards the eastern and western parts of Kangetet division and around Katilia area. The rest of the area is in ACZ VII comprising of Loperot, Kachodin, Kerio, Loiyangalani locations and Loriu plateau within the study area.

Rainfall is unreliable and famine is a constant threat. Flash floods are common during the rains and with the inherent sparse vegetation cover in the area, this leads to degradation of the soil.

**Air Quality**
The air quality is good as the area is rural, sparsely populated, generally undeveloped and far removed from major towns, cities, agricultural and industrial centers that are major contributors to air pollution. There is some natural pollution related to windblown dust as the sometimes strong easterly winds blow across the sparsely vegetated surface. Minimal and transient air pollution is also as a result exhaust fumes and dust released by of the few vehicles traversing the survey area, and dust raised by herds of grazing animals.

**Surface and Groundwater Resources and Quality**

**Surface water**
Lake Turkana is the main surface water body in the area and is replenished largely by the Omo River from the North. The second largest river, Turkwel River, is now being dammed for hydroelectric power generation at Turkwel Gorge 150 km west of the lake. The other large but seasonal river is Kerio. The waters of these rivers are, however, murky due to high content of silt/alluvial clays and therefore not likely suitable for domestic and/or industrial uses. Other surface waters are mostly ephemeral streams that flow only during and shortly after the rains.

The flows are often torrential and flooding outside the shallow stream/river channels is a common phenomenon. Water pans and earth dams are significantly absent in the study area. Most of the inhabitants of the area get their water from shallow, hand dug wells within the luggas, while those living next to Lake Turkana may also use its waters for domestic and livestock use. Also noted in the study area is a bottomland within an upland landform, at Lokwamising, with a high water table yielding water through spring outlets. This area is used as a grazing ground by the local community and the water is used for human and livestock consumption.
Groundwater
Groundwater resources form the most available source of water supply in the study area is exploited through boreholes and shallow wells excavated in luggas. The water is often clear but some recently dug wells have yielded somewhat murky water. The water is used both for domestic and livestock consumption. Some boreholes have, however, dried up due to lack of recharge which has contributed to fluctuating levels of the water table (e.g. boreholes at Kanga’kipur area-- Kerio river basin, Lomunyenkuprat and at Napusimoru area) whereas others have slightly saline water. Even though the mean rainfall is less than 550 mm per annum, a combination of alluvial and/or fractured volcanic aquifers ensures that the overall potential for groundwater development in the investigated area is considered to be reasonable. However, the hydrogeological conditions are variable, and strongly linked to the physiography and secondary features.

Turkana south is dominated by vast plains and towering volcanic capped hills and the lava sheets are anticipated to continue underneath the alluvial deposits of the plains. Basalts, in particular, have a tendency to be very massive. This can be an unfavorable attribute for groundwater storage, considering that older lava flows (such as the basalts and phonolites of Turkana south rarely posses significant primary pore space. Instead, groundwater is mostly stored in secondary features, such as fissure zones, fractures, cooling and shrinkage joints, lithological contacts and Old Land Surfaces (OLS). In strongly stratified or fractured lavas, substantial yields can be obtained from relatively thin but highly permeable, water bearing layers. Often, the thickness of these individual aquifers is limited to a few metres.

Individual aquifers formed within OLS, pyroclastic layers and contact zones generally produce in the range of 1 to 2 m³/hr. This means that several consecutive water strikes are generally required to obtain a reasonably high discharge. Yields in excess of 5 m³/hr can be achieved from boreholes located in "open" faults and fissure zones. Although faults and fractures are often associated with water bearing zones, it should be noted that they might also form barriers to groundwater flow especially when filled with clays (Mulwa, 2001; Mulwa et al, 2005). Evidence from borehole logs confirm that most groundwater resource in this area is tapped from fractured aquifers developed within the basalts.

Within the plains, direct recharge from rainfall is estimated to be low (0-3%), due to a combination of irregular, erratic and unreliable rainfall and a generally clayey underground. However, a fairly high portion of rainfall (5-10%, or 30-60 mm/year) is expected to infiltrate into the fractured basalts and phonolites of the higher grounds. Groundwater drainage from the hills is responsible for replenishment of the adjacent aquifers on the plains and as well as lowlands. Indirect recharge from seasonal streams and rivers is difficult to quantify. However, it can be assumed that the effective precipitation (i.e. the portion of rainfall that is drained as streamflow) over the hills and
the intra-montane plains is probably close to 20%. Most of the surface water disappears before the streams reach their ultimate destinations, i.e. Lake Turkana.

**Terrestrial Environment**

**Habitat types and associated flora species**

The ecosystems in Turkana are unique in terms of environmental characteristics with the ecosystem being influenced by the following physical factors: climate at regional as well as continental scales; by topographic effects on rainfall and landscape water redistribution, geomorphic effects on soil and plant available water at the landscape to regional scales; and by water redistribution and disturbance at local and patch scales (Coughenour and Ellis, 1993).

The study area is an ASAL region with heterogeneous and highly variable habitat conditions that are influenced by prevailing soil units and water availability.

The County is characterized by a near barren landscape with scattered *Acacia tortilis* of less than 15% present at the fringes and annual grasses (*Aristida*), *Senna spp* and a wild member of the cucumber family *Citrullus colocynthis* growing along waterways, rills and dunes. Other vegetal species found in the area include *Indigofera spp*, *Cadaba farinosa*, *Acacia mellifera*, *Indigofera spp*. and *Boscia spp*.

![Figure 17. Vegetation Map](image_url)
Faunal Species
Fauna includes a variety of mammals species such the dikdiks, hares, ground squirrels and jackals, various species of arthropods (spiders, ticks, scorpions, ants, butterflies, wasps and beetles), reptiles (snakes, skinks and other lizards), and birds such as the Buffalo weaver, Fork-tailed drongo, Namaqua dove, Brown-necked crow, Eastern pale chanting goshawk, White bellied go away bird and Carmine Bee-eater.

Aquatic Environment
The major aquatic ecosystems within the block are the Lake Turkana, River Kerio, and River Turkwel and associated ephemeral streams (luggas). The area is of great global significance for both terrestrial and aquatic conservation, harboring a wide variety of unique plants, mammals, birds, reptiles, amphibians and arthropods species.

Common plant species in this ecosystem include emergent macrophytes such as the grasses Paspalidium germinatum and Sporobolus spicatus which cover the seasonally exposed shallows and provide important nurseries for fish (Hughes & Hughes 1992), and Pondweed (Potamogeton spp) found in the shallow bays of Lake Turkana (Hughes & Hughes 1992). The watercourses of Rivers Kerio, Turkwel and their lugga systems are characterized by riverine forests with the dominant species being Acacia tortilis, Balanites aegyptiaca, Salvadoria persica, and Hyphaene coriacea. Calotropis procera and Prosopis juliflora are common in disturbed areas.

Mammals in the area include olive baboon, wild dog, striped hyena, caracal, warthog hippopotamus Grant’s gazelle, reticulated giraffe, Beisa oryx, hartebeest, topi, dikdik, and gerenuk. Also present in the area are lion and cheetah which have both been classified as vulnerable by IUCN whilst the plains and Grevy’s zebras have been classified as endangered. Reptilian species include Nile crocodile, puff-adder, cobra and saw-scaled viper. 47 fish species, seven being endemic, live in Lake Turkana (Fitzgerald 1981; KWS 2001). At least 350 species of aquatic and terrestrial birds are known to occur in the Turkana area with Lake Turkana serving as an important breeding habitat and stopover for migrant birds (Bennun & Njoroge, 2001).

Aquatic flora
The vegetation followed the river floodplains, with Salvadoria persica and Maerua crassifolia, both evergreen shrubs, marking the extent of the floodplains boundary. Other species found were Acacia tortilis, Ziziphus mucronata, Balanites aegyptiaca, and Hyphaene compressa. Calotropis procera was frequently encountered in disturbed areas prone to seasonal flooding. The species was an indicator of a high water table and probably alkaline substrate conditions.

Aquatic Fauna
Fauna species found within the confines of the aquatic ecosystems included: various birds” species such as sacred ibises, black headed plover, and hammerkop; insects as
such the dragon flies; fish species e.g. catfish, and herpetiles such as frogs and geckos. Littoral species found in the aquatic environments include various orders of crustaceans.

**Visual Aesthetics**  
The area has a pristine and rugged scenic beauty with hills, extensive plains, and several sand rivers (luggas). The varying landscape relaxes the eye and spots of interest manifests themselves as surface stones and various rocks of varied colors in uplands, that yield to gentle sandy plains and to hill masses. Intensely dissected piedmonts are followed by flood plains and sand dunes before changing once again into uplands. Presence of abundant birdlife and scanty wildlife augment the aesthetics of the environment.

**Economic Setting**  
The stronghold of the project area’s economy is pastoral livestock production. The sub-sector is a source of livelihood for over 60% of the inhabitants. Nonetheless, cattle rustling, frequent disease outbreaks, water scarcity, low productivity and poor marketing hamper expansion of the sector. The rest of the population (20%, 12% and 8%) depend on agro-pastoralism, fishing and casual and formal labor in urban and peri-urban areas respectively (FAO, 2007). Crop production is carried out along the Kerio and Turkwel rivers and on the arable flood plains and is both rain fed and irrigated. Main crops cultivated are maize, sorghum, beans and cassava.

The project area is a pastoral region thus the constant movements of the pastoralists coupled with high levels of poverty (according to FAO, 2007 approximately 62% of the inhabitants of the larger Turkana area are classified as absolutely poor) have not permitted growth of an efficient market infrastructure for livestock and its products.

*Figure 18. Fishing in L. Turkana is also an important economic activity*
Figure 19. Livestock rearing is also a very important economic activity in the area.

4.5 Samburu County

Geographical Location, Size and Administrative Units
Samburu County is situated in the northern half of the Rift valley Province. Five (5) Counties in the Rift Valley and Eastern Province border it. To the northwest is Turkana, southwest is Baringo and south is Laikipia and Marsabit is to the northeast and Isiolo to the east. The County lies between latitudes $0^040'$ north and $2^050'$ north of the Equator and longitude $36^020'$ east and $38^010'$ east of the prime meridian. It lies within the semi-arid areas of the country. The total area of the County is approximately 21,126.5 km$^2$ (including 3,288 km$^2$) of Government gazetted forests and 170 km$^2$ under game reserves and sanctuary and 1.8 km$^2$ under surface water.

Climate and Physical Features
Samburu lies on the northern interface between highlands and lowlands. To extreme west is Suguta Valley, which is bounded on both sides by fault escarpments and floored by red clays, boulders and gravel fans. Valley floor frequently flooded during the rainy season but occupied and affected by wind action during the dry season.
The valley was originally part of Lake Turkana as evidenced by beach terraces. East of Suguta Valley, the district is characterized by repeated extensive high-level plateaus which have been built by repeated floods of lava from the Rift valley. The highest parts of these plateaus are the kirisia hill, rising to 2000m above sea level. The erosion of lava fields has produced only a thin mantle of soils, the lava flow remaining as rough sheets with boulders sheets devoid of vegetation and useless for any imaginable agricultural activities, in the near future.

North of Baragoi and between Tuum and South –Horr, the area rises to Mt Nyiro tapers northwards and falls steeply southwards. South and west of Mt Nyiro are peneplains which have been eroded to plains of lower levels ranging from 1000-1,350 m above sea level. These are noticeable at Kawap and the area between Lodungokwe and Wamba continuing eastwards and southwards. These plains are covered by red soils and sands derived from the adjacent slopes by sheet erosion.

East of the central plains are the Mathew Ranges and the Ndoto mountains forming discontinuous ranges tending nearly north-south on the eastern side of the district. Apart from the Lorroki plateau and the mountain ranges of Nyiro and Mathews, the rest of the district is a continuous basin, which slopes northwards to L. Turkana and east of Mathew Ranges. The high altitude of the plateau and the mountain ranges has resulted in indigenous forests, which are all gazetted and preserved for rain catchments. Apart from occasional and controlled grazing during droughts periods, no commercial exploitation is permitted. The slopes on the plateau and mountain ranges have been reduced into gravel or shallow stony soils with conspicuous rocky outcrops.

The surface run off from the slopes has created numerous dry river beds in the central basin which are quite dangerous to transportation during rains. The central basin has therefore been subjected to severe erosion and the area has only been able to support savannah type of vegetation dominated by acacia trees and tufts of grass.

**Soils:** The County is predominantly covered by sandy loam soils. The distribution and development is influenced by topography, rock types and vegetation cover among other factors. The volcanic hills on Lorroki plateau are covered by shallow dark to dark brown rocky and stony soils especially to the north. In the south west and high altitude areas where rainfall is above 600mm per annum the soils are comparatively deep.

Kirisia Division is predominantly covered by sandy loam and sandy clay soils, mostly lithosol (shall stoney soils) and cambisols. In the areas covered by lithosols water run-off is common and erosion quite prevalent.

Lorroki Division is predominantly covered by sandy loam soils. The soils are mostly well-drained phaezems. However some parts of the Division is covered by shallow lithosols, including the surrounding of Suguta Marmar where the risk of flooding is classified as medium. The lithic phase of the soils encourages run-off during periods of high precipitation.
Baragoi division and Nyiro are predominantly covered by boulders cambisols and lithosol. The soils are particularly more stony and rocky on the southern slopes of Mt Nyiro and Ndoto mountains. These soils are shallow and have a lithic (stony) phase, a characteristics that makes the soils prone to run off.

The eastern parts of the County which covers Wamba and Waso divisions is predominantly covered by weakly developed soils, mostly sandy and low in organic matter and in some places in Waso Division the soils are saline and sodic (mostly cambisols and solonetz).

**Ecological zones:** Lower Highlands (LH2-LH4), lower highlands zone V(LH5,upper midland (UM4-UM6) ,lower midlands zone V-VI (LM5-LM6), lower midland zone VII (LM7) , intermediate lowlands (IL7) and indistinct zones/transitional zones.

**Major drainage:** The County fall in drainage areas No2 (Kerio Valley) and No 5 (Ewaso Nyiro). Main water sources in the County constitute surface and ground water. It shares one permanent river-Ewaso Nyiro, with other districts and other rivers/streams are seasonal. 1.8km² of the district is under surface water.

**Vegetation types:** Evergreen forests, evergreen bush land, evergreen to semi-deciduous bush land/thicket, evergreen shrub land, semi-deciduous grassland, deciduous bush land, deciduous bush grassland, deciduous shrub land, deciduous shrub grassland, deciduous shrub annual grasslands, dwarf shrub grassland and grassland.

Table 4: Land Areas Covered by Forests and Protected to Maintain Biological Diversity

<table>
<thead>
<tr>
<th>Land area</th>
<th>Ha</th>
<th>Sq km</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gazetteed forest</td>
<td>328,806.50</td>
<td>3,288</td>
<td>Grazing pressure</td>
</tr>
<tr>
<td>Game reserve</td>
<td>16,500.00</td>
<td>165</td>
<td>Degraded/Human activities</td>
</tr>
<tr>
<td>Animal sanctuary</td>
<td>500.00</td>
<td>5</td>
<td>Degraded/human activities</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>345,806.50</strong></td>
<td><strong>3458</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** *DFO, MTC, SCC records, 2006*

**Climate:** Tropical. Temperature are 24°C (minimum), 33°C (maximum) and 29°C (mean), rains are bimodal-April-June (long rains), October –December (short rains) and range from 250mm-1250mm p.a.

**Soils and Land Use**
Land is the basic natural resource as it forms the basis for the country’s socio-economic development. It supports agriculture, livestock, forestry and wildlife. With
increasing population, poverty levels and demand for the resources, instances of over exploitation and degradation of natural resources are common.

**Soils**
Soil is one of the most important non-renewable natural resource that supports life on earth. In Kenya, soil resources are especially significant because of the importance of agriculture to the country and the mounting pressures upon land constantly making this resource even more valuable. Soils in Kenya are classified based on their inherent fertility.

The County is predominantly covered by sandy loam soils. The distribution and development is influenced by topography, rock types and vegetation cover among other factors. The volcanic hills on the Lorroki plateau are covered by shallow dark to dark brown rocky and stoney soils especially to the North. In the South west and high altitude areas where rainfall is above 600mm per annum the soils are comparatively deep. Kirisia Division is predominantly covered by sandy loam and sandy clay soils, mostly lithosols (shallow stoney soils) and cambisols. In areas covered by lithosols water run-off is common and erosion quite prevalent.

Lorroki division is predominantly covered by sandy loam soils. The soils are mostly well- drained phaezems. However, some parts of the Division is covered by shallow lithosols, including the surrounding of Suguta Marmar where the risk of flooding is classified as medium. The lithic phase of the soils encourages run-off during periods of high precipitation.

**Dry lands**
Samburu County as a whole is classified as being semi-arid to arid, though it has very small pockets of dry sub- humid conditions in the ecological zones LH2 to LH4. Small scale and large scale farming is found in the sub-humid areas found in the highlands –LH2 to LH4.

Livestock production is the main economic activity in the district. Animals kept include beef cattle, camels, sheep and goats. There is potential for commercial fishing at Lake Turkana not yet exploited mainly because Samburu customs discourage fish eating.

Forest exploitation in the district is mainly confined to collection of firewood, poles and timber and the main tree species include: *Juniperus procera* (red pencil cedar), *Podocarpus falcantus* (podo) and *Olea africana* (Elgon Olive).

Wildlife is also one of the districts most important resources. The district has one of the highest wildlife populations outside protected areas in the country, with an estimated 350 species of birds and 79 species of mammals.

**Agriculture**
Samburu County has a total land area of 140, 900Ha (1400km$^2$) medium to high potentials land which receive 600mm – 900mm of rainfall per annum. The land is under group ranches with only a few people owning individual parcels with title deeds. About 6, 000 ha (60km2) of land is currently being cultivated half of which cereals (wheat, barley and maize) are produced under mono cropping systems. The rest of the cultivated land is utilized for mixed farming and inter cropping (maize/beans, potatoes, vegetables, fruits).

The remaining land of the vast County is utilized predominantly for free-range nomadic pastoralism (77.5%) where cattle, camels, sheep and goats are reared.
5 DESCRIPTION OF THE ADMINISTRATIVE, POLICY AND REGULATORY FRAMEWORK

This chapter outlines and highlights the relevant institutional and legal as well as policy framework in Kenya, which has a direct bearing on the RPLRP. The chapter further highlights the World Bank Safeguard Operational Policies applicable to the project including a comparative analysis and gaps existing between the Bank’s policies and host country regulations and suggestions on bridging the gaps. Finally, sections on international laws and conventions that bear relevance to the implementation of this project have also been highlighted in this chapter.

5.1 The Legal, Regulatory and Policy Framework

5.1.1 Constitutional Provisions

Kenya now has a new Supreme law in form of the New Constitution which was promulgated on the 27th of August 2010 and which takes supremacy over all aspects of life and activity in the New Republic. With regard to environment, Section 42 of the Constitution states as follows:-

Every person has the right to a clean and healthy environment, which includes the right -

a) To have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69; and

b) To have obligations relating to the environment fulfilled under Article 70

In Sections 69 and 70, the Constitution has inter alia identified National Obligations in respect of the environment and Enforcement of Environmental Rights respectively as follows:-

Section 69 (1): The State shall—

a) Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;

b) Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;

c) Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;

d) Encourage public participation in the management, protection and conservation of the environment;

e) Protect genetic resources and biological diversity;

f) Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;

g) Eliminate processes and activities that are likely to endanger the environment; and

h) Utilize the environment and natural resources for the benefit of the people of Kenya.
Section 69 (2) States that: Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

Section 70 provides for enforcement of environmental rights thus:

(1) If a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter.

(2) On application under clause (1), the court may make any order, or give any directions, it considers appropriate—
   a) To prevent, stop or discontinue any act or omission that is harmful to the environment;
   b) To compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or
   c) To provide compensation for any victim of a violation of the right to a clean and healthy environment.

(3) For the purposes of this Article, an applicant does not have to demonstrate that any person has incurred loss or suffered injury.

Essentially, the new Constitution has embraced and provided further anchorage to the spirit and letter of EMCA 1999 whose requirements for environmental protection and management have largely informed Sections 69 through to 71 of this document. In Section 72 however, the new constitution allows for enactment of laws towards enforcement of any new provisions of the Supreme Law.

5.1.2 Vision 2030
The economic, social and political pillars of Kenya Vision 2030 are anchored on macroeconomic stability; continuity in governance reforms; enhanced equity and wealth creation opportunities for the poor; infrastructure; energy; science, technology and innovation (STI); land reform; human resources development; security as well as public sector reforms. The 2030 Vision aspires for a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities, and telecommunications.

5.1.3 Environment Management and Coordination Act (No. 8 of 1999), EMCA
This is an Act of Parliament providing for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto. This Act is divided into 13 Parts, covering main areas of environmental concern as follows: Preliminary (I); General principles (II); Administration (III); Environmental planning (IV); Protection and Conservation of the Environment (V), Environmental impact assessments (EIA), audits and monitoring (VI); Environmental audit and monitoring (VII); Environmental quality standards (VIII); Environmental Restoration orders, Environmental Easements (IX); Inspection, analysis and records (IX);
Inspection Analysis and Records (X); International Treaties, Conventions and Agreements (XI) National Environment Tribunal (XII); Environmental Offences (XIII). The Act provides for the setting up of the various ESIA Regulations and Guidelines, which are discussed below:

*Environmental (Impact Assessment and Audit) Regulations 2003*

The Environmental (Impact Assessment and Audit) Regulations 2003 state in Regulation 3 that “the Regulations should apply to all policies, plans, programmes, projects and activities specified in Part III and V of the Regulations” basically lists the guidelines of undertaking, submission and approval of the ESIA Reports a key requirement outlined in this ESMF.

*Environmental Management and Co-ordination (Waste Management) Regulations 2006*

These are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69 of September 2006. These Regulations apply to all categories of waste as provided in the Regulations. These include:

- Industrial wastes;
- Hazardous and toxic wastes;
- Pesticides and toxic substances;
- Biomedical wastes;
- Radio-active substances.

The proposed Project will have to abide by these regulations in dealing with waste management especially the provisions of wastes which may be generated during their construction and operation phases of the sub project investments. Pesticides may also be used under the irrigation related components of certain sub projects and as such the regulations on the disposal of pesticide wastes must be adhered to.

*Environmental Management and Coordination, (Water Quality) Regulations 2006*

These are described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006. These Regulations apply to drinking water, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife and water used for any other purposes. This includes the following:

- Protection of sources of water for domestic use;
- Water for industrial use and effluent discharge;
- Water for agricultural use.

These Regulations outline:

a) Quality standards for sources of domestic water;
b) Quality monitoring for sources of domestic water;
c) Standards for effluent discharge into the environment;
d) Monitoring guide for discharge into the environment;
e) Standards for effluent discharge into public sewers;
f) Monitoring for discharge of treated effluent into the environment.
In fulfilling the requirements of the regulations the project proponent will have to undertake monitoring of both domestic water and wastewater and ensure compliance with the acceptable discharge standards.

**Environmental Management and Coordination, Conservation of Biological Diversity (BD) Regulations 2006**
These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84 of December 2006. These Regulations apply to conservation of biodiversity, which includes Conservation of threatened species, Inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties.

**Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations 2006**
These regulations are described Legal Notice No. 131 of the Kenya Gazette Supplement no. 74, October 2006 and will apply to all internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnerships to control fossil fuel emissions used by the Contractor. The fossil fuels considered are petrol, diesel, fuel oils and kerosene.

**Environmental Management and Coordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations 2009**
These regulations provide for the protection and management of wetlands, riverbanks, lakeshores and sea shore management and detail guidelines on the same.

**Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009**
These regulations prohibit making or causing any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. It also prohibits the Contractor from excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment or excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source. Under the regulation the Contractor will be required to undertake daily monitoring of the noise levels within the Project area during construction period to maintain compliance.

**5.1.4 Occupational Health and Safety Act, 2007**
This is an Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. The Act has the following functions among others:

- **Secures safety and health for people legally in all workplaces by minimization of exposure of workers to hazards (gases, fumes & vapours, energies, dangerous machinery/equipment, temperatures, and biological agents) at their workplaces.**
- **Prevents employment of children in workplaces where their safety and health is at risk.**
- Encourages entrepreneurs to set achievable safety targets for their enterprises.
- Promotes reporting of work-place accidents, dangerous occurrences and ill health with a view to finding out their causes and preventing of similar occurrences in future.
- Promotes creation of a safety culture at workplaces through education and training in occupational safety and health.

Failure to comply with the OSHA, 2007 attracts penalties of up to KES 300,000 or 3 months jail term or both or penalties of KES 1,000,000 or 12 months jail term or both for cases where death occurs and is in consequence of the employer. The Occupational Safety and Health Act (OSHA) 2007 repealed the Factories and Other Places of Work Act. Anything done under the provisions of the Factories and Other Places of Work Act including subsidiary legislation issued before the commencement of the OSHA 2007 shall be deemed to have been done under the provisions of this Act.

The Factories and Other Places of Work Act had over the years passed several subsidiary rules and regulations for effective implementation of the Act. All shall, as long as it is not inconsistent with OSHA 2007 remain in force until repealed or revoked by subsidiary legislation under the provisions of OSHA 2007 and shall for all purposes be deemed to have been made under this Act.

These regulations include:
- The Factories (Cellulose Solutions) Rules 1957;
- The Factories (Wood Working Machinery) Rules 1959;
- The Factories (Dock) Rules 1962;
- The Factories (Eye Protection) Rules 1978;
- The Factories (Electric Power) (Special) Rules 1978;
- The Factories and Other Places of Work (Health & Safety Committees) Rules 2004;
- The Factories and Other Places of Work (Medical Examination) Rules 2005;
- The Factories and Other Places of Work (Fire Risk Reduction) Rules 2007;

The scope of OSHA 2007 has been expanded to cover all workplaces including offices, schools, academic institutions and plantations. It establishes codes of practices to be approved and issued by the Director, Directorate of Occupational Health and Safety (DOHS) for practical guidance of the various provisions of the Act.

Other parameters within the Act relevant to the project include:
1. Duties of employers, owners or occupiers of workplace;
2. Establishment of safety and health committees;
3. Annual safety and health audit of workplaces;
4. Safety and Health obligations for persons who may come to premises for work and are not employees of that particular workplace;
5. Reporting of any accident, dangerous occurrence or occupational poisoning caused in the workplace to the area Occupational Health and Safety Office. These incidents should be
entered in the General Register. In case of fatal accident information to the area Safety and Health Office should be within 24 hrs. and a written notice to the same within 7 days;

6. The duties of manufactures, designers, importers and suppliers to ensure that all articles and substances for use at workplace are safe and will not cause injury to health and the environment;

7. Duties of self-employed persons;

8. Duties of employed persons;

9. Prohibition of interference or misuse of any appliance, convenience or any other facility provided to secure Safety, Health and Welfare at work by any person (occupier, self-employed person or employed);

10. The administration of the Act is the responsibility of a Director and other appointed and gazetted officials (Occupational Health and Safety Officers);

11. The registration of all workplaces by the Director Directorate of Occupational Health and Safety (DOHS) forming the basis of his work statistics;

12. Machinery safety to include:
   - Safe use of machinery, plant and equipment;
   - Prime makers and transmission machines;
   - The maintenance, construction of fencing safeguards;
   - The statutory requirements of various machines, plants and equipment (hoists and lifts, chains and ropes, cranes, steam receivers and containers, air receivers, cylinders for compressed liquefied and dissolved gases and refrigeration plants).

13. Chemical safety including:
   (i) Handling, transportation and disposal of chemicals and other hazardous substances;
   (ii) Importance of Materials Safety Data Sheets (MSDS);
   (iii) Labelling and marking of chemical substances;
   (iv) Classification of hazardous chemicals and substances;
   (v) Establishment and adoption of exposure limits on hazardous substances in a workplace;
   (vi) Control of air pollution, noise and vibrations;
   (vii) Redeployment on medical advice.

5.1.5 The Water Act 2002
Water in Kenya is owned by the Government, subject to any right of the user, legally acquired. The control and right to use water is exercised by the Minister administering the Act, and such use can only be acquired under the provisions of the Act. The Minister is also vested with the duty to promote investigations, conserve and properly use water throughout Kenya. Water permits may be acquired for a range of purposes, including the provision and employment of water for the development of power and other uses. The following are the regulations developed under Water Act 2002 relevant to the Project. These regulations will relate to abstraction and use of water from rivers.

These Rules are described in Legal Notice Number 171 of the Kenya Gazette Supplementary Number 52 of 2007. They apply to all water resources and water bodies in Kenya, including all lakes, water courses, streams and rivers, whether perennial or seasonal, aquifers, and shall include coastal channels leading to territorial waters.
The Water Resources Management Rules empower Water Resources Management Authority (WRMA) to impose management controls on land use falling under riparian land. It also enables any person with a complaint related to any matter covered by these rules to the appropriate office in WRMA as per the Tenth Schedule which provides a format for report on complaints. WRMA is to reply to the complainant with “copies to all other relevant parties within twenty one days of receiving the complaint, starting with what action is being taken, the position of the Authority on the matter and any recommendation to the complainant.”

The rules also elaborate on the following:

- Mechanisms for appeal;
- Public notification;
- Public consultation;
- Orders on compliance;
- Protection of the integrity of the water resources monitoring network;
- Water Resource User Associations;
- Water Resource Database;
- Approval of activities listed in the fifth schedule of Water Act 2002;
- Authorization and permitting;
- Wetlands;
- Allocation of water for irrigation;
- Prior right to water for storage;
- Dams;
- Groundwater development and its regulation;
- Control of water pollution and effluent discharge;
- Water works;
- Water use charges on permitted water use;
- Conservation of riparian land and catchment areas;
- Catchment management strategies;
- Protected areas and ground water conservation areas;
- Establishment and protection of reserve water;
- Miscellaneous provisions which include provisions on:
  (i) Qualifications to practice as a water resource professional;
  (ii) Qualifications for a registered contractor;
  (iii) Recognized water quality laboratories;
  (iv) Emergency orders;
  (v) Penalties for offences;
  (vi) Revocation of rules under Cap 372.

Part IX: Conservation of Riparian and Catchment Areas of the Rules, Section 116(5) states “Unless otherwise determined by a water resources inspector, the riparian land adjacent to the ocean is defined as a minimum of two metres vertical height or thirty metres horizontal distance from the high watermark, whichever is less”.

Section 118 (1) of the Rules state “No person shall undertake the activities listed in the Sixth Schedule on riparian land unless authorised by the Authority in consultation with other relevant stakeholders”.

Part A of the Sixth Schedule: Protection and Conservation of Riparian and Catchment Areas of the Rules provide activities proscribed on riparian land as:

1) Tillage or cultivation;
2) Clearing of indigenous trees or vegetation;
3) Building of permanent structures;
4) Disposal of any form of waste within the riparian land;
5) Excavation of soil or development of quarries;
6) Planting of exotic species that may have adverse effect to the water resource;
7) Or any other activity that in the opinion of the Authority and other relevant stakeholders may degrade the watercourse.

5.1.6 The Wildlife Conservation and Management Act, Cap 376
The Wildlife Conservation and Management Act, Cap 376 of 1976, as amended in 1989, covers matters relating to wildlife in Kenya including protected areas, activities within protected areas, control of hunting, import and export of wildlife, enforcement and administrative functions of wildlife authorities. The 1989 amendment specifically established the Kenya Wildlife Service (KWS) as the parastatal charged with implementation of the provisions of the Act.

The Act specifically provides for the protection and regulation of protected animals, game animals and game birds as defined in three schedules. The first schedule includes game animals mostly mammals, although the list also includes crocodile and ostrich. The second schedule lists game birds, and the third schedule lists protected animals, which comprise primarily mammals, although it also includes two species of marine turtles, while in 1981 it was amended to include several species of reptiles, amphibians and butterflies. Apart from the protection provided to plants within National Parks and National Reserves, plants receive no further protection under this Act outside the protected areas.

Specific provisions of the Act allow for the establishment of National Parks (Section 6), National Reserves (Section 18), and local sanctuaries (Section 19). The National Parks are managed by KWS. Strict regulations prohibit various activities within National Parks, unless they are subject to the written consent of the Minister or, in other cases, the Director of KWS. No such prohibitions are specified for National Reserves or for local sanctuaries. Areas that were formerly game reserves but are declared as National Reserves continue to be administered by the local authorities, unless otherwise directed by the Minister by notice in the Kenya Gazette

5.1.7 Public Health Act Cap 242
The Public Health Act provides for the protection of human health through prevention and guarding against introduction of infectious diseases into Kenya from outside, to promote public health and the prevention, limitation or suppression of infectious, communicable or
preventable diseases within Kenya, to advice and direct local authorities in regard to matters affecting the public health to promote or carry out researches and investigations in connection with the prevention or treatment of human diseases. This Act provides the impetus for a healthy environment and gives regulations to waste management, pollution and human health.

The Public Health Act regulates activities detrimental to human health. The owner(s) of the premises responsible for environmental nuisances such as noise and emissions, at levels that can affect human health, are liable to prosecution under this act. An environmental nuisance is defined in the act as one that causes danger, discomfort or annoyance to the local inhabitants or which is hazardous to human health. This Act controls the activities of the project with regard to human health and ensures that the health of the surrounding community is not jeopardized by the activities of the project such as water development.

5.1.8 Physical Planning Act
This Act provides for the preparation and implementation of physical development plans for connected purposes. It establishes the responsibility for the physical planning at various levels of Government in order to remove uncertainty regarding the responsibility for regional planning. A key provision of the Act is the requirement for Environmental Impact Assessment (ESIA). This legislation is relevant to the implementation and siting of sewerage plants in pilot urban centres as identified in the project document.

It provides for a hierarchy of plans in which guidelines are laid down for the future physical development of areas referred to in a specific plan. The intention is that the three-tier order plans, the national development plan, regional development plan, and the local physical development plan should concentrate on broad policy issues.

The Act calls for public participation in the preparation of plans and requires that in preparation of plans proper consideration be given to the potential for socio-economic development needs of the population, the existing planning and future transport needs, the physical factors which may influence orderly development in general and urbanization in particular, and the possible influence of future development upon natural environment.

5.1.9 The Forest Act No 7, 2005
The Forest Act, Cap 385 of 1962 (revised 1982, 1992 and 2005) addresses the reservation, protection, management, enforcement and utilisation of forests and forest resources on Government land. The Forest Act is applicable to gazetted forest areas (Forest Reserves) and specifically covers:

- **Gazettement, alteration of boundaries and de-gazettement of Forest Reserves (Section 4):**
- **Declaration of Nature Reserves within Forest Reserves and regulation of activities within Nature Reserves (Section 5):**
- **Issuance of licenses for activities within Forest Reserves (Section 7):**
- **Prohibition of activities in Forest Reserves (removal of forest produce, grazing, cultivation, hunting, etc.) and on un-alienated Government land (removal of trees,**
collection of honey, lighting of fires) except under license from the Director of Forest Services (Section 8);

- Enforcement of the provisions of the Act, penalties and powers afforded to enforcing officers (Sections 9-14);
- Power of the Minister to make rules with respect to sale and disposal of forest products, use and occupation of land, licensing and entry into forests (Section 15). This prerogative has been taken with the Forests (General) Rules, which sets forth rules for sale of forest produce and specifies royalty rates for these products.

Section 4 of the Forest Act relates to excision and addition to the Government forest estate. Section 4 (2) states that declaration or alteration of forest boundaries, or cessation of a forest area may not take place unless twenty-eight days’ notice of the intention to make the declaration is published by the Minister in the Kenya Gazette. Implementation of changes in forest areas can be affected by Legal Notices (published in the Kenya Gazette Supplement) once the formalities of 28 days’ notice are complete.

5.1.10 The Land Act 2012)

It is very explicit in the Land Act, 2012, Section 107, that whenever the national or county government is satisfied that it may be necessary to acquire some particular land under section 110 of Land Act 2012, the possession of the land must be necessary for public purpose or public interest, such as, in the interests of public defence, public safety, public order, public morality, public health, urban and planning, or the development or utilization of any property in such manner as to promote the public benefit; and the necessity therefore is such as to afford reasonable justification for the causing of any hardship that may result to any person having right over the property, and so certifies in writing, possession of such land may be taken.

5.1.11 The Trust Land Act (CAP 288)

The constitution vests all land which is not registered under any act of parliament under the ownership of local authorities as trust land. Section 117 of the Constitution of Kenya provides that the Trust Lands Act may empower a county council to set apart an area of trust land vested in that county council for use and occupation by a public body or authority for public purposes, or by any person for a purpose likely to benefit the persons. The Act states that while giving due considerations to the rights and obligations of landowners, there shall be compensation whenever a materials site, diversion or realignment results into relocation of settlement or any change of user whatsoever of privately owned land parcels;

5.1.12 Antiquities and Monuments Act, Cap 215 of 1983

This Act aims to preserve Kenya’s national heritage. Section-2 defines an antiquity as any moveable object other than a book or document made or imported into Kenya before 1895. Human, faunal or floral remains in Kenya dating to before the benchmark date of 1895 are also deemed to be antiquities. Both the National Museums of Kenya and the Kenya Cultural Centre have been established in part to discharge this Act.
5.1.13 **The Lakes and Rivers Act Chapter 409 Laws of Kenya**
This Act provides for protection of river, lakes and associated flora and fauna. The provisions of this Act may be applied in the management of the project.

5.1.14 **The Employment Act, 2007**
This Act declares and defines the fundamental rights of employees; minimum terms and conditions of employment; to provide basic conditions of employment of employees; and to regulate the employment of children, among other rights. Key sections of the Act elaborate on the employment relationship; protection of wages; rights and duties in employment; termination and dismissal and protection of children, among others. This Act will guide the management of workers, especially during the construction period.

While the EMCA supersedes all other environmental legislation, numerous other laws and regulations in addition to those described above influence the various aspects and activities of the Project, which include the following among others:

i) **Trade Licence Act, Cap 497**;
ii) **Penal Code Cap 63 (rev. 1985)**;
iii) **Standards Act, Chapter 496 (1974)**;
iv) **Building Code (1968)**;
v) **Work Injury and Benefits Act (2007)**;
vi) **Food, Drugs and Chemical Substances Act, Cap 254 (rev 1992)**;
vii) **Use of Poisonous Substances Act, Cap 247 (rev. 1983)**;
viii) **Transport Licensing Board Act (Cap. 404)**.

5.2 **Relevant Sector Policies and Reforms**

5.2.1 **National Policy on Environment and Development Sessional Paper No. 6 of 1999**
Currently, a far-reaching initiative towards an elaborate national environmental policy is contained in the Sessional Paper No. 6 of 1999 on Environment and Development. It advocates for the integration of environmental concerns into the national planning and management processes and provides guidelines for environmental sustainable development. The challenge of the document and guidelines is to critically link the implementation framework with statutory bodies namely, the National Environmental Management Authority (NEMA), Kenya Wildlife Service (KWS), Kenya Forestry Service (KFS); the Public Complaints Committee (PCC) and the National Environmental Tribunal (NET).

5.2.2 **The National Environmental Sanitation and Hygiene Policy-July 2007**
The National Environmental Sanitation and Hygiene Policy is devoted to environmental sanitation and hygiene in Kenya as a major contribution to the dignity, health, welfare, social well-being and prosperity of all Kenyan residents. The policy recognizes that healthy and hygienic behaviour and practices begin with the individual. The implementation of the policy will greatly increase the demand for sanitation, hygiene, food safety, improved housing, use of safe drinking water, waste management, and vector control at the household level, and encourage communities to take responsibility for improving the sanitary conditions of their immediate environment.
5.2.3 **Forest Policy 2005**

The goal of this Policy is to: enhance the contribution of the forest sector in the provision of economic, social and environmental goods and services. The specific objectives of this policy are to:

- Contribute to poverty reduction, employment creation and improvement of livelihoods through sustainable use, conservation and management of forests and trees.
- Contribute to sustainable land use through soil, water and biodiversity conservation, and tree planting through the sustainable management of forests and trees.
- Promote the participation of the private sector, communities and other stakeholders in forest management to conserve water catchment areas, create employment, reduce poverty and ensure the sustainability of the forest sector.
- Promote farm forestry to produce timber, wood fuel and other forest products.
- Promote dry land forestry to produce wood fuel and to supply wood and non-wood forest products.
- Promote forest extension to enable farmers and other forest stakeholders to benefit from forest management approaches and technologies.
- Promote forest research, training and education to ensure a vibrant forest sector.

5.2.4 **Fisheries Policy**

The overall objective of this policy is to: “Create an enabling environment for a vibrant fishing industry based on sustainable resource exploitation providing optimal and sustainable benefits, alleviating poverty, and creating wealth, taking into consideration gender equity.” The specific objectives of this policy are to:

1. Promote responsible and sustainable utilization of fishery resources taking into account environmental concerns;
2. Promote development of responsible and sustainable aquaculture, recreational and ornamental fisheries;
3. Ensure that Kenya has a fair access to, and benefit from, the country’s shared fishery resources;
4. Promote responsible fish handling and preservation measures and technologies to minimize post-harvest losses;
5. Encourage value addition, marketing and fair trade in Kenya’s fishery products worldwide;
6. Encourage efficient and sustainable investment in the Kenya fishery sector;
7. Promote active involvement of fisher communities in fisheries management;
8. Integrate gender issues in fisheries development;
9. Promote fish consumption in the country

5.2.5 **Draft Wildlife Policy 2007-Draft**

The goal of this Policy is to provide a framework for conserving, in perpetuity, Kenya’s rich diversity of species, habitats and ecosystems for the wellbeing of its people and the global community. The objectives and priorities are to:

- Conserve Kenya’s wildlife resources as a national heritage.
- Provide legal and institutional framework for wildlife conservation and management throughout the country.
- Conserve and maintain viable and representative wildlife populations in Kenya.
• Develop protocols methodologies and tools for effective assessment and monitoring of wildlife conservation and management throughout the country.
• Promote partnerships, incentives and benefit sharing to enhance wildlife conservation and management.
• Promote positive attitudes towards wildlife and wildlife conservation and management.

5.2.6 Wetland Policy 2008 Draft
The development of this Policy is in cognizance of the importance of wetlands nationally and Kenya’s obligation under the Ramsar Convention. The policy takes into consideration the broader national environmental frameworks, particularly the Environment Management and Coordination Act (EMCA) 1999, the country’s premier framework environmental law, the Water Act 2002, the Water Policy and the Forest Policy 2007.

The policy spells out clearly eight objectives to achieve its aim. These are;

1. Establish an effective and efficient institutional and legal framework for integrated management and wise use of wetlands which will provide an enabling environment for the participation of all stakeholders.
2. Enhance and maintain functions and values derived from wetlands protect biological diversity and improve essential processes and life-support systems of wetlands.
3. Promote communication, education and public awareness among stakeholders to enhance their participation in wetland conservation.
4. Carry out demand driven research and monitoring on wetlands to improve scientific information and knowledge base.
5. Enhance capacity building within relevant institutions and for personnel involved in conservation and management of wetlands.
6. Establish a national wetlands information management system and database including tools and packages to targeted groups.
7. Promote innovative planning and integrated management approaches towards wetlands conservation and management in Kenya
8. Promote partnership and cooperation at regional and international levels for the management of transboundary wetlands and migratory species

5.3 Relevant Institutions-Environmental

5.3.1 Environmental Assessment Administrative/Institutional framework
There are over 20 institutions and departments, which deal with environmental issues in Kenya. Some of the key institutions include the Ministry of Environment and Water and Natural Resources (MEWR), Kenya Forest Services (KFS), Kenya Wildlife Service (KWS), National Museums of Kenya (NMK), National Environment Management Authority (NEMA), Water Resources Management Authority (WRMA) and the public universities, among other organisations. There are also local and international NGOs involved in environmental issues in Kenya. In 2001, the Government established specific administrative structures to implement the EMCA. The main administrative structures are described in the following sections.

The National Environment Council
The National Environmental Council (the Council) is responsible for policy formulation and directions for the purposes of the Act. The Council also sets national goals and objectives, and determines policies and priorities for the protection of the environment.

The National Environment Management Authority
The responsibility of the National Environmental Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment.

In addition to NEMA, the Act provides for the establishment and enforcement of environmental quality standards to be set by a technical committee of NEMA known as the Standards and Enforcement Review Committee (SERC) which will govern the discharge limits to the environment by the proposed project.

Provincial and District Environmental Committees
The Provincial and District Environmental Committees also contribute to decentralised environmental management and enable the participation of local communities. These environmental committees consist of the following:

i) Representatives from all the ministries;
ii) Representatives from local authorities within the province/district;
iii) Two farmers / pastoral representatives;
iv) Two representatives from NGOs involved in environmental management in the province/district;
v) A representative of each regional development authority in the province/district.

Public Complaints Committee on Environment
The Public Complaints Committee is established under Section 31 of EMCA. The PCC is concerned with the investigation of complaints relating to environmental damage and degradation generally. The PCC has powers to investigate complaints against any person or even against NEMA or on its own motion investigate any suspected case of environmental degradation. The PCC is required by law to submit reports of its findings and recommendations to NEC. The law however is weak in that it does not provide PCC with the mandate to see its recommendations carried through. Further, NEC is not specifically required to do anything with regard to the reports submitted by the PCC and will often note and adopt the same without any further follow up action. So far the PCC has experienced challenges such as failure to honour summons, hostility between parties, hostility directed at PCC investigators, lack of understanding of EMCA and abdication of duty by Lead Agencies.

Standards and Enforcement Review Committee
The Standards and Enforcement Review Committee (SERC) is a committee of NEMA and is established under Section 70 of EMCA. This is a technical Committee responsible for formulation of environmental standards, methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures. The Permanent Secretary under the Minister is the Chairman of the Standard and Enforcement Review Committee.
The members of the SERC are set out in the third schedule to EMCA. They consist of representatives of various relevant government ministries and parastatals that are Lead Agencies as well as those responsible for matters such as economic planning and national development, finance, labour, public works, law and law enforcement, etc. Other members are drawn from public universities, and other government institutions.

**National Environmental Tribunal (NET)**

The NET is established under Section 125 of EMCA for the purpose of hearing appeals from administrative decisions by organs responsible for enforcement of environmental standards. An appeal may be lodged by a project proponent upon denial of an EIA licence or by a local community upon the grant of an EIA licence to a project proponent. NEMA may also refer any matter that involves a point of law or is of unusual importance or complexity to NET for direction. The proceedings of NET are not as stringent as those in a court of law and NET shall not be bound by the rules of evidence as set out in the Evidence Act. Upon the making of an award, NET’s mandate ends there as it does not have the power to enforce its awards. EMCA provides that any person aggrieved by a decision or award of NET may within 30 days appeal to the High Court.

**Land and Environment Court**

The new constitutional dispensation has provided for the creation of land and environment courts for specific handling of land and environmental related disputes and grievances.

### 5.4 International Environmental and Social Management Requirements

Kenya is a signatory to several international treaties and conventions that are relevant to the sectors that the proposed sub projects under the RPLRP. The conventions include among others:

1. United Nations Framework Convention on Climate Change
2. United Nations Convention on Biological Diversity
5. Africa Convention on Conservation of Nature and Natural Resources
6. International Convention for the Prevention of Pollution from Ships
6 DESCRIPTION OF WORLD BANK ENVIRONMENTAL & SOCIAL SAFEGUARDS POLICIES AND TRIGGERS

Table 5 below shows the Banks safeguards policies in general and table 5 highlights the specific safeguards that are triggered as a result of the proposed RPLRP sub projects.

<table>
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<tr>
<th>Policy</th>
<th>Objective</th>
<th>Trigger for the Policy</th>
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<tr>
<td>OP/BP 4.01 Environmental Assessment</td>
<td>The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. This policy is triggered if a project is likely to have potential (adverse) environmental risks and impacts on its area of influence. OP 4.01 covers impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and transboundary and global environment concerns.</td>
<td>Depending on the project, and nature of impacts a range of instruments can be used: EIA, environmental audit, hazard or risk assessment and environmental management plan (EMP). When a project is likely to have sectoral or regional impacts, sectoral or regional EA is required. The Borrower is responsible for carrying out the ESIA.</td>
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<tr>
<td>OP/BP 4.04 Natural Habitats</td>
<td>This policy recognizes that the conservation of natural habitats is essential to safeguard their unique biodiversity and to maintain environmental services and products for human society and for long-term sustainable development. The Bank therefore supports the protection, management, and restoration of natural habitats in its project financing, as well as policy dialogue and economic and sector work. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. Natural habitats are land and water areas where most of the original native plant and animal species are still present. Natural habitats comprise many types of terrestrial, freshwater, coastal, and marine ecosystems. They include areas lightly modified by human activities, but retaining their ecological functions and most native species. This bank policy prohibits financing for developments that would significantly convert or degrade critical natural habitats, and preference is on siting projects on already converted land.</td>
<td>This policy is triggered by any project (including any sub-project under a sector investment or financial intermediary) with the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project).</td>
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<tr>
<td>OP/BP 4.36 Forests</td>
<td>The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. Where forest restoration and plantation development are necessary to meet these objectives, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank assists borrowers with the establishment of environmentally appropriate, socially</td>
<td>This policy is triggered whenever any Bank-financed investment project (i) has the potential to have impacts on the health and quality of forests or the rights and welfare of people and their level of dependence upon or interaction with forests; or (ii) aims to bring about changes in the management, protection or utilization of natural forests or plantations.</td>
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| **Final RPLRP Environmental and Social Management Framework - ESMF**
<p>| <strong>OP 4.09 Pest Management</strong> | The objective of this policy is to (i) promote the use of biological or environmental control and reduce reliance on synthetic chemical pesticides; and (ii) strengthen the capacity of the country’s regulatory framework and institutions to promote and support safe, effective and environmentally sound pest management. More specifically, the policy aims to (a) Ascertain that pest management activities in Bank-financed operations are based on integrated approaches and seek to reduce reliance on synthetic chemical pesticides (Integrated Pest Management (IPM) in agricultural projects and Integrated Vector Management (IVM) in public health projects. (b) Ensure that health and environmental hazards associated with pest management, especially the use of pesticides are minimized and can be properly managed by the user. (c) As necessary, support policy reform and institutional capacity development to (i) enhance implementation of IPM-based pest management and (ii) regulate and monitor the distribution and use of pesticides. | The policy is triggered if: (i) procurement of pesticides or pesticide application equipment is envisaged (either directly through the project, or indirectly through on-lending, co-financing, or government counterpart funding); (ii) the project may affect pest management in a way that harm could be done, even though the project is not envisaged to procure pesticides. This includes projects that may (i) lead to substantially increased pesticide use and subsequent increase in health and environmental risk; (ii) maintain or expand present pest management practices that are unsustainable, not based on an IPM approach, and/or pose significant health or environmental risks. |
| <strong>OP/BP 4.11 Physical Cultural Resources</strong> | The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources. For purposes of this policy, “physical cultural resources” are defined as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above ground, underground, or underwater. The cultural interest may be at the local, provincial or national level, or within the international community. This policy applies to all projects requiring a Category B Environmental Assessment under OP 4.01, project located in, or in the vicinity of, recognized cultural heritage sites, and projects designed to support the management or conservation of physical cultural resources. | |
| <strong>OP/BP 4.10 Indigenous Peoples</strong> | The objective of this policy is to (i) ensure that the development process fosters full respect for the dignity, human rights, and cultural uniqueness of indigenous peoples; (ii) ensure that adverse effects during the development process are avoided, or if not feasible, ensure that these are minimized, mitigated or compensated; and (iii) ensure that indigenous peoples receive culturally appropriate and gender and inter-generationally inclusive social and economic benefits. The policy requires free, prior and informed consultation with indigenous peoples. | The policy is triggered when the project affects the indigenous peoples (with characteristics described in OP 4.10 para 4) in the project area. |
| <strong>OP/BP 4.12 Involuntary Resettlement</strong> | The objective of this policy is to (i) avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; (ii) assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them; (iii) encourage community | This policy covers not only physical relocation, but any loss of land or other assets resulting in: (i) relocation or loss of shelter; (ii) loss of assets or access to assets; (iii) loss of income sources or means of livelihood, |</p>
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<td>OP/BP 4.37 Safety of Dams</td>
<td>The objectives of this policy are as follows: For new dams, to ensure that experienced and competent professionals design and supervise construction; the borrower adopts and implements dam safety measures for the dam and associated works. For existing dams, to ensure that any dam that can influence the performance of the project is identified, a dam safety assessment is carried out, and necessary additional dam safety measures and remedial work are implemented.</td>
<td>This policy is triggered when the Bank finances: (i) a project involving construction of a large dam (15 m or higher) or a high hazard dam; and (ii) a project which is dependent on an existing dam. For small dams, generic dam safety measures designed by qualified engineers are usually adequate. Dams with ≥15m in height review by an independent dam safety panel is required.</td>
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<tr>
<td>OP 7.50 Projects in International Waters</td>
<td>The objective of this policy is to ensure that Bank-financed projects affecting international waterways would not affect: (i) relations between the Bank and its borrowers and between states (whether members of the Bank or not); and (ii) the efficient utilization and protection of international waterways. The policy applies to the following types of projects: (a) Hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, industrial and similar projects that involve the use or potential pollution of international waterways; and (b) Detailed design and engineering studies of projects under (a) above, include those carried out by the Bank as executing agency or in any other capacity.</td>
<td>This policy is triggered if (a) any river, canal, lake or similar body of water that forms a boundary between, or any river or body of surface water that flows through two or more states, whether Bank members or not; (b) any tributary or other body of surface water that is a component of any waterway described under (a); and (c) any bay, gulf strait, or channel bounded by two or more states, or if within one state recognized as a necessary channel of communication between the open sea and other states, and any river flowing into such waters.</td>
</tr>
<tr>
<td>OP 7.60 Projects in Disputed Areas</td>
<td>The objective of this policy is to ensure that projects in disputed areas are dealt with at the earliest possible stage: (a) so as not to affect relations between the Bank and its member countries; (b) so as not to affect relations between the borrower and neighboring countries; and (c) so as not to prejudice the position of either the Bank or the countries concerned.</td>
<td>This policy is triggered if the proposed project will be in a “disputed area”. Questions to be answered include: Is the borrower involved in any disputes over an area with any of its neighbors. Is the project situated in a disputed area? Could any component financed or likely to be financed as part of the project be situated in a disputed area?</td>
</tr>
<tr>
<td>The WB Group Environment, Health and Safety Guidelines.</td>
<td>The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. The guidelines include: - Environment - Air Emissions and Ambient Air Quality - Energy Conservation</td>
<td>These guidelines will be followed during the preparation of mitigation measures. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures...</td>
</tr>
</tbody>
</table>
6.1 **World Bank’s Safeguards likely to be triggered by RPLRP**

The RPLRP is an ASAL based project and expected to have project investments in 14 out of the 22 Counties in Kenya categorised as ASAL for as long as the selected sites are feasible in terms of water development. However, the likely or potential locations of the proposed investments are unknown at this point in time.

Components 1, 2, 3 and 4 of the RPLRP are expected to trigger OPs 4.01 (Environmental Assessment), 4.12 (Involuntary Resettlement), 4.10 (Indigenous People), 4.04 (Natural Habitats), 4.11 (Physical Cultural Resources), and 4.09 (Pest Management). The safeguards instruments prepared for any sub projects will address the requirements of any applicable policies.

<table>
<thead>
<tr>
<th>Safeguard Policies Triggered by the Project(For the Moment)</th>
<th>Yes</th>
<th>Reasons For Triggers</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Assessment (OP/BP 4.01)</td>
<td>X</td>
<td>Sub projects are likely to have potential adverse environmental impacts</td>
<td></td>
</tr>
<tr>
<td>Natural Habitats (OP/BP 4.04)</td>
<td>X</td>
<td>Sub projects may be located in or close to areas with natural unique flora and fauna, described in Chapter 4 above.</td>
<td></td>
</tr>
<tr>
<td>Pest Management (OP 4.09)</td>
<td>X</td>
<td>Sub projects in irrigation for agriculture purposes including fodder production may employ the use of pesticides or may indirectly result in increased pesticide usage. Livestock health management may also involve use of pesticides. A Pest Management Plan to guide subproject implementation is provided in Annex G.</td>
<td></td>
</tr>
<tr>
<td>Involuntary Resettlement (OP/BP 4.12)</td>
<td>X</td>
<td>Sub projects may involve land take for construction purposes including livestock markets, crushes, irrigation schemes, holding grounds, quarantine zones, etc. A Resettlement Policy Framework was developed for this project as a stand-alone document.</td>
<td></td>
</tr>
</tbody>
</table>
### Environmental Safeguards

This policy requires Environmental Assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. The EA is a process whose breadth, depth, and type of analysis will depend on the nature, scale, and potential environmental impact of the proposed investments under the RPLRP. The EA process takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and cultural property) and trans-boundary and global environmental aspects.

The adverse environmental and social impacts under RPLRP will come from the proposed sub projects and associated activities. However, since the exact location of these investments will not be identified before bank appraisal of the project, the Banks’ EA policy calls for the GoK to prepare an Environmental and Social Management Framework (ESMF) in accordance with its’ procedures.

OP 4.01 is triggered because the RPLRP will finance civil works projects including the rehabilitation and refurbishment of existing infrastructure, as well as the construction of new livestock management related infrastructure. This ESMF establishes a mechanism to determine and assess future potential environmental and social impacts during implementation of RPLRP activities, and sets out mitigation, monitoring and institutional

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*By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas.*
measures to be taken during operations of these activities, to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels.

In regard to disclosure of the ESMF report, World Bank requires that the report be disclosed as a separate document as a condition for Bank appraisal. This report will be disclosed to the general public to meet this requirement as well as the Infoshop of the World Bank and the date of disclosure will precede the date for appraisal of the program. The World Bank system assigns a project to one of three project categories, as defined below:

The extent and type of environmental and social assessment required by the World Bank is a function of the project's environmental impact and hence, its environmental screening category. The World Bank undertakes environmental and social screening of each proposed subproject to determine the appropriate extent and type of environmental and social assessment. The World Bank classifies projects into one of three categories (A, B and C), depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

Table 7. World Bank EA Screening Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category “A”</strong></td>
<td>An EIA is always required for projects that are in this category. Impacts are expected to be ‘adverse, sensitive, irreversible and diverse with attributes such as pollutant discharges large enough to cause degradation of air, water, or soil; large-scale physical disturbance of the site or surroundings; extraction, consumption or conversion of substantial amounts of forests and other natural resources; measurable modification of hydrological cycles; use of hazardous materials in more than incidental quantities; and involuntary displacement of people and other significant social disturbances. This project will not include any Category A investments.</td>
</tr>
<tr>
<td><strong>Category B</strong></td>
<td>When the subproject’s adverse environmental impacts on human populations or environmentally important areas (including wetlands, forests, grasslands, and other natural habitats) are less adverse than those of Category A subprojects. Impacts are site – specific; few, if any, of the impacts are irreversible; and in most cases, mitigation measures can be designed more readily than for Category A subprojects. The scope of environmental assessment for a Category B subproject may vary from sub-project to sub-project, but it is narrower than that of a Category A sub-project. It examines the subproject’s potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.</td>
</tr>
<tr>
<td><strong>Category C</strong></td>
<td>If the subproject is likely to have minimal or no adverse environmental impacts. Beyond screening, no further environmental assessment action is required for a Category C sub-project.</td>
</tr>
</tbody>
</table>

The RPLRP is rated as Category B. The EA for a Category B project examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the "without project" scenario), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. For a Category B project, the borrower is responsible for preparing a report, normally an Environmental and Social Impact Assessment (or a suitably comprehensive regional or sectoral EA).

All projects in this RPLRP will be subjected to mandatory screening to determine whether they require further environmental analysis or otherwise.
The RPLRP triggers other safeguard policies alongside this ESMF and thus the other related safeguard instruments have been prepared for this project. During the screening process of sub projects if identified as a requirement, a Resettlement Action Plan, Integrated Pest Management Plan, Vulnerable and Marginalised Groups Plan and/or a Physical Cultural Resources Management Plan or a combination of these, will be prepared alongside the Environmental and Social Management Plan (ESMP) as an integrated part of the overall sub project management plan for the specific sub projects.

**Dam Safety:** The project anticipates constructing and rehabilitating valley dams for watering animals. Such infrastructure will not trigger OP 4.37 on Safety of Dams, as there are no downstream safety implications that have been identified during project screening. The proposed infrastructure does not include large dams or dams that will become large during the operation phase. To assist the project with generic safety measures of such valley dams, the FAO Manual on small Earth Dams\(^{1}\) will be used to assist the project teams and stakeholders.

**Pest Management:** Integrated Pest Management Plans (IPMPs) will be required for each sub project screened and confirmed that it will lead to increased pesticide use especially the irrigation related investments and this is in line with the OP 4.09 for pest management. The proposed sub projects that are likely to use pesticides will have to list all the pesticide products authorised for procurement and they should be products registered by the Pesticide Control and Product Board of Kenya (PCPBK). The Pest Management Plan has been provided in Annex G of this document.

**Physical Cultural Resources:** It is important that the ESIA also include identify the process for addressing impacts on cultural property. Measures will need to be integrated into the ESMP to address the following areas:

- Avoidance or mitigation of identified adverse impacts;
- Provisions for chance finds;
- Preparation, as appropriate, of a physical cultural resources management plan consistent with the overall policy framework and national legislation, taking into account institutional capabilities;
- Measures for strengthening institutional capacity; and
- Monitoring systems to track progress of these activities.

**Natural Habitats:** OP 4.04 is triggered due to the fact that sub projects may be situated in or around sensitive ecological areas of the ASALs in the Counties like the wetlands, forest etc., as described in Chapter 4 of this ESMF. Compliance will be handled through this ESMF and site specific ESIAs.

6.1.2 Social Safeguards

Vulnerable and Marginalizes Groups Plan: This plan will be an integral part of the ESMP especially on socio-economic aspects and is necessary because the RPLRP triggers the OP 4.10. A VMGF has been developed as a separate safeguard instrument for this project and contains a VMGP that will have to be prepared for each proposed sub project in an event that marginalised and vulnerable persons are located in the investment project site. The VMGF has been disclosed in Kenya and in the World Bank InfoShop.

Involuntary Resettlement: The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative project designs, to avoid resettlement. This policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts.

This policy covers direct economic and social impacts that both result from Bank-assisted investment projects, and are caused by (a) the involuntary taking of land resulting in (i) relocation or loss of shelter; (ii) loss of assets or access to assets, or (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or (b) the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to project appraisal of proposed projects. The main objective of this policy is to (i) avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; and (ii) assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them; and (iv) provide assistance to affected people regardless of the legality of land tenure.

The policy requires the displaced persons and their communities, and any host communities receiving them, are provided timely and relevant information, consulted on resettlement options, and offered opportunities to participate in planning, implementing, and monitoring resettlement; and appropriate and accessible grievances mechanisms are established for these groups. In new resettlement sites or host communities, infrastructure and public services are provided as necessary to improve, restore, or maintain accessibility and levels of service for the displaced persons and host communities.

A Resettlement Policy Framework (RPF) has been prepared that establishes standards and procedures for the preparation of Resettlement Action Plans (RAPs), as required. For individual investments/subproject the RAP will be prepared when a project activity, in the cases mentioned above, for example, causes the involuntary taking of land and other assets resulting in:

1) Relocation or loss of shelter,
2) *Loss of assets or access to assets,*
3) *Loss of income sources or means of livelihood, whether or not the affected persons must move to another location,*
4) *Loss of land,*

A Resettlement Policy Framework has been prepared for the RPLRP principally because the envisaged sub projects may involve land acquisition and or restriction of access to existing infrastructure. The RPF will guide preparation of Resettlement Action Plans (RAPs), where required.

### 6.2 Alignment of WB and GOK Policies relevant to this ESMF

Both the World Bank safeguards policies and GoK laws are generally aligned in principle and objective:

- *Both require screening of sub project investments in order to determine if further environmental analysis (ESIAs) is needed.*
- *Both require ESIA before project design and implementation (which also includes an assessment of social impacts).*
- *Both require public disclosure of ESIA reports.*
- *EMCA recognizes other sectoral laws while WB has safeguards for specific interests.*
- *The Bank requires that stakeholder consultations be undertaken during planning, implementation and operation phases of the project, which is equivalent to the EMCA requirements.*
- *Additionally, statutory annual environmental audits are required by EMCA.*
- *The national provisions for the management of resettlement related issues are not as fully developed and therefore not at par with the World Bank safeguard policy requirements. Thus, it is expected that the WB OP 4.12 will be mostly applied under the RPLRP Programme and a separate document to guide the process, i.e. a Resettlement Policy Framework (RPF) document will be prepared as a standalone report to support the social management and acceptability of the projects.*

In Kenya, it is a mandatory requirement under EMCA 1999 for all proposed development projects to be preceded by an ESIA study. However, prior to developing an ESIA, a project proponent is required to prepare a project report to aid NEMA in making a determination whether a full scale ESIA is necessary or not. Thus, under the laws of Kenya, environmental assessment is fully mainstreamed in all development process and starts with a screening process, which is consistent with World Bank safeguard policies on EA that calls for mandatory screening as well to determine the rating category and the required follow up actions.

Project reports will be prepared for all the sub project investments under the RPLRP to determine if they require a full scale ESIA. Further, in order to fully insure against triggers to WB safeguard policies, individual investments will be screened against each policy as part of the EA process.
6.3 **Requirements for Public Disclosure**

Prior to appraisal of the RPLRP, this ESMF will be disclosed in country through posting on the Ministry of Agriculture, Livestock and Fisheries (MALF) website [www.malf.go.ke](http://www.malf.go.ke) as well as in the Bank’s Infoshop. If there are any changes, a final version will be disclosed in the same manner to be accessible to all project stakeholders.
7 DETERMINATION OF POTENTIAL ENVIRONMENT AND SOCIAL IMPACTS

This chapter analyses the potential positive (beneficial) and negative (adverse) environmental consequences of the sub project investments envisioned under the RPLRP.

7.1 Potential Adverse Impacts

The potential adverse environmental and social impacts of the RPLRP are numerous and this ESMF highlights these impacts which are broad and cross cutting across most of the envisaged investments projects. However, the specific adverse impacts for each investment will be distinguished during the preparation of the specific ESIA or ESMP based on the sub project investment environmental category once the screening process is complete.

Describing a potential impact involves an appraisal of its characteristics, together with the attributes of the receiving environment. Relevant impact characteristics include whether the impact is:

- Adverse or beneficial;
- Direct or indirect;
- Short, medium, or long-term in duration; and permanent or temporary;
- Affecting a local, regional or global scale; including trans-boundary; and
- Cumulative: a cumulative impact is “the impact on the environment which result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions”.

Consideration of the above will give a sense of the relative magnitude of the impact. The sensitivity of the receiving environment will be determined based on the baseline data collected during the ESIA.

Impact significance for planned project activities - The purpose of impact assessment is to assign relative significance to the predicted impacts associated with the project, and thus determines the order in which impacts are to be avoided, mitigated or compensated. By considering the combination of the magnitude of impact and the sensitivity of the receiving environment, the significance of the potential impact is derived. The determination of significance of an impact is largely subjective and primarily based on professional judgment. Key elements for assessing impact significance include:

- Level of public concern (particularly over health and safety);
- Scientific and professional judgment;
- Disturbance/disruption of valued ecological systems;
- Degree of negative impact on social values and quality of life; and
• Public perception versus the scientific/professional opinion of the risks/benefits involved.

To provide a relative significance of different impacts, it is useful to assign numerical descriptors to the impact magnitude and receptor sensitivity for each potential impact. Each impact will be assigned a numerical descriptor of 1, 2, 3, or 4, equivalent to very low, low, medium or high. The significance of impact will then be indicated by the product of the two numerical descriptors, with significance being described as negligible, minor, moderate or major. This qualitative method is designed to provide a broad ranking of the different impacts of a project.

**Table 7: Determination of Impact Significance**

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Very low -1</th>
<th>Low - 2</th>
<th>Medium -3</th>
<th>High -4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very minor</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Minor</td>
<td>2 Minor</td>
<td>4 Minor</td>
<td>6 Moderate</td>
<td>8 Moderate</td>
</tr>
<tr>
<td>Moderate</td>
<td>3 Minor</td>
<td>6 Minor</td>
<td>9 Moderate</td>
<td>12 Major</td>
</tr>
<tr>
<td>Major</td>
<td>4 Minor</td>
<td>8 Minor</td>
<td>12 Major</td>
<td>16 Major</td>
</tr>
</tbody>
</table>

**7.2 Environmental & Social Management Process**

This ESMF contains potential mitigation measures and monitoring indicators through which the adverse impacts for specific sub project investments may be managed. However, each sub project investment will have to prepare an ESIA/ESMP. The ESIA/ESMP for each sub project should at a very minimum contains among others:-

• *Description of the possible adverse effects that the ESIA/ESMP is intended to address;*
• *Identification of project design alternatives that would meet similar objectives, and a description of why these projects are not viable, especially if they have a lesser environmental or social impact;*
• *Description of planned mitigation measures, and how and when they will be implemented*
• *Program for monitoring the environmental and social impacts of the project, both positive and negative;*
• *Description of who will be responsible for implementing the ESIA/ESMP; and*
• *Cost estimate and source of funds.*
7.2.1 Mitigation considerations and options
All moderate to major adverse impacts are considered for mitigation. Specific measures have been suggested in this regard where practicable. With regard to negligible and minor impacts where the project activity is not expected to cause any significant impact in such cases, best practice measures and mitigation have also been recommended where appropriate to improve the environmental and social performance of the Project. The mitigation options considered may include project modification, provision of alternatives, project timing, pollution control, compensations and relocation assistance. In cases where the effectiveness of the mitigation is uncertain, monitoring programs are introduced.

7.2.2 Recommended mitigation measures
The mitigation measures or guidelines have been designed in order to avoid, minimize and reduce negative environmental and social impacts at the project level. The mitigation measures are presented in the following tables in a descriptive format.

Table 8: Summary of Potential Subproject Impacts and Mitigations

<table>
<thead>
<tr>
<th>SLAUGHTERHOUSE PROJECTS</th>
<th>Project Activity</th>
<th>Aspects or impact Identification</th>
<th>Impact Description</th>
<th>Impact Magnitude</th>
<th>Severity</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation</td>
<td>Dust</td>
<td>Contribute to air pollution directly and indirectly as synergists or carriers of other pollutants. Can affect health and local ecosystem.</td>
<td>4</td>
<td>2</td>
<td>Spraying water during the excavation phase</td>
<td></td>
</tr>
<tr>
<td>Vehicular Emissions</td>
<td></td>
<td>Emissions of VOCs, NOx, SOx, CO₂ and particulate matter to atmosphere and thus contribute to air pollution, greenhouse gas production and global warming.</td>
<td>4</td>
<td>2</td>
<td>Reducing number of trips and frequency of operation of the vehicles</td>
<td></td>
</tr>
<tr>
<td>Soil Disturbance</td>
<td></td>
<td>Heavy machinery used will cause soil compaction.</td>
<td>2</td>
<td>4</td>
<td>Limiting the excavation area</td>
<td></td>
</tr>
<tr>
<td>Destruction of plant cover</td>
<td></td>
<td>Plant cover present at the site will be removed leading to increased soil erosion.</td>
<td>1</td>
<td>4</td>
<td>Tree planting and landscaping (with indigenous plant species) to reduce soil erosion.</td>
<td></td>
</tr>
<tr>
<td>Disposal of excavated materials</td>
<td></td>
<td>The excavated material will be used for landscaping, construction and deep rooted tree planting</td>
<td>2</td>
<td>4</td>
<td>Soil/clay reused for improving degraded agricultural soils.</td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td></td>
<td>Excessive or prolonged exposure to noise (typically more than 8 hrs above 85-90 decibels) leads to hearing loss. This can affect the workers on site.</td>
<td>3</td>
<td>3</td>
<td>Reduction of the frequency of noisy operation</td>
<td></td>
</tr>
<tr>
<td>Levelling</td>
<td>Dust</td>
<td>Contribute to air pollution directly and indirectly as synergists or carriers of other pollutants. It can affect</td>
<td>2</td>
<td>1</td>
<td>Spraying water while working</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Impact</td>
<td>Measure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle Emissions</td>
<td>Emissions of VOCs, NOx, SOx, CO₂ and particulate matter to the atmosphere and thus contribute to air pollution, greenhouse gas production and global warming.</td>
<td>Reducing number of trips, and frequency of operation of the vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Disturbance</td>
<td>Heavy machinery used will cause soil compaction.</td>
<td>Limit leveling area.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete Work</td>
<td>Solid waste Disposal</td>
<td>Concrete waste, carton, bags, wood, trees etc.</td>
<td>All waste material should be transferred to an approved dump site upon agreement with Local Authorities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workers’ Safety</td>
<td>Risk of accidents and injuries</td>
<td>Follow safety instructions, workers should wear proper clothing and PPE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>Excessive or prolonged exposure to noise (typically more than 8 hrs above 85-90 decibels) leads to hearing loss, which is not the case here. This will affect the workers on site.</td>
<td>Reduction of the frequency of noisy operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electro-Mechanical Work</td>
<td>Energy Consumption</td>
<td>Combustion of fuel leads to emissions of VOCs, NOx, SOx, CO₂ and thus air pollution, acidification, greenhouse gas production, and global warming.</td>
<td>Regular testing of the air quality, due to different kinds of emissions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid waste Disposal</td>
<td>Carton boxes, bags, metal, wood, etc.</td>
<td>All waste material should be transferred to an approved dump site.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>Excess noise at the construction site cause disturbance on the wildlife</td>
<td>Minimize the unnecessary use of vehicles and equipment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Public Health</td>
<td>Potential of farmers slaughtering sick animals unfit for human consumption.</td>
<td>Put in place inspection facilities as part of slaughterhouse to enable testing of meat by Veterinary officials.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Waste Disposal</td>
<td>Wastewater from slaughterhouses tends to have high BOD levels and can contaminate surface water.</td>
<td>Pretreatment before discharge.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### REHABILITATION AND OPERATION OF CATTLE MARKETS

<table>
<thead>
<tr>
<th>Project Activity</th>
<th>Aspects or Impact Identification</th>
<th>Impact Description</th>
<th>Impact Magnitude</th>
<th>Severity</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth works and clearings</td>
<td></td>
<td>Soil erosion and loss of vegetation implications are likely to be generated</td>
<td>2</td>
<td>2</td>
<td>Restricting works to designated areas; Planting of vegetation on open/cleared surfaces</td>
</tr>
<tr>
<td>Earth works and clearings</td>
<td></td>
<td>Sedimentation of streams and water bodies.</td>
<td>1</td>
<td>2</td>
<td>Placement of gabions to check erosion and transportation of loose materials downstream</td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td>Generation of hazardous waste</td>
<td>2</td>
<td>4</td>
<td>Licenced contractor for disposal</td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td>Potential of fires</td>
<td>2</td>
<td>2</td>
<td>Put in place and always service fire extinguishers</td>
</tr>
</tbody>
</table>

### PESTICIDE AND ACARICIDE STORAGE AND USE

<table>
<thead>
<tr>
<th>Project Activity</th>
<th>Aspects or Impact Identification</th>
<th>Impact Description</th>
<th>Impact Magnitude</th>
<th>Severity</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccination and Spraying or Dipping of Cattle</td>
<td>Key issues include storage and use of acaricides and disposal of empty containers</td>
<td>Potential for poisonings due to accidental consumption especially by children. Public health due to potential use of empty container for water collection. Biodiversity loss associated with misuse of acaricides and pesticides.</td>
<td>3</td>
<td>4</td>
<td>Storage, application and general handling of agro-chemicals to be based on best international practices. Procure PPE for livestock farmers. Conduct awareness training for farmers on safe use and storage of pesticides.</td>
</tr>
</tbody>
</table>

### SOCIAL AND CULTURAL ISSUES

<table>
<thead>
<tr>
<th>Project Activity</th>
<th>Aspects or Impact Identification</th>
<th>Impact Description</th>
<th>Impact Magnitude</th>
<th>Severity</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Physical Cultural Impacts</td>
<td>There are existing PCRs in the project areas that could be impacted during construction of the different infrastructure.</td>
<td>2</td>
<td>3</td>
<td>Follow the Chance Find Procedure annexed to this report.</td>
</tr>
<tr>
<td>Slaughterhouses</td>
<td>Religious requirements</td>
<td>Muslim community requires slaughter of animals by a practicing Muslim.</td>
<td>2</td>
<td>2</td>
<td>Put in place requirement for all slaughterhouses to have a Muslim to slaughter all animals for public</td>
</tr>
</tbody>
</table>

Potential of unsafe handling of condemned meat which can transmit livestock diseases to humans. Avail land for safe disposal of condemned meat by burial as per best practices.
### Operation | HIV/AIDS Concerns | Influx of people to area especially new farm workers. Possible prostitution and irresponsible sex behavior | 3 | 4 | HIV/AIDS sensitization and awareness as well as provision of condoms. Also regular visits home for the imported labor.  
---|---|---|---|---|---  
### Operation | Potential Conflicts over grazing lands and water points. | It is common for pastoralists to fight over grazing land and watering points. The problem if already existing may exacerbate after rehabilitation of abandoned infrastructure. | 4 | 4 | Clear demarcations of grazing areas and water points for different pastoral ethnic groups. Put in place local management structures for the different infrastructure. Ongoing capacity building and sensitization programs with involvement of the local government.  
### Operation | Health and Safety. | Pastoralists may get exposed to pesticides and acaricides during storage and use. | 2 | 3 | Provide and supervise use of PPEs by the farmers. Provide conditions and training on procurement, safe storage, use, and disposal of empty containers.  

### 7.3 Monitoring Plans and Indicators

#### 7.3.1 Monitoring of Environmental and Social Indicators

The goal of monitoring is to measure the success rate of the project, determine whether interventions have resulted in dealing with negative impacts, whether further interventions are needed or monitoring is to be extended in some areas. Monitoring indicators will be very much dependent on specific project contexts.

**Monitoring Levels-Overall Project Level**

The MALF will be responsible for monitoring and reporting on compliance with the ESMF. MALF through the RPLRP/PCU will ensure that sub projects are screened, their safeguard instruments prepared, cleared and disclosed prior to sub project approval.

Further, MALF/RPLRP/PCU will ensure that contractors implement the specific sub project ESIA/ESMP, and submit reports on ESIA/ESMP implementation as required.
Monitoring and surveillance of the entire sub projects will be undertaken by the RPLRP/PCU established for the project. The RPLRP/PCU will report results of this monitoring to the Bank. In appreciation of the fact that it would be impossible to visit or monitor all sub project investments to be financed under the project, “spot checks” may be undertaken by the RPLRP/PCU but no investment will be ignored in this high level monitoring.

**Bank’s Monitoring Support**

The Bank will provide the second line of monitoring compliance and commitments made in the ESIA/ESMP through supervision albeit in a less frequent manner and detail as compared to the first line of monitoring that will be undertaken by the RPLRP/PCU. The bank will further undertake monitoring during its scheduled project supervision missions.

RPLRP/PCU will prepare monitoring reports and consolidate and summarise these reports and submit to the Bank as part of its reporting to the Bank and the Bank supervision missions will review these reports and provide feedback.

**Sub Project Level Monitoring**

The second level of monitoring will be at the sub project level where the safeguard instruments for sub project will and must include a monitoring plan for which the RPLRP will be responsible for ensuring that monitoring is carried out. Each sub project will set up an implementation unit solely responsible for executing the project and which will include responsibility for monitoring and reporting all the elements in the ESIA/ESMP on day to day or periodically as specified in the monitoring plan. The sub project level monitoring reports will be submitted to the environmental safeguards specialist at the RPLRP/PCU for review and analysis. The higher level monitoring at the PCU level will check to see that executing agencies are doing this.

All sub project investments will be subject to mandatory annual environmental audit/supervision to ensure that they comply with national requirements by EMCA.

**Table 10: Monitoring indicator**

<table>
<thead>
<tr>
<th>Monitoring Level</th>
<th>Monitoring Issue</th>
<th>Verifiable Indicators</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESMF Level</td>
<td>Adequate dissemination of ESMF and RPF to stakeholders Capacity building and training programs</td>
<td>Record of consultations and meetings; Workshop reports.</td>
<td>MALF, Consultants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MALF, Consultants</td>
</tr>
<tr>
<td>Project Investment Level</td>
<td>Preparation of environmental and social impact assessment report Environmental permitting</td>
<td>Independent consultants hired to prepare ESIA and/ RAP documents Environmental Permits for sub projects Environmental Management Plans,</td>
<td>Line Ministries, Consultants Investor, Line Ministries, NEMA</td>
</tr>
<tr>
<td>Monitoring and evaluation</td>
<td>Monitoring Reports, Annual Environmental Reports</td>
<td>Investor, Line Ministries, NEMA</td>
<td></td>
</tr>
</tbody>
</table>
7.4 Monitoring Roles and Responsibilities

7.4.1 National Environment Management Authority (NEMA)
The EMCA places the responsibility of environmental protection on NEMA as the coordinating agency. NEMA is charged with the overall role of providing oversight in regard to monitoring for all project activities that have potential impacts on the environment in Kenya. NEMA will undertake periodic monitoring of the investment projects by making regular site inspection visits to determine compliance with the investment projects ESIA approved and will further rely on the submitted annual audit reports submitted for each investment project annually as required by EMCA as a way of monitoring. NEMA will provide approvals and ESIA licence to all the investments based on the ESIA reports submitted, without NEMA’s approval implementation of the investment project will not move forward. All monitoring reports as well as annual environmental audit report will be submitted to NEMA as specified by the environmental assessment and audit regulations.

7.4.2 RPLRP/PCU - Environmental and Social Specialist
The RPLRP/PPT will recruit environmental and social safeguard specialists who will provide oversight, screening of sub projects, and preparation of ToRs for ESIA, facilitation, coordination, review of ESIA, monitoring and evaluation of all the sub projects.

The environmental and social specialists based at the RPLRP/PCU will submit quarterly monitoring reports of all active investments under implementation to the RPLRP/PCU Coordinator who will then submit these reports to the World Bank.
8 PROJECT REVIEW, COORDINATION & IMPLEMENTATION ARRANGEMENTS

8.1 Sub Project Investment Review

The Environmental Management and Coordination Act (EMCA) require that all projects be subjected to a review and screening process in order to determine whether a full scale ESIA is necessary or otherwise. This is done through preparation of a sub project report, which will be prepared by the RPLRP/PCU for each sub project. Each sub project will need to be reviewed independently for potential environmental and social impacts. In cases where a full scale ESIA is required, it will be paramount that the feasibility studies occur concurrent with the ESIA study in order to ensure that the findings of the ESIA are incorporated in the feasibility study at the design stage. This will ensure that environmental sound design including proposed mitigation measures as well as alternatives are incorporated in the feasibility reports at the design stage hence avoiding design change at an advanced stage.

The RPLRP has been rated as category B this requires an ESIA which must be conducted parallel to the feasibility studies to ensure that the findings of the ESIA are incorporated in the feasibility study at the design stage. The Environmental Management and Coordination Act (EMCA) require that all sub projects be subjected to a review and screening process in order to determine whether an ESIA is necessary or otherwise. Sub projects will each need to be reviewed independently for potential environmental and social impacts.

A completed appraisal package comprises all of the results of the ESIA procedures in order to permit a full environmental review. If the World Bank determines that the appraisal package is not complete because the environmental procedures have not been completed, or because after further review it is discovered that the information provided earlier for the screening procedures was incorrect or misleading and that further information is required, the appraisal package will be deemed incomplete and the Task Manager will promptly notify the applicant of the deficiencies.

No RPLRP support will be provided until (i) the applicant has presented the WB with a certified copy of the positive conclusion of the relevant national authority or - as the case may be - the World Bank determines that no further environmental review is required, and (ii) the World Bank has reviewed and cleared the environmental documentation and issued its formal no objection.

Consultation and Disclosure Requirements: In addition to the environmental documentation requirements described above, World Bank Operational Policy 4.01 (paragraphs 15 and 16), and the WB Policy on Access to Information stipulates that the following consultation and disclosure requirements be utilized for all Category B sub projects:
During the EA process, the applicant shall consult groups affected by the subproject and local NGOs about the subproject’s environmental aspects and take their views into account. The applicant shall initiate such consultations as early as possible. Consultations with stakeholders should take place only once after a draft EA report is prepared. In addition, the applicant shall consult with such groups throughout project implementation as necessary to address EA-related issues that affect them.

For meaningful consultations, the applicant shall apply the following disclosure requirements:

- The applicant shall provide relevant material in English and/or the local language (as appropriate) in a timely manner prior to consultation;

- The applicant shall make the draft ESIA report including a detailed summary of the ESIA’s conclusions available at a public place accessible to groups affected by the subproject and local NGOs.

8.1.1 Screening and investment project preparation

Screening of investments will commence right at the project inception phase as soon as the specific sub project details are known including nature and scope, proposed location and area among other parameters. Screening is expected to happen concurrently with the project specific feasibility studies so that any potential impacts identified through screening are immediately incorporated into the feasibility study hence ensuring that environmental sound design of the sub projects occurs right at the project design phase.

The screening process could result in any of the following determination;

1. ESIA
2. A stand-alone ESMP or
3. No further environmental study

8.1.2 Who prepares a screening checklist?

NEMA is the institution designated to make a decision on whether a full scale ESIA is necessary for proposed investments or otherwise. To make this determination, a project report must be submitted to NEMA in order to make a determination and this is part of the screening. The project/screening report will be prepared by RPLRP/PCU on behalf of the executing agencies of the RPLRP in the individual institutions and then submitted to the NEMA for further determination.

The Bank also requires that sub project investments are screened in order to make a determination as to whether a full scale ESIA, a standalone ESMP or no further environmental studies are needed for investments. In order to blend the requirements of the bank and that of NEMA, the screening will be done and submitted to the bank and NEMA respectively. In the event that both NEMA and the bank recommend for a full scale ESIA then the same will be prepared.

However, bearing in mind that the Bank will never recommend a less stringent environmental study than NEMA, even if NEMA could do so according to its own policies, but (b) recognizing that the Bank may require a more stringent study than
NEMA does and if so, that more stringent requirement will apply to the sub project concerned.

This implies that even if the screening is done to meet the bank requirements and a decision is made that an ESMP alone is sufficient by the Bank, the Bank will still expect that the executing agency for the sub project prepare an ESIA if NEMA directs so. On the other hand, if NEMA determines that no ESIA is required following screening and submission of project report, and the Bank feels that project requires an ESIA, then the sub project executing agency will need to prepare the same to satisfy and get approval for the sub project from the Bank.

Format 1.0: SCREENING CHECKLIST (Filled and prepared by environmental and social experts in RPLRP /PCU or by consultants if agencies lack experts)

<table>
<thead>
<tr>
<th>IFPPP Project: Select relevant project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Investment name</td>
</tr>
<tr>
<td>Location</td>
</tr>
<tr>
<td>Estimated cost (USD)</td>
</tr>
</tbody>
</table>

**TYPE OF PROJECT OR ACTIVITY**

**Sub Project Type**
- Construction of Livestock Markets
- Construction of Earth Dams
- Construction of boreholes and water pans
- Construction of Holding Grounds and Quarantine Areas
- Construction of Irrigation Schemes
- Construction of Crushes

Please give more details: [type here]

For all projects, an Environmental and Social Management Plan (ESMP) will be required.

In addition, the following studies may be required:

- Will this project affect vulnerable and marginalised groups? If yes, a Vulnerable and Marginalised Groups’ Plan will be required
- Will the project require land for its development, and therefore displace individuals, families or businesses from land that is currently occupied, or restrict people’s access to crops, pasture, fisheries or forests, even, whether on a permanent or temporary basis. If yes, a Resettlement Action Plan will be required
- Will the investment project involve the construction of dams?

<table>
<thead>
<tr>
<th>Will the Project:</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adversely affect natural habitats nearby, including forests, rivers or wetlands?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Require large volumes of construction materials (e.g. gravel, stone, water, timber, firewood)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use water during or after construction, which will reduce the local availability of groundwater and surface water?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affect the quantity or quality of surface waters (e.g. rivers, streams, wetlands), or groundwater (e.g. wells, reservoirs)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Be located within or nearby environmentally sensitive areas (e.g. intact natural forests, mangroves, wetlands) or threatened species?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead to soil degradation, soil erosion in the area?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create waste that could adversely affect local soils, vegetation, rivers and streams or groundwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create pools of water that provide breeding grounds for disease vectors (for example malaria</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
or bilharzia)?

- Involve significant excavations, demolition, and movement of earth, flooding, or other environmental changes?

- Affect historically-important or culturally-important site nearby?

- Require land for its development, and therefore displace individuals, families or businesses from land that is currently occupied, or restrict people’s access to crops, pasture, fisheries, forests or cultural resources, whether on a permanent or temporary basis?

- Result in human health or safety risks during construction or later?

- Involve inward migration of people from outside the area for employment or other purposes?

Will the Project: Yes No

- Result in conflict or disputes among communities?

- Affect indigenous people, or be located in an area occupied by indigenous people?

- Be located in or near an area where there is an important historical, archaeological or cultural heritage site?

- Result in a significant change/loss in livelihood of individuals?

- Adversely affect the livelihoods and/or the rights of women?

If you have answered Yes to any of the above, please describe the measures that the project will take to avoid or mitigate environmental and social impacts

What measures will the project take to ensure that it is technically and financially sustainable?

If the answer to any of questions “Yes”, please use the indicated Annexes or sections(s) of the ESMF for guidance on how to avoid or minimize typical impacts and risks.

When considering the location of an investment, rate the sensitivity of the proposed site in the following table according to the given criteria. Higher ratings do not necessarily mean that a site is unsuitable. They do indicate a real risk of causing undesirable adverse environmental and social effects, and that more substantial environmental and/or social planning may be required to adequately avoid, mitigate or manage potential effects.

**Table 10: Site Sensitivity Rating**

<table>
<thead>
<tr>
<th>Issues</th>
<th>Site Sensitivity</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low (L)</td>
<td>Medium (M)</td>
</tr>
<tr>
<td>Natural habitats</td>
<td>No natural habitats present of any kind</td>
<td>No critical natural habitats; other natural habitats occur</td>
</tr>
<tr>
<td>Water quality and water resource availability and use</td>
<td>Water flows exceed any existing demand; low intensity of water use; potential water use conflicts expected to be low; no potential water quality issues</td>
<td>Medium intensity of water use; multiple water users; water quality issues are important</td>
</tr>
<tr>
<td>Natural hazards vulnerability, floods, soil stability/erosion</td>
<td>Flat terrain; no potential stability/erosion problems; no known volcanic/seismic/ flood risks</td>
<td>Medium slopes; some erosion potential; medium risks from volcanic/seismic/ flood/ hurricanes</td>
</tr>
<tr>
<td>Cultural property</td>
<td>No known or suspected cultural heritage sites</td>
<td>Suspected cultural heritage sites; known heritage sites in broader area of influence</td>
</tr>
<tr>
<td>Involuntary resettlement</td>
<td>Low population density; dispersed population; legal tenure</td>
<td>Medium population density; mixed ownership and land</td>
</tr>
<tr>
<td>Issues</td>
<td>Site Sensitivity</td>
<td>Rating (L,M,H)</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td>Low (L)</td>
<td>Medium (M)</td>
</tr>
<tr>
<td>Indigeneous peoples</td>
<td>is well-defined; well-defined rights</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tenure; well-defined rights</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dispersed and mixed indigenous populations; highly acculturated indigenous populations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indigenous territories, reserves and/or lands; vulnerable indigenous populations</td>
<td></td>
</tr>
</tbody>
</table>

**CONCLUSION**

Which course of action do you recommend?

- [ ] ESIA  
- [ ] ESMP  
- [ ] RAP (RPF is the reference document with reference to resettlement issues)

- [ ] VMGP  
- [ ] OTHER ENVIRONMENTAL/SOCIAL PLANS

- [ ] There are no environmental or social risks

If a RAP is required, will the project Displace or restrict access for less than 200 individuals, or if over 200, are losses for all individuals less than 10% of their assets?

If Yes, Prepare an abbreviated RAP
If No, Prepare a full RAP

Full details of resettlement requirements are provided in the accompanying Resettlement policy Framework.

Completed by:  [type here]
Name:  [type here]
Position:  [type here]
Date:  [type here]

*Format 2.0: SCREENING CHECKLIST REVIEW FORM (Prepared by Environment and Social Specialists from RPLRP/PCU/MALF)*

<table>
<thead>
<tr>
<th>Based on the location and the type of investment, please explain whether the Proponent’s responses are satisfactory.</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Their description of the compliance of the investment with relevant planning Documents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If ‘No’, please explain: [type here]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Their responses to the questions on environmental and social impacts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If ‘No’, please explain: [type here]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Their proposed mitigation measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If ‘No’, please explain: [type here]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Their proposed measures to ensure sustainability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If ‘No’, please explain: [type here]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**REVIEWER’S CONCLUSION**

Which course of action do you recommend?
There are no environmental or social risks

If a RAP is required, will the investment displace or restrict access for less than 200
Individuals, or if over 200, are losses for all individuals less than 10% of their assets?

If Yes, Prepare an abbreviated RAP
If No, Prepare a full RAP

Full details of resettlement requirements are provided in the accompanying Resettlement Policy Framework. If this
differs from the Proponent’s recommended course of action, please explain:

[Type here]

Preparation of a project Report, based on field appraisal by NEMA District Officer, is required to investigate further,
specifically to investigate:

[Type here]

Reject

Review form completed by: [type here]
Name: [type here]
Position / Community: [type here]

Completion of this screening form will facilitate the identification of potential
environmental and social impacts, determination of their significance, assignment of the
appropriate environmental category, proposal of appropriate environmental mitigation
measures, or recommend the execution of an Environmental and Social Impact
Assessment (ESIA), if necessary.

Development of project reports follows systematic process as follows;

- Review of TORs with the implementing partners for adequacy
- Familiarization with project design
- Familiarization with projects area of influence
- Identification of the relevant statutes and WB safeguard policies
- Determination/ Identification of all stakeholders to project
- On-the-ground investigations of the bio-physical baseline
- Consultations with stakeholders
- Impact prediction and interpretation
- Identification of mitigation measures
- Development of an environmental management plan complete with budget and
  identification of responsibilities
- Finalization of project report

8.1.3 Statutory content of Project Reports:
Regulation 7(1) of Legal Notice 101 stipulates content of Project Reports to include the
following:-

- The nature of the project;
- The location of the project including the physical area that may be affected by the
  project’s activities;
- The activities that shall be undertaken during the project construction, operation, and
decommissioning phases;
- The design of the project;
- The materials to be used, products, by-products, including waste to be generated by the project and the methods of disposal;
- The potential environmental impacts of the project and the mitigation measures to be taken during and after implementation;
- An action plan for the prevention and management of possible accidents during the project cycle;
- A plan to ensure the health and safety of the workers and neighbouring communities;
- The economic and socio-cultural impacts to the local community and the nation in general;
- The project budget;
- Any other information that the Authority may require.

Once a project report is submitted to NEMA, a decision is made by NEMA and in the event that NEMA, based on the project report submitted makes a decision that an ESIA report must be prepared, the RPLRP will be required to identify independent NEMA registered expert(s) to prepare an ESIA report in accordance with the EMCA.

Project Reports are normally prepared as a means of informing NEMA of the proposed development such that after review of the report, NEMA advises on the need or otherwise for an ESIA. The ESIA regulations allow for approval of proposed projects at the Project Report Stage and have been effectively used by NEMA to grant Environmental Licenses to small projects without requiring an ESIA.

**Table 11: The NEMA Process for Approving Investment Project Reports**

<table>
<thead>
<tr>
<th>Steps</th>
<th>Action</th>
<th>Actor</th>
<th>Time requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Submission of PR to NEMA. NEMA receives PR, issues a receipt and acknowledgement.</td>
<td>RPLRP/PCU and Implementing partners</td>
<td>To be undertaken by RPLRP/PCU and Implementing partners environmental and social specialists with input from the Safeguards Advisor</td>
</tr>
<tr>
<td>Two</td>
<td>NEMA mails PR to Lead Agencies</td>
<td>NEMA</td>
<td>7 days assuming all requirements are fulfilled</td>
</tr>
<tr>
<td>Three</td>
<td>Lead agencies review PR and issue comments</td>
<td>Lead Agencies</td>
<td>21 days (minimum) after receipt of PR from NEMA.</td>
</tr>
<tr>
<td>Four</td>
<td>Review of PR by NEMA</td>
<td>NEMA</td>
<td>30 days after receipt of PR.</td>
</tr>
<tr>
<td>Five</td>
<td>Communication of findings from NEMA review</td>
<td>NEMA</td>
<td>45 days after receipt of PR.</td>
</tr>
</tbody>
</table>

Typical outcomes of review of Project Reports from NEMA are likely to be as shown in **Table 12** below. These are as follows:

**Project investment is approved.** Where NEMA and lead agencies ascertain that a project report has disclosed adequate mitigation for identified impacts, the project is approved by NEMA upon which, conditions attached to grant of an Environmental License are issued. Once these are fulfilled, an Environmental License is also issued subject to conditions which will be specific to the sub project in question. Among these is the requirement that...
the scheme design should not be altered without approval by NEMA. As well, an audit report is required of each project after the first year of completion.

**Project Report discloses potential for major irreversible adverse impacts.** In this case, NEMA may not approve the project.

Table 12: Possible Outcomes of NEMA Review of Project Reports

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Recommendation</th>
<th>Important precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project found to have no significant Social and Environmental Impacts or Project report discloses sufficient mitigation measures</td>
<td>An Environmental License will be issued by NEMA</td>
<td>Project report must disclose adequate mitigation measures and show proof of comprehensive consultations within the area of influence.</td>
</tr>
<tr>
<td>Significant adverse social and environmental impacts found or Project Report fails to disclose adequate mitigation measures.</td>
<td>ESIA will be required by NEMA</td>
<td>As above</td>
</tr>
<tr>
<td>A proponent is dissatisfied with the outcome of the NEMA review.</td>
<td>An Appeal is provided for</td>
<td></td>
</tr>
</tbody>
</table>

In the eventuality that a Project cannot be approved by NEMA on the basis of a Project Report, the proponent will be advised to undertake an ESIA leading to development of a fully-fledged Environmental and Social Impact Assessment Study Report. **Figure 11** below outlines the ESIA process and review to be followed in an event that a determination for a full scale ESIA is arrived at by NEMA.
8.1.4 Scoping Report
Firstly, on advice from NEMA, the proponent will prepare a Scoping Report specifying the project’s area of influence, the thematic scope and depth of assessments required, the composition of the required ESIA team, and the probable budget required to prepare the ESIA Study.

Figure 20: EIA process
8.1.5 **ESIA Study**

Upon review and approval of the Scoping Report, NEMA will advise that an ESIA Study be undertaken. The ESIA Study will entail a systematic investigation of all impact areas as identified in the scoping report, taking care to document the current baseline environment, resource exploitation patterns and ecological pressure points.

The RPLRP/PCU will prepare the Terms of Reference for the ESIA and follow procurement rules for the recruitment of consultants for the ESIA.

Also, the impact mitigation measures provided in this ESMF may provide some basis for the design of the ToR. To facilitate the formulation of the ToR, a template has been prepared and provided in the *Annex D* of this report. In the case of existing operations, the outline for Environmental and Social Management Plans (ESMPs) is also given.

The ESIA will identify and evaluate potential environmental impacts for the proposed investments, evaluate alternatives, and design mitigation measures. The preparation of the ESIA will be done in consultation with stakeholders, including people who may be affected. It is mandatory for the ESIA study to undertake public consultation with all stakeholders in the project’s area of influence. Public consultations are critical in preparing a proposal for the activities of the RPLRP likely to have impacts on the environment and population. The public consultations should identify key issues and determine how the concerns of all parties will be addressed in the ESIA. When an ESIA is necessary, the administrative process enacted by the NEMA will be followed and executed. The ESIA Team should note and understand all stakeholder interests so as to cater for them in the ESMP. All accruing information will be written into a Draft ESIA Report prepared in the same format as the project Report and submitted to NEMA for review. Upon review of this report, it will be subjected to public review.

8.1.6 **Social Impact Assessment Process**

The breadth, depth, and type of analysis required for the social assessment will be proportional to the nature and scale of the proposed sub project’s potential and effects on the affected persons.

The social assessment will be conducted by socio-economic experts and will ensure that through primary and secondary literature search critical information including (i) ethnic composition and demographic characteristics; (ii) land use; (iii) water use; (iv) non-agricultural activities such as livestock/itinerant pastoralism, fishing and other income generating activities; (v) socio-cultural issues regarding decision making within communities; (vi) gender division of labor and rights/responsibilities; (vii) use of land, land and resource tenure, access to and control over resources, resource rights including those related to water; (viii) access to different services and inclusion in the producer organizations based on gender; and (ix) baseline health situation with a focus on water borne and sexually transmitted diseases (STDs) among others are collected and documented.
8.1.7 Public Review of the ESIA Report
EMCA provides for public consultation and review of all EIA reports prepared and dictates that all ESIA documents be disclosed at certain points for the public to provide comment. Copies of ESIA are placed at vantage points including the NEMA Library and NEMA website, NEMA Regional Offices and the sector Ministry responsible for a particular undertaking. NEMA serves a 21-day public notice in the national and local newspapers about the ESIA publication and its availability for public comments. When the public review period elapses, the comments and issues raised by the public are consolidated and addressed and the report re-submitted as final.

8.1.8 ESIA Review Process
The Implementing Agency will submit the draft ESIA to NEMA. The report will be reviewed by a cross-sectoral National Environmental and Social Impact Assessment Technical Review Committee (ESIA/TAC) made up of representatives of various Ministries, Departments and Agencies. The review committee is expected to:

- Assist the Agency in screening/reviewing all Environmental Assessment Applications and Reports (Environmental Impact Statements, Annual Environmental Reports, Environmental Management Plans and other related reports)
- Make recommendations to the Director General of the NEMA for final decision-making
- Provide technical advice on conduct of assessments and related studies on undertakings and the reports submitted on them;
- Make recommendations on the adequacy of the assessment and any observed gap;
- Advice on the seriousness of such gaps and the risks or otherwise to decisions required to be made recommend whether the undertakings as proposed must be accepted and under what conditions, or not to be accepted and the reasons, as well provide guidance on how any outstanding issue/areas may be satisfactorily addressed.

The review committees are mandated to co-opt relevant officials as and when necessary. In certain instances the support of international ESIA institutions such as the Netherlands ESIA Commission are solicited in review of some major or controversial projects where there is limited national expertise.

8.1.9 Environmental Permitting Decision (EPD)
In cases where the draft ESIA is found acceptable, the implementing agencies of the specific RPLRP executing agency and PMU will be notified to finalized the reports and submit 10 hard copies and an electronic copy. Following submission to NEMA, the implementing agency shall be issued an Environmental License.

8.1.10 Annual Environmental Audit
An independently commissioned environmental and social audit will be carried out on an annual basis. The audit team will report to NEMA, MWI/RPLRP/PCU and the World Bank, who will lead the implementation of any corrective measures that are required. An audit is necessary to ensure (i) that the ESMF process is being implemented appropriately, and (ii) that mitigation measures are being identified and implemented. The audit will be able to identify any amendments in the ESMF approach that are required to improve its effectiveness.
The annual audit also provides a strong incentive for the MWI to ensure that the ESMF will be implemented, and the individual ESMPs will be developed and implemented.

### 8.2 Overall Project Compliance and Reporting

The ESMF will be implemented by the RPLRP executing agencies. The implementing agency will collaborate with the safeguards specialist within the PCU and the World Bank to ensure effective execution. **Table 13** provides a summary of the stages and institutional responsibilities for the screening, preparation, assessment, approval and implementation of the RPLRP project activities.

**Table 13: Screening Responsibilities.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Stage</th>
<th>Institutional responsibility</th>
<th>Implementation responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Screening of Environmental and Social Infrastructure Project to assist in project formulation using checklist</td>
<td>MALF</td>
<td>Environmental Officer (EO) /Safeguard specialists in the executing agency and PCU</td>
</tr>
<tr>
<td></td>
<td>Statutory Environmental Registration of RPLRP sub projects</td>
<td>MALF</td>
<td>Environmental Officer executing agency and PCU</td>
</tr>
<tr>
<td>2.</td>
<td>Determination of appropriate environmental assessment level/ category</td>
<td>NEMA</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Selection validation</td>
<td>World Bank</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>Implementation of environmental assessment</td>
<td>MALF</td>
<td>Environmental Officer executing agency and PCU</td>
</tr>
<tr>
<td></td>
<td>If ESIA is necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Preparation of Terms of Reference</td>
<td>NEMA/ World Bank</td>
<td>PCU Safeguard Specialist</td>
</tr>
<tr>
<td>3.3</td>
<td>Selection of Consultant</td>
<td>MALF / MOF/ Procurement Office</td>
<td>EO/ Procurement Officer/ PCU Safeguard Specialist</td>
</tr>
<tr>
<td>3.4</td>
<td>Realization of the EIA, Public Consultation Integration of environmental and social management plan issues in the tendering and project implementation</td>
<td>Implementing agency/Procurement Office/Consultancy firm/Contractor</td>
<td>Safeguards Consultant/ Environmental Officer/ Procurement Officer/ PMU Safeguard Specialist</td>
</tr>
<tr>
<td>4.</td>
<td>Review and Approval</td>
<td>NEMA/ World Bank/ MALF</td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Simple ESIA/ESMP Approval (Category B and C)</td>
<td>MALF/World Bank</td>
<td>Environmental Officer/Project manager</td>
</tr>
<tr>
<td>5.</td>
<td>Public Consultation and disclosure</td>
<td>MALF / NEMA</td>
<td>EO/Contractor// PCU Safeguard Specialist</td>
</tr>
<tr>
<td>6.</td>
<td>Surveillance and monitoring</td>
<td>Implementing agency/NEMA/ World Bank/ MALF</td>
<td>Environmental Officer// PCU Safeguard Specialist</td>
</tr>
<tr>
<td>7.</td>
<td>Development of monitoring indicators</td>
<td>MALF</td>
<td>Environmental Officer /PCU Safeguard Specialist</td>
</tr>
</tbody>
</table>
9  CAPACITY BUILDING, TRAINING AND TECHNICAL ASSISTANCE – RPLRP

9.1 Institutional Capacity for ESMF Implementation

The principal institution that will provide overall coordination including administration of the RPLRP is the MALF in order to ensure environmentally sound design and management of proposed project investments. However, other institutions will be directly or indirectly involved and they include among others:

- NEMA
- Ministry of Finance for disbursement of funds
- World Bank
- MALF

9.1.1 Ministry of Agriculture, Livestock and Fisheries
MALF is the principal implementing institution for this project and a senior official in the Ministry will be the overall Project Coordinator. MALF will also be responsible for day-to-day implementation (project management, financial management, procurement, disbursement, monitoring, including environmental and social aspects of the project etc.) for all components.

9.1.2 Other Relevant Government line ministries and agencies
The technical capacity and capability of the institutions that will be implementing the ESMF for the RPLRP will require bolstering in order to ensure effective implementation of the Environmental and Social Management Framework (ESMF). At present, several key partners in the RPLRP do not have to a great extent in-house capacity and specialist in environment and social safeguards.

A capacity needs assessment of the implementing partner institutions on social and environmental evaluation, screening, mitigation and monitoring will be necessary as part of the capacity strengthening program. This ESMF proposes capacity building by way of awareness creation and sensitization, actual training through workshops and seminars as well as short courses as described below for different stakeholder and implementing partners within the RPLRP.

9.2 Identification of Capacity Needs

The first step in pursuing capacity building will be to identify the capacity needs of the various stakeholders. Capacity building should be viewed as more than training. It is human resource development and includes the process of equipping individuals with the understanding, skills and access to information, knowledge and training that enables them to perform effectively. It also involves organizational development, the elaboration of relevant management structures, processes and procedures, not only within organizations but also the management of relationships between the different organizations and sectors (public, private and community). The capacity building requirements will mostly be in the form of training workshops and seminars.
9.2.1 Technical Capacity Enhancement
Awareness creation, training and sensitization will be required for personnel of the following institutions.

- National Environment Management Authority
- Environmental and Social officers from implementing partner ministries and agencies
- Local Engineering Contractors who will be contracted or sub contracted to undertake the construction works
- Local Governments Authorities
- County Environment Officers

9.2.2 Training will focus on:
- Stakeholder engagement, consultation and partnerships;
- ESIA law, relevant environmental policies;
- Development of mitigation measures and Environmental Management Plans
- Thorough review of Country ESIA procedures, Environmental Management Policies & Guidelines and WB safeguards as well as their implementation and enforcement.
- The group will also be trained on use and application of ESMF tools (Screening checklists, ESIA), their review, implementation and enforcement.
- Participants will be trained on environmental reporting, monitoring and follow-up of ESMF
- Community Consultation/Participatory Planning
- Significant emphasis will be placed on understanding ESIA procedures, Environmental Management policies & guidelines, WB safeguards, implementation and enforcement
- Reporting, monitoring and follow-up of ESMF

Table 14: Trainings and Target groups

<table>
<thead>
<tr>
<th>Training Aspect</th>
<th>Target group</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIA law, relevant Environment policies and World Bank Safeguard Policy and guidelines</td>
<td>Government agency representatives including district-level officials, NGOs, CBOs.</td>
</tr>
<tr>
<td>Relevant social laws and policies</td>
<td>Government agency representatives including district-level officials, Local Government, Private Sector, NGOs, CBOs and community members.</td>
</tr>
</tbody>
</table>

Table 15: Training directly linked to implementation ESMF

<table>
<thead>
<tr>
<th>Identification of Indicators and data collection</th>
<th>PCU and Central Govt. Agencies</th>
<th>County Government</th>
<th>Private Sector</th>
<th>NGO &amp; CBO</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of environmental and social Impacts</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>A</td>
</tr>
<tr>
<td>Determination of negative and positive impact of project investments</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>A</td>
</tr>
<tr>
<td>Development of mitigation measures and Environmental Management Plan including Institutional Responsibility Framework and Budget</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>EIA procedures, Environmental Management policies &amp; guidelines, WB safeguards, implementation and</td>
<td>T</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
</tbody>
</table>
Contractors and supervision consultants as part of best practice, and in order to comply with international standards for Occupational, Health and Safety (OHS), will be provided with awareness raising and environmental and OHS training on site. These should focus not only on the construction phase but also operational phase of the Project. A proposed format for 1 day training is provided in the following *Table 16* below.
Table 16: Awareness raising and training for civil work contractors and supervision consultants

<table>
<thead>
<tr>
<th>Topic</th>
<th>Input</th>
</tr>
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<tbody>
<tr>
<td><strong>Awareness raising</strong></td>
<td></td>
</tr>
<tr>
<td>• Environmental awareness and the importance of effective mitigation</td>
<td>0.5 day</td>
</tr>
<tr>
<td>• Practice mitigation measures and environmentally sound construction techniques</td>
<td></td>
</tr>
<tr>
<td>• Compliance with local legislation on OHS, EIA and ESMP requirements</td>
<td></td>
</tr>
<tr>
<td><strong>Technical training</strong></td>
<td></td>
</tr>
<tr>
<td>• Implementation of the ESMP (contract clauses)</td>
<td>0.5 day</td>
</tr>
<tr>
<td>• Monitoring of ESMPs (and RAPs)</td>
<td></td>
</tr>
<tr>
<td>• Preparation of budgets</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1 day</td>
</tr>
</tbody>
</table>

The training and capacity building exercises will take into consideration during their development, the integration and fulfilment of the requirements of World Bank social and environmental policies and guidelines, as well as those on Environmental Protection (including relevant policies, regulations and guidelines). Where institutional capacity in terms of availability of human resource is inadequate, the project will engrain support for this through hiring of qualified staff to provide necessary expertise.

Training directly linked to the implementation of the ESMF should be undertaken first and subsequently followed with regular interval training on aspects influencing success of ESMF. The training program/agenda below provides a sample training outline and course content. The training programmes have been clustered into appropriate groups to facilitate for various target groups. Target groups for training, awareness and sensitization will be as follows.

### 9.3 ESMF Implementation Budget

The estimated total cost for ESMF implementation is indicated in the table 17 below and included the resettlement implementation costs.

Table 17: Overall costs for implementation of ESMF in RPLRP

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Unit cost, US$</th>
<th>No</th>
<th>Total Cost, US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation and implementation of ESIA, ESMP and related safeguard management plans for investments funded from the investment pool</td>
<td>Recruitment of Consultants and experts to prepare and review the ESIA and ESMPs</td>
<td>1,500,000.00</td>
<td></td>
<td>1,500,000.00</td>
</tr>
<tr>
<td>Monitoring of ESIA, ESMPs and related safeguard management plans for investments funded from the investment pool</td>
<td>Recruitment of Consultants and experts to monitor the ESIA and ESMPs</td>
<td>1,500,000.00</td>
<td></td>
<td>1,500,000.00</td>
</tr>
<tr>
<td>Awareness creation and Capacity building</td>
<td>Training workshop/seminars on Programme for MWI, project staff</td>
<td>500,000.00</td>
<td></td>
<td>500,000.00</td>
</tr>
<tr>
<td>Activity</td>
<td>Details</td>
<td>Cost</td>
<td>Frequency</td>
<td>Total</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Study tours</td>
<td>Selected environmental champions participating in RPLRP drawn from NEMA, MWI, Implementing Agencies to visit related or similar project sites</td>
<td>150,000</td>
<td>Biannual</td>
<td>150,000.00</td>
</tr>
<tr>
<td>Capacity building/improvement for Line Ministries</td>
<td>Training workshops</td>
<td>500,000.00</td>
<td>Biannual</td>
<td>500,000.00</td>
</tr>
<tr>
<td>Awareness creation for general public</td>
<td>Radio, TV discussions, Newspaper adverts on issues relating to ESMF</td>
<td>50,000</td>
<td>Biannual</td>
<td>50,000.00</td>
</tr>
</tbody>
</table>
10 PUBLIC CONSULTATION AND DISCLOSURE

10.1.1 ESMF Disclosure
The World Bank disclosure policies require that ESIA reports for sub projects are made available to project affected groups, local NGOs, and the public at large. Public disclosure of ESIA documents is also a requirement of the Kenya environmental procedures. MALF in collaboration with the line agencies and NEMA will make available copies of the ESMF and ESIA on the respective websites and offices of the ministries. Public notice in the media should be used to serve as information source to the public. However, the ESIA will have to be advertised in the local newspaper, website of MALF. The notification should provide:

10.1.2 Public Consultation
The implementation of each specific sub project under the RPLRP will require that public consultation and stakeholder engagement is carried out as a means of gathering information on public concerns, issues, perception, fears and suggestions on proposed investment. Public consultation will be conducted in line with the requirements of Environmental Management and Coordination Act (EMCA) which calls for utilisation of all forms of consultation and stakeholder engagement and the Bank’s requirements for public consultation. The consultations will be conducted through among others:

- Key Informant Interviews
- Direct Interviews with Project Affected Persons
- Workshops and Meetings
- Public Hearings (Barazas)
- Advertisements’ in the print and electronic media
- Focus Group Discussions
- Internet and telephone interviews

10.1.3 Grievance Mechanism
Grievance mechanisms provide a formal avenue for affected groups or stakeholders to engage with the project implementers or owners on issues of concern or unaddressed impacts. Grievances are any complaints or suggestions about the way a project is being implemented. They may take the form of specific complaints for damages/injury, concerns about routine project activities, or perceived incidents or impacts. Identifying and responding to grievances supports the development of positive relationships between projects and affected groups/communities, and other stakeholders.

The World Bank standards outline requirements for grievance mechanisms for some projects. Grievance mechanisms should receive and facilitate resolution of the affected institutional or communities’ concerns and grievances. The World Bank states the concerns should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities, at no cost and without retribution. Mechanisms should be appropriate to the scale of impacts and risks presented by a project.
Grievances can be an indication of growing stakeholder concerns (real and perceived) and can escalate if not identified and resolved. The management of grievances is therefore a vital component of stakeholder management and an important aspect of risk management for a project. Projects may have a range of potential adverse impacts to people and the environment in general, identifying grievances and ensuring timely resolution is therefore very necessary.

10.1.4 Establishment of Grievance Redress Committee

Each sub project investment will have a Grievance Redress Committee (GRC) established for the purpose of handling grievances related to environmental and social concerns. The GRCs will be ad hoc institutions established primarily for the sub project investment and will have no legal mandate. The GRC will be established under the guidance of NEMA County/District Officer and comprise of:

1. Project Affected Persons representative
2. Environmental and Social Specialists from the RPLRP/PCU
3. NEMA County/Sub County representative
4. Representatives from relevant line ministries
5. Contractor/Engineers
6. Women and Youth Representatives
7. Representation of active NGOs or CBOs in project area

Table 13: Grievance Redress Process

<table>
<thead>
<tr>
<th>Process</th>
<th>Description</th>
<th>Time frame</th>
<th>Other information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of grievance</td>
<td>Face to face; phone; letter, e-mail; recorded during public/community interaction; others</td>
<td>1 Day</td>
<td>Email address; hotline number</td>
</tr>
<tr>
<td>Grievance assessed and logged</td>
<td>Significance assessed and grievance recorded or logged (i.e. in a log book)</td>
<td>4-7 Days</td>
<td>Significance criteria: Level 1 – one off event; Level 2 – complaint is widespread or repeated; Level 3 – any complaint (one off or repeated) that indicates breach of law or policy or this ESMF provisions</td>
</tr>
<tr>
<td>Grievance is acknowledged</td>
<td>Acknowledgement of grievance through appropriate medium</td>
<td>7-14 Days</td>
<td></td>
</tr>
<tr>
<td>Development of response</td>
<td>Grievance assigned to appropriate party for resolution</td>
<td>4-7 Days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Response development with input from management/ relevant stakeholders</td>
<td>7-14 Days</td>
<td></td>
</tr>
<tr>
<td>Response signed off</td>
<td>Redress action approved at appropriate levels</td>
<td>4-7 Days</td>
<td>Project staff to sign off</td>
</tr>
<tr>
<td>Implementation and communication of response</td>
<td>Redress action implemented and update of progress on resolution communicated to complainant</td>
<td>10-14 Days</td>
<td></td>
</tr>
<tr>
<td>Complaints Response</td>
<td>Redress action recorded in grievance log book</td>
<td>4-7 Days</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Confirm with complainant that grievance can be closed or determine what follow up is necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close grievance</td>
<td>Record final sign off of grievance</td>
<td>4-7 Days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If grievance cannot be closed, return to step 2 or refer to sector minister or recommend third-party arbitration or resort to court of law.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.1.5 Public Complaints Committee

The Public Complaints Committee on Environment is an organ established by the EMCA whose role is to address complaints by the public on projects and investments that the public oppose due to environmental and social impacts. In an event that the public is dissatisfied with the proposed projects the PCC will serve as the first stop for getting redress and if this fails then the National Environmental Tribunal (NET) another organ set up by NET to resolve environmental and social disputes on investments will form the next avenue for redress.

10.1.6 Land and Environment Courts

The Constitution of Kenya (CoK) has further provided for specific courts to deal with land and environment (Land and Environment Courts) that are charged with playing a vital role in reconciling environmental related disputes and these courts will serve as the ultimate stop in the event of disputes or complaints that cannot be resolved through other alternative means.
II REFERENCE

2. Government of Kenya Land Control Act
4. Government of Kenya Physical Planning Act
5. Government of Kenya Public Health Act
6. Government of Kenya Forest Act
10. Government of Kenya The Land Acquisition Act
11. Government of Kenya The Trust Land Act
17. Government of Kenya Fisheries Policy
20. Government of Kenya Wildlife Conservation and Management Act
21. Project Documentation for RPLRP
22. Survey of Kenya 2003
23. World Bank Aide Memoire for RPLRP
24. World Bank Draft Project Appraisal Document (PAD), RPLRP
Annex A. Stakeholders Consulted

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. D. K. Kigera</td>
<td>Livestock Dept.</td>
<td>07122-995-289</td>
</tr>
<tr>
<td>G. H. Ndongye</td>
<td>Livestock Dept.</td>
<td>07214118-69</td>
</tr>
<tr>
<td>Dr. D. N. Thuo</td>
<td>Vet. Dept.</td>
<td>0722696191</td>
</tr>
<tr>
<td>Dr. Peter M. Namwai</td>
<td>Vet. Dept.</td>
<td>0726919989</td>
</tr>
<tr>
<td>Dr. Faith W. Nakuru</td>
<td>Vet. Dept.</td>
<td>0718493626</td>
</tr>
<tr>
<td>Amos O. Longo</td>
<td>Vet. Dept.</td>
<td>0712564269</td>
</tr>
<tr>
<td>George Makaate</td>
<td>OOP</td>
<td>0706136734</td>
</tr>
<tr>
<td>Erick Ng'elese</td>
<td>Farmer</td>
<td>0722560687</td>
</tr>
<tr>
<td>Alex K. lwambo</td>
<td>Farmer</td>
<td>0722560687</td>
</tr>
<tr>
<td>Joseph Manna</td>
<td>Livestock</td>
<td>0723472821</td>
</tr>
<tr>
<td>Charles L. Wachira</td>
<td>Livestock</td>
<td>0716974371</td>
</tr>
<tr>
<td>John Enamhiro</td>
<td>Membe</td>
<td>0729100623</td>
</tr>
<tr>
<td>Nk. W. Kajeji</td>
<td></td>
<td>0718879707</td>
</tr>
<tr>
<td>Isaac J. Gathu</td>
<td>Farmer</td>
<td>0722415546</td>
</tr>
<tr>
<td>D. N. Mjavani</td>
<td>Livestock Dept.</td>
<td>0714154924</td>
</tr>
<tr>
<td>J. K. Kindi</td>
<td>Farmer</td>
<td>0722750655</td>
</tr>
<tr>
<td>S. J. M. Nandi</td>
<td>Farmer</td>
<td>0721643888</td>
</tr>
<tr>
<td>S. N. M. Murati</td>
<td>Livestock Dept.</td>
<td>0722419118</td>
</tr>
<tr>
<td>A. C. N. Nikogotho</td>
<td>Farmer</td>
<td>0726942432</td>
</tr>
<tr>
<td>William Letita</td>
<td>Livestock Prod.</td>
<td>0725446637</td>
</tr>
<tr>
<td>D. Peterson</td>
<td>Veterinary</td>
<td>0712358343</td>
</tr>
<tr>
<td>Stephen G. G.</td>
<td>Veterinary</td>
<td>0725007546</td>
</tr>
<tr>
<td>NAME</td>
<td>ORGANISATION/BUSINESS</td>
<td>TELEPHONE</td>
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<td>---------------</td>
</tr>
<tr>
<td>Grace Arach</td>
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<td>0720655591</td>
</tr>
<tr>
<td>Peter Gatimu</td>
<td>Farmer</td>
<td>0726162855</td>
</tr>
<tr>
<td>Peter Kibor</td>
<td>Farmer</td>
<td>0727981301</td>
</tr>
<tr>
<td>Washington Ngari</td>
<td>MOA</td>
<td>0728609288</td>
</tr>
<tr>
<td>William M. Thiga</td>
<td>Farmer</td>
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RUMURUTI - KAKIPIA WORKSHOP
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<td>John Pariam</td>
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ISILOLO WORKSHOP 11/11/2013

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<tr>
<td>Mohamed Abdullahi Mwam</td>
<td>Livestock Trader</td>
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<td>Hagiwa Wako</td>
<td>Chemist</td>
<td>ISILOLO Market Town</td>
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<td>Pauline Karumba</td>
<td>County Cooperative Office</td>
<td>0741 163154</td>
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<td>Estelle K Kalo</td>
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<td>Daniel N. Ngugi</td>
<td>Mga Abi Fisherman</td>
<td>0742 547691</td>
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<td>Dorote Kabuteo B</td>
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<td>John M. Millani</td>
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<td>John Matiri</td>
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<td>Wanjiru Sitiwigi</td>
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LIST OF PARTICIPANTS
ENVIRONMENTAL SOCIAL MANAGEMENT FRAMEWORK HELD AT NDMA HALL
ON 12TH NOVEMBER, 2013.

NAME: ORGANIZATION ID/NO. TELEPHONE

1. Qedo Simon Hussein BLMC - 8761093-072098296
2. Muhoozi Stephen ARDI chairman - 0015498-022980857
3. Adam Mohamed Deseret Bloom - 00122987887920
4. Ismail Ali Galsha Yabeyun 2984303-0728448
5. Hussein Abdu Kamu - Gathang 2632985-072679092
6. Abdulle M. Aden - Min of Water 2992857-072176992
7. Ibrahim M. Ali - Engager 2421907-072844892
8. Abdirraheem I. Abdi - Cop 2801482-072888585
9. Abdi Walid Adam - YFP 80 - 10028607-072229992
10. Jamshid Hassan K. - YFP 80 - 2302349-072823229
11. Oscar Nagi - Livestock 20302458 072655453
12. Mohamed M. Ismail - Livestock 0795437-072176922
13. Ali Wario Smata - KAL 3- 0904471-0728982
15. Edi Hassan - Pachkata 026893 072498
16. Abdi Mohamed - 040108 072574
17. Abdulla Hay. Musa OLMC 0720684726
18. Ali Hassan MCUN 0723593458

ID No: 2111402
39. Huma, Zak 
30 - 1128931
40. Aziz, A. A. Al - 124 25726
41. Habib, Mohanand - 22 432576
42. Nusr, Mohaned - 26889230
43. Abdurahman, Abdinour - 21458078
44. Adam, Osmail, Sheik - 26653657
45. Haqeen, Abdirehman - 14585 - 26655599
26655292
PUBLIC CONSULTATION WORKSHOP
HELD AT LODWAR ON 8/11/13
ON PASTORAL LIVELIHOOD RESILIENCE PROGRAMME
(REGIONAL)

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<th>ORGANISATION OR BUSINESS</th>
<th>TEL.</th>
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<tbody>
<tr>
<td>1. Wilfred Wafafa</td>
<td>Livestock Prod. Dept.</td>
<td>0716178349</td>
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<tr>
<td>2. Samuel Nyakale</td>
<td>Livestock Prod. Dept.</td>
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<td>3. John S. Eipa</td>
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<td>4. Ewan Kembo</td>
<td>Animal Dept.</td>
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<td>5. Anzaho Ernest</td>
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<td>6. Jacob E. Leitani</td>
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<td>7. William K. Kilimo</td>
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<td>26. Alfred Omoro</td>
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<td>27. Monica A. B.</td>
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Environmental and Social Management Framework - ESMF
# ATTENDANCE LIST FOR THE REGIONAL PASTORALIST LIVELIHOOD RESILIENCE PROGRAMME WORKSHOP HELD AT MARIGAT, BARINGO COUNTY ON 13/11/13

<table>
<thead>
<tr>
<th>NAME</th>
<th>BUSINESS/ORGANIZATION</th>
<th>TELEPHONE</th>
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<tbody>
<tr>
<td>1. Samuel Chepkoto</td>
<td>MAOI Community INT. DEV. PROGRAMME</td>
<td>0721964724</td>
<td>SGC</td>
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<tr>
<td>2. Richard Bungothey</td>
<td>Livestock Mogoro</td>
<td>0722285297</td>
<td>BDC</td>
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<td>3. Amos D. Nyakio</td>
<td>NDBA - Baringo</td>
<td>0773034855</td>
<td>BDC</td>
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<td>4. Evans M. Ayari</td>
<td>MIN OF AGR &amp; LAND DEVELOPMENT</td>
<td>0791975618</td>
<td>EDC</td>
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<td>5. Peter Kimai Njiru</td>
<td>NDBA - Baringo</td>
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<td>BDC</td>
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<td>6. Philip Ndalwa</td>
<td>LAND RECLAMATION DEPT</td>
<td>0720845953</td>
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<td>7. Ronald Tamu</td>
<td>Livestock Research</td>
<td>0724871571</td>
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<td>8. Dr. Kabir Mwakia</td>
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<td>0703811121</td>
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<td>9. Nicholas K. Teter</td>
<td>Kinoon Sheppa Grant Station</td>
<td>0722285434</td>
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<td>10. Joeph K. Munyiva</td>
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<td>0744369955</td>
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<td>11. Anne C. Aruoke</td>
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<td>12. Michael Kapuku</td>
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<td>13. Nicholas K. Chebil</td>
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<td>14. Laban C. Laba</td>
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<td>15. John Lemlem</td>
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<td>16. Benson Lenaiki</td>
<td>BAREERED YOUTH GROUP</td>
<td>0725179285</td>
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<td>17. David K. Biwott</td>
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<td>18. Raphael Kimwambo</td>
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<td>19. Alice Karungi</td>
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<td>20. Denis K. Kukura</td>
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<td>0725073013</td>
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<td>21. Estelle Koroccoio</td>
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<td>22. Dennis Ngocilolo</td>
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<td>23. Jackson Cheteru</td>
<td>Microni Group</td>
<td>0714842464</td>
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<td>24. Joseph K. Sifinyo</td>
<td>KARI</td>
<td>0724997775</td>
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<td>25. David K. Koei</td>
<td>Agricultural Livestock Centre (ALC)</td>
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<td>Vincende K. Kibet</td>
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<td>Simon Choge</td>
<td>KEPRI</td>
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<tr>
<td>Jan Benjamin</td>
<td>ASDSF</td>
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<tr>
<td>Reuben K. Cherutich</td>
<td>ASBSP - ENV. RESILIENCE OF KENYA</td>
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<tr>
<td>Dorothy Ndungu</td>
<td>County Councillor, Vihiga</td>
<td>0722803447</td>
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<tr>
<td>Samuel Opdenk</td>
<td>CDK E. Baringo</td>
<td>0721351972</td>
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<tr>
<td>William Angalo</td>
<td>County Director - Agric Office</td>
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<tr>
<td>Dorel Cherono</td>
<td>CDS - Baringo County</td>
<td>0723305679</td>
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<tr>
<td>Dorcas Changwony</td>
<td>CLMC Office</td>
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<td>Francis Pania</td>
<td>R.D.A. Trust</td>
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<tr>
<td>David Ki. Kandu</td>
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<tr>
<td>Edwine Ki. Kemai</td>
<td>Chairman BSA</td>
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<td>Wilson K. Talamu</td>
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<td>Mary J. Sang</td>
<td>CDLP - Baringo Court</td>
<td>0721975339</td>
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<td>County Office - Baringo (litigation)</td>
<td>0722907693</td>
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Annex B. Stakeholders Issues and Concerns Summary

ISSUES RAISED DURING CONSULTATIVE MEETING AT COUNTIES WHERE RPLRP WILL BE UNDERTAKEN

1. ISIOLO COUNTY ON 11TH NOVEMBER 2013

This section discusses the issues raised during consultative meeting at counties where RPLRP will be undertaken.

The workshop was convened to inform the various stakeholders in Isiolo County of the intended project and to solicit their views on the same. Primarily the main thrust was to get views and/or concerns on the environmental and social safeguards policies by the World Bank as well as the host country regulations on the same.

The workshop participants were led through the four (4) core components of the intended project together with the sub-components involved and were then requested to give their views or any concerns that may emerge in tandem with the World Bank policies on safeguards measures. Their views were as follows:

**Natural Resource Management**

**Rehabilitation of Water Infrastructure**: - This includes building new or rehabilitating existing water sources such as dams, water pans, boreholes and shallow wells. Participants raised concerns that such undertakings may result in negative impacts such as:

1. Conflict: - It was noted that conflicts could arise as communities compete for water resources.
2. Public health hazard: - Dams were identified as a potential public health hazard as they act as breeding grounds for mosquitoes and snails which being vectors may spread diseases
3. Soil erosion: - Water pans were identified as major contributors to soil erosion hence mitigating measures would be needed.
4. Death and destruction: - The proposed projects would also result in destruction of property and deaths e.g. if a dam were to burst. It was also noted that both humans and animals may drown in dams either accidentally or in the case of humans as a suicidal act.
5. Resettlement: - Some of the projects may result in displacement of persons e.g. dam construction, livestock markets among others

**Rangeland Rehabilitation**: - The sub component intends to revive exhausted pasture areas by reseeding. Impacts noted by the stakeholders consulted as likely to occur include;
1. Invasive species – New fodder species may not be compatible to the environment hence harmful and an example being the infamous “mathenge” was cited.
2. Conflict over grazing lands – This may arise due to competition among pastoralists over rangeland pasture.
3. Fodder/seed bulking may entail use of pesticides and fertilizers, which could have negative impacts on the environment if indiscriminate application of pesticides and fertilizers are utilized.
4. Water sources may be depleted especially if irrigation activities entail over abstraction of the water resources from existing surface/sub surface bodies.

**Conflict Management:** - Natural Resource Management may result in conflicts. It was noted by participants that where conflict management systems have been successfully implemented, the peace resulting may lead to adverse impacts on the environment. This may include degradation due to over grazing of pastures.

**Marketing Infrastructure**
The component as proposed would include among others the rehabilitation and/or building of livestock markets and stock routes together with holding grounds. Likely impacts noted by the participants were;

1. Soil erosion – As livestock move through the migratory corridors, within the market and on the holding grounds soil erosion is likely to occur.
2. Conflict – This could arise due to competition and it was further noted that stock theft and compromised security is also likely to occur as animals are taken to the markets for sale.
3. Displacement – People may end up being displaced (economically and physically) e.g. when livestock markets, holding grounds or slaughterhouse are constructed.
4. Pesticide use – Indiscriminate use and application of pesticides may lead to negative impacts on the environment and human health.
5. HIV/AIDS – Increased sales of livestock as a result of productivity by farmers may lead to spread of HIV/AIDS and other communicable diseases especially when farmers choose to squander the sales from livestock.
6. Spread of livestock diseases – During movement to holding grounds, the animals may infect other animals.

**Livelihoods Support**
Stakeholders raised the following concerns regarding impacts associated with the livelihood support component;

1. Waste disposal concerns especially those related to veterinary wastes like vaccine bottles; needles and syringes could be a risk to the environment and human health
2. Pollution and contamination of water resources could occur from activities related to eradication of ticks, which could include spraying or dipping
3. Breeding – Concentrating on having better breeds may result in complete phasing out of some breeds hence resulting in loss of livestock biodiversity/germplasm.
4. Irrigation of the fodder crop may result in displacement on either private or communal land
5. Public health hazards – stagnant irrigation water may become disease breeding grounds.
6. Conflicts – Due to use of water for irrigation, water sources may be depleted leading to conflicts.

**Alternative Livelihoods**

This sub component looks at other alternatives to livestock keeping. It proposes starting up cottage industries, engage in gum and resins harvesting, bee keeping, tourism, emerging livestock etc. Likely impacts include;

1. Pollution – Cottage industries such as hides and skins may pollute the air and surroundings.
2. Displacement – may arise e.g. when building fish ponds
3. Invasive species – in case of fish breeds.
4. Human/Wildlife conflict may occur.
5. Deforestation may occur due to over harvesting of gum and resin trees.
6. Fish ponds may cause diseases (public health related to stagnant water) and even death by drowning in the ponds.
2. KAJIADO COUNTY ON 13TH NOVEMBER 2013.

The workshop was convened to inform the various stakeholders in Kajiado County of the intended project and to solicit their views on the same. Primarily the main thrust was to get views and/or concerns on the environmental and social safeguards policies by the World Bank as well as the host country regulations on the same.

The workshop participants were led through the four (4) core components of the intended project together with the sub-components involved and were then requested to give their views or any concerns that may emerge in tandem with the World Bank policies on safeguards measures. Their views were as follows;

**Natural Resource Management**

**Rehabilitation of Water Infrastructure**: This includes building new or rehabilitating existing water sources such as Dams, water pans, boreholes and shallow wells. Participants raised concerns that such undertakings may result in negative impacts such as:

1. Conflict: - It was noted that conflicts could arise as people compete for water resources.
2. Public health hazard: - Dams were identified as a potential public health hazard as they act as breeding grounds for mosquitoes and snails which may infect humans.
3. Soil erosion: - Water pans were identified as major contributors to soil erosion hence mitigating measures would be needed.
4. Death and Destruction: - The proposed projects would also result in destruction of property and deaths e.g. if a dam were to break walls. It was also noted that both humans and animals may drown in dam waters either accidentally or suicidal act.
5. Resettlement: - Some of the projects may result in displacement of persons e.g. dam construction

**Rangeland Rehabilitation**: The sub component intends to revive exhausted pasture areas by reseeding. Impacts noted as likely to occur are:

1. Invasive species – New fodder species may not be compatible to the environment hence harmful and an example being the infamous “mathenge” was cited.
2. Conflict over grazing lands – This may arise due to competition among pastoralists over rangeland pasture.
3. Fodder/seed bulking may entail use of pesticides and fertilizers, which could have negative impacts on the environment if indiscriminate application of pesticides and fertilizers are utilized.
4. Water sources may be depleted especially if irrigation activities entail over abstraction of the water resources from existing surface/sub surface bodies.

**Conflict Management:** - Natural Resource Management may result in conflicts. It was noted by participants that where Conflict management systems have been successfully implemented, the peace resulting may lead to adverse impacts on the environment. This may include degradation due to over grazing of pastures.

**Marketing Infrastructure**
The component as proposed would include among others the rehabilitation and/or building of livestock markets and stock routes together with holding grounds. Likely impacts noted were;

1. **Soil erosion** – As livestock move through the migratory corridors, within the market and on the holding grounds soil erosion is likely to occur.
2. **Conflict** – This could arise due to competition and it was further noted that stock theft and compromised security is also likely to occur as animals are taken to the markets for sale.
3. **Displacement** – People may end up being displaced (economically and physically) e.g. when livestock markets, holding grounds or slaughterhouse are constructed.
4. **Pesticide use** – Indiscriminate use and application of pesticides may lead to negative impacts on the environment and human health
5. **HIV/AIDS** – Increased sales of livestock as a result of productivity by farmers may lead to spread of HIV/AIDS and other communicable diseases especially when farmers choose to squander the sales from livestock
6. **Spread of livestock diseases** – During movement to holding grounds, the animals may infect other animals.

**Cross Border Movement** – This sub component is intended to ease transboundary movement. Likely impacts include;

1. **Propagating of livestock diseases**
2. **Cattle rustling may increase**
3. **Degradation e.g. soil erosion**
4. **May result in invasive species transmission**

**Livelihoods Support**
1. Waste disposal concerns especially those related to veterinary wastes like vaccine bottles; needles and syringes could be a risk to the environment and human health
2. **Pollution and contamination of water resources could occur from activities related to eradication of ticks, which could include spraying or dipping**
3. **Breeding** – Concentrating on having better breeds may result in complete phasing out of some breeds hence resulting in loss of livestock biodiversity/germplasm.
4. Irrigation of the fodder crop may result in displacement on either private or communal land
5. Public health hazards – stagnant irrigation water may become disease breeding grounds.
6. Conflicts – Due to use of water for irrigation, water sources may be depleted leading to conflicts.

**Alternative Livelihoods**
This sub component looks at other alternatives to livestock keeping. It proposes starting up cottage industries, engage in gum and resins harvesting, bee keeping, tourism, emerging livestock etc. Likely impacts include;
1. Pollution – Cottage industries such as hides and skins may pollute the air and surroundings.
7. Displacement – may arise e.g. when building fish ponds
8. Invasive species – in case of fish breeds.
9. Human/Wildlife conflict may occur.
10. Deforestation may occur due to over harvesting of gum and resin trees.
11. Fish ponds may cause diseases (public health related to stagnant water) and even death by drowning in the ponds.
3. LAIKIPIA COUNTY ON 7TH NOVEMBER 2013.

The workshop was convened to inform the various stakeholders in Laikipia County of the intended project and to solicit their views on the same. Primarily the main thrust was to get views and/or concerns on the environmental and social safeguards policies by the World Bank as well as the host country regulations on the same.

The workshop participants were led through the four (4) core components of the intended project together with the sub-components involved and were then requested to give their views or any concerns that may emerge in tandem with the World Bank policies on safeguards measures. Their views were as follows;

**Natural Resource Management**

Rehabilitation of water infrastructure: - This includes building new or rehabilitating existing water sources such as dams, water pans, boreholes and shallow wells. Participants raised concerns that such undertakings may result in negative impacts such as;

1. Conflict: - It was noted that conflicts could arise as people compete for water resources.
2. Public health hazard: - Dams were identified as a potential public health hazard as they act as breeding grounds for mosquitoes and snails which may infect humans.
3. Soil erosion: - Water pans were identified as major contributors to soil erosion hence mitigating measures would be needed.
4. Death and Destruction: - The proposed projects would also result in destruction of property and deaths e.g. if a dam were to burst. It was also noted that both humans and animals may drown in dam waters either accidentally or in the case of humans as a suicidal act.
5. Resettlement: - Some of the projects may result in displacement of persons e.g. dam construction

**Rangeland Rehabilitation**: - The sub component intends to revive exhausted pasture areas by reseeding. Impacts noted as likely to occur are;

1. Invasive species – New fodder species may not be compatible to the environment hence harmful and an example being the infamous “mathenge” was cited.
2. Conflict over grazing lands – This may arise due to competition among pastoralists over rangeland pasture.
3. Fodder/seed bulking may entail use of pesticides and fertilizers, which could have negative impacts on the environment if indiscriminate application of pesticides and fertilizers are utilized.
4. Water sources may be depleted especially if irrigation activities entail over abstraction of the water resources from existing surface/sub surface bodies.

Marketing Infrastructure
The component as proposed would include among others the rehabilitation and/or building of livestock markets and stock routes together with holding grounds. Likely impacts noted were;
1. Soil erosion – As livestock move through the migratory corridors, soil erosion is likely to occur.
2. Conflict – This could arise due to completion. It is noted that stock theft and compromised security is also likely to occur as animals are taken to the markets.
3. Displacement – People may end up being displaced e.g. when slaughterhouses/livestock markets are constructed.
4. Pesticide use – Misuse of pesticides may lead to negative impacts on the environment
5. HIV/AIDS – Enhanced markets may lead to life style change. This may lead to increased prevalence of HIV/AIDS and other diseases.
6. Family disruptions – This was noted as likely in cases where land may be sold by a household head without informing other family members.
7. Spread of livestock diseases – During movement to holding grounds, the animals may infect other animals on the way hence impact is adverse.

Livelihoods Support
This component entails livestock production and health as well as disease surveillance.
1. Vaccination – Waste generated from vaccine containers and needles require proper and sound disposal.
2. Livestock breed improvement – Improving breeds may risk in propagating diseases if the breeds are not approved or certified by competent authorities.
3. Irrigated fodder/bulking risks include depletion of water sources if indiscriminate abstraction is undertaken.

Alternative Livelihoods
This sub component looks at other alternatives to livestock keeping. It proposes starting up cottage industries such as;
1. Bee Keeping – Bees can sting so should be handled carefully. When harvesting honey, fire should be used well to avoid injury and property loss.
2. Pollution – Cottage industries such as hides and skins may pollute the air and surroundings.
3. Displacement may arise
4. Social conflict may arise
5. HIV/AIDS due to life style change, HIV/AIDS may be a major risk.
6. Human/Wildlife conflict may occur.
4. TURKANA COUNTY IN LODWAR ON THE 8TH NOVEMBER 2013.

The workshop was convened to inform the various stakeholders in Turkana County of the intended project and to solicit their views on the same. Primarily the main thrust was to get views and/or concerns on the environmental and social safeguards policies by the World Bank as well as the host country regulations on the same.

The workshop participants were led through the four (4) core components of the intended project together with the sub-components involved and were then requested to give their views or any concerns that may emerge in tandem with the World Bank policies on safeguards measures. The participants were set up in groups and after deliberating they presented the following resolutions to the plenary in relation to the Environmental and social safeguards;

Environmental Concerns
1. Environmental Impact Assessment needs to be undertaken in all projects that may have an impact on the environment.
2. They wish to have more knowledge on E.I.A; sensitization is needed.
3. They feel the cost of undertaking an E.I.A is very expensive. This may deter potential projects from being undertaken.
4. The county has minimal expertise on E.I.A. It only has one expert in the field.
5. They wished to know the time frame of carrying out an E.I.A and whether the reports generated from such an exercise would be available to the public and not just NEMA only.

Involuntary Resettlement
1. Compensation should be done in a fair and timely manner in situations where displacement is unavoidable.
2. Provision of social amenities to displaced/resettled persons. These may be schools or health facilities.
3. Any project area should be the responsibility of the proponent in regards to environmental conservation. An example is Tullow Oil Company ensuring that in areas they drill for oil they also ensure the area is rehabilitated.

Marginalized and Vulnerable People.
1. Gender sensitivity of the project
2. Social protection programmes for the elderly.
3. Provision of grants to the vulnerable groups.

Pests Management
1. Training of personnel or users of the pesticides on correct storage, use and disposal of the waste.
Safety of Dams
1. Protection of dams for provision of water to the locals for domestic use and irrigation
2. Introduction of fish farming as alternative livelihood.

Natural Habitats
1. Consultations with the locals
2. Re-afforestation in case of destruction of the habitat.
3. Identify and put protection measures.
4. Develop policies for protection of natural habitats by the county government.
5. Reclaim destroyed natural habitat.

Forests
1. Re-afforestation in case of destruction of forests by locals.
2. Reclaim destroyed forests
3. Formation of forest users associations.
5. BARINGO COUNTY WORKSHOP HELD AT MARIGAT TOWN ON 13TH NOVEMBER 2013 IN

The workshop was convened to inform the various stakeholders in Baringo County of the intended project and to solicit their views on the same. Primarily the main thrust was to get views and/or concerns on the environmental and social safeguards policies by the World Bank as well as the host country regulations on the same.

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2. Pollution and contamination of water resources could occur from activities related to eradication of ticks, which could include spraying or dipping
3. Breeding – Concentrating on having better breeds may result in complete phasing out of some breeds hence resulting in loss of livestock biodiversity/germplasm.
4. Irrigation of the fodder crop may result in displacement on either private or communal land
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2. Displacement – may arise e.g. when building fish ponds
3. Invasive species – in case of fish breeds.
4. Human/Wildlife conflict may occur.
5. Deforestation may occur due to over harvesting of gum and resin trees.
6. Fish ponds may cause diseases (public health related to stagnant water) and even death by drowning in the ponds
6. WORKSHOP HELD AT KAPENGURIA IN WEST POKOT COUNTY ON 15TH NOVEMBER 2013.

The workshop was convened to inform the various stakeholders in West Pokot County of the intended project and to solicit their views on the same. Primarily the main thrust was to get views and/or concerns on the environmental and social safeguards policies by the World Bank as well as the host country regulations on the same.

The workshop participants were led through the four (4) core components of the intended project together with the sub-components involved and were then requested to give their views or any concerns that may emerge in tandem with the World Bank policies on safeguards measures. Their views were as follows;

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**Rehabilitation of Water Infrastructure**: - This includes building new or rehabilitating existing water sources such as dams, water pans, boreholes and shallow wells. Participants raised concerns that such undertakings may result in negative impacts such as;

1. **Conflict**: - It was noted that conflicts could arise as communities compete for water resources.
2. **Public health hazard**: - Dams were identified as a potential public health hazard as they act as breeding grounds for mosquitoes and snails which being vectors may spread diseases
3. **Soil erosion**: - Water pans were identified as major contributors to soil erosion hence mitigating measures would be needed.
4. **Death and destruction**: - The proposed projects would also result in destruction of property and deaths e.g. if a dam were to burst. It was also noted that both humans and animals may drown in dams either accidentally or in the case of humans as a suicidal act.
5. **Resettlement**: - Some of the projects may result in displacement of persons e.g. dam construction, livestock markets among others

**Rangeland Rehabilitation**: - The sub component intends to revive exhausted pasture areas by reseeding. Impacts noted by the stakeholders consulted as likely to occur include;

1. **Invasive species** – New fodder species may not be compatible to the environment hence harmful and an example being the infamous “mathenge” was cited.
2. **Conflict over grazing lands** – This may arise due to competition among pastoralists over rangeland pasture.
3. **Fodder/seed bulking** may entail use of pesticides and fertilizers, which could have negative impacts on the environment if indiscriminate application of pesticides and fertilizers are utilized.
4. Water sources may be depleted especially if irrigation activities entail over abstraction of the water resources from existing surface/sub surface bodies.

**Conflict Management:** - Natural Resource Management may result in conflicts. It was noted by participants that where conflict management systems have been successfully implemented, the peace resulting may lead to adverse impacts on the environment. This may include degradation due to over grazing of pastures.

**Marketing Infrastructure**
The component as proposed would include among others the rehabilitation and/or building of livestock markets and stock routes together with holding grounds. Likely impacts noted by the participants were;

1. Soil erosion – As livestock move through the migratory corridors, within the market and on the holding grounds soil erosion is likely to occur.
2. Conflict – This could arise due to competition and it was further noted that stock theft and compromised security is also likely to occur as animals are taken to the markets for sale.
3. Displacement – People may end up being displaced (economically and physically) e.g. when livestock markets, holding grounds or slaughterhouse are constructed.
4. Pesticide use – Indiscriminate use and application of pesticides may lead to negative impacts on the environment and human health
5. HIV/AIDS – Increased sales of livestock as a result of productivity by farmers may lead to spread of HIV/AIDS and other communicable diseases especially when farmers choose to squander the sales from livestock
6. Spread of livestock diseases – During movement to holding grounds, the animals may infect other animals.

**Livelihoods Support**
Stakeholders raised the following concerns regarding impacts associated with the livelihood support component;

1. Waste disposal concerns especially those related to veterinary wastes like vaccine bottles; needles and syringes could be a risk to the environment and human health
2. Pollution and contamination of water resources could occur from activities related to eradication of ticks, which could include spraying or dipping
3. Breeding – Concentrating on having better breeds may result in complete phasing out of some breeds hence resulting in loss of livestock biodiversity/germplasm.
4. Irrigation of the fodder crop may result in displacement on either private or communal land
5. Public health hazards – stagnant irrigation water may become disease breeding grounds.
6. Conflicts – Due to use of water for irrigation, water sources may be depleted leading to conflicts.

**Alternative Livelihoods**
This sub component looks at other alternatives to livestock keeping. It proposes starting up cottage industries, engage in gum and resins harvesting, bee keeping, tourism, emerging livestock etc. Likely impacts include;

1. Pollution – Cottage industries such as hides and skins may pollute the air and surroundings.
2. Displacement – may arise e.g. when building fish ponds
3. Invasive species – in case of fish breeds.
4. Human/Wildlife conflict may occur.
5. Deforestation may occur due to over harvesting of gum and resin trees.
6. Fish ponds may cause diseases (public health related to stagnant water) and even death by drowning in the ponds
Introduction
The Ministry of Agriculture, Livestock and Fisheries has applied for a loan from World Bank to fund Regional Pastoral livelihood Resilience project in Arid and Semi-Arid counties in Kenya and before funding World Bank has safeguard procedures to follow, by carrying out an Environment Impact Assessment.

Components
1. Natural Resource Management
2. Market access and trade
3. Livelihood support
4. Pastoral Risk Management

The objective of the project is to help communities in these regions to be resilient

Stakeholders Concerns
1. How will project will improve resilience
2. What pastoral livelihood and resilience is all about
3. Use of NRM
4. Sustainability of the project and implementation period
5. Knowledge on environmental aspect
6. Gain more knowledge of methods of sensitizing communities about the project
7. Can Somali to be considered for future funding because they trade a lot with Mandera County

Component 1 - Natural Resource management
Activities to be undertaken under NRM
- Water Infrastructure for example
- River/farms
- Dams
- Borehole
- Shallow wells and water pans
Impact to the environment
1. Displacement
2. Degradation
3. Conflict
4. Overgrazing
5. Wild Five
6. Noise Pollution
7. Mushrooming of settlement
8. Diseases both human and Animals
9. Erosion

Mitigation measures
1. Resettlement according to the provision of law
2. Proper management of early stage both water and environment
3. Afforestation
4. Sensitization of community
5. Positioning of resources should be central
6. Empower committees
7. Constitute conflict committees
8. Introduce range
9. Introduce right pasture/seedlings that resilient i.e. Grass for their livestock and remove invasive species like “mathenge” that is causing harm to the livestock in this region
10. Proper grazing management
11. Install silencers on equipment to curb noise pollution
12. Introduction of Policy on settlement

Market Access And Trade
Impact to the environment
1. Disease
2. Prices
3. Degradation/Overgrazing
4. Crime Rate
5. Conflict/Through Farmlands
6. Market Policy
7. Dissemination of Information
8. Holding yards/grounds
9. Market Facility
10. Social Conflict

Proposed Mitigation
1. Create Stock Route - Access across the region
2. Cattle crush to separate sick animals – Isolated Pen
3. Introduce systemized branding of animals
4. Screening of animals @ peripheries
5. Vet labs @ market levels for disease control
6. Strengthen vet stores proper re-stock
7. Animal health workers – given mandate to treat and their capacity strengthened
8. Livestock Market Information System
9. Hotspot Committee across Legion
10. Form Vigilante Youth Groups to Manage Market – Train them
11. Harmonize Policies across the region
12. Empower women on ownership

Livelihood Support

Diversify Income Generating Activities
- Capacity building on alternatives livelihoods
- Funds to improve utilization of natural resources to support/well hood
- Provision of drought Resistant seeds
- Demonstration of different foods i.e. fish, poultry

Value Addition Techniques to Farmers
- Beekeeping
- Poultry/Ostrich farming
- Rabbit farming
- Small Scale Irrigation
- Fish farming

Impact to the environment
1. Diseases
2. Lack of markets
3. Degradation
4. Lack of knowledge
5. Soil erosion
6. Land
7. Conflict on resources
8. Drought
9. Deforestation

Mitigation measures
1. Water Storage
2. Build resilience of all aspects
3. Awareness based on indicators involved
4. Information and Knowledge management
5. Rapid response
6. Timely Re-stocking and Des-stocking
7. World Space Radio – local content – livestock
8. Develop early warning systems
9. Build capacity of county weather proof.
10. Introduce local Processing firms
11. Promote Rain fed farmer/drip irrigation
12. Poverty support safety net for women – Revolving funds
13. Fodder Production/conservation/storage
14. Incorporate traditional/modern technology to determine weather conditions.
15. Introduction of a regular disease surveillance mechanism
16. Train more Veterinary doctors posted to the area
17. Train and post more animal Health workers
18. Vaccination of opportunistic diseases/Deworm Trans-boundary of vaccination and treatment
19. Harmonization of roll-out on treatment
20. Establishment of local vet/drug store manned by professional.
21. Establish well equipped VET LAB/Mobile labs.
22. Establish a cross border committees
23. Harness check dams – Afforestation and fodder production conservation
24. Create community awareness of water ways and riverbank protection.
25. Establish and strengthen inclusive environment management committee
26. Involve community in selection of custodian of water and pasture
27. Link water and pasture usage
28. Strengthen peace committees
29. Establish conflict early warning systems
30. Involve local communities at all stages of the project.

8. NAROK TOWN IN NAROK COUNTY ON 12TH NOVEMBER 2013.

The workshop was convened to inform the various stakeholders in Narok County of the intended project and to solicit their views on the same. Primarily the main thrust was to get views and/or concerns on the environmental and social safeguards policies by the World Bank as well as the host country regulations on the same.

The workshop participants were led through the four (4) core components of the intended project together with the sub-components involved and were then requested to give their views or any concerns that may emerge in tandem with the World Bank policies on safeguards measures.
Their views were as follows;

**Natural Resource Management**

Rehabilitation of water infrastructure: - This includes building new or rehabilitating existing water sources such as dams, water pans, boreholes and shallow wells. Participants raised concerns that such undertakings may result in negative impacts such as;

6. **Conflict**: - It was noted that conflicts could arise as people compete for water resources.

7. **Public health hazard**: - Dams were identified as a potential public health hazard as they act as breeding grounds for mosquitoes and snails which may infect humans.

8. **Soil erosion**: - Water pans were identified as major contributors to soil erosion hence mitigating measures would be needed.

9. **Death and Destruction**: - The proposed projects would also result in destruction of property and deaths e.g. if a dam were to burst. It was also noted that both humans and animals may drown in dam waters either accidentally or in the case of humans as a suicidal act.

10. **Resettlement**: - Some of the projects may result in displacement of persons e.g. dam construction

**Rangeland Rehabilitation**: - The sub component intends to revive exhausted pasture areas by reseeding. Impacts noted as likely to occur are;

5. **Invasive species** – New fodder species may not be compatible to the environment hence harmful and an example being the infamous “mathenge” was cited.

6. **Conflict over grazing lands** – This may arise due to competition among pastoralists over rangeland pasture.

7. **Fodder/seed bulking may entail use of pesticides and fertilizers, which could have negative impacts on the environment if indiscriminate application of pesticides and fertilizers are utilized.**

8. **Water sources may be depleted especially if irrigation activities entail over abstraction of the water resources from existing surface/sub surface bodies.**

**Marketing Infrastructure**

The component as proposed would include among others the rehabilitation and/or building of livestock markets and stock routes together with holding grounds. Likely impacts noted were;

8. **Soil erosion** – As livestock move through the migratory corridors, soil erosion is likely to occur.

9. **Conflict** – This could arise due to completion. It is noted that stock theft and compromised security is also likely to occur as animals are taken to the markets.

10. **Displacement** – People may end up being displaced e.g. when slaughterhouses/livestock markets are constructed.
11. Pesticide use – Misuse of pesticides may lead to negative impacts on the environment
12. HIV/AIDS – Enhanced markets may lead to life style change. This may lead to increased prevalence of HIV/AIDS and other diseases.
13. Family disruptions – This was noted as likely in cases where land may be sold by a household head without informing other family members.
14. Spread of livestock diseases – During movement to holding grounds, the animals may infect other animals on the way hence impact is adverse.

Livelihoods Support
This component entails livestock production and health as well as disease surveillance.

4. Vaccination – Waste generated from vaccine containers and needles require proper and sound disposal.
5. Livestock breed improvement – Improving breeds may risk in propagating diseases if the breeds are not approved or certified by competent authorities.
6. Irrigated fodder/bulking risks include depletion of water sources if indiscriminate abstraction is undertaken.

Alternative Livelihoods
This sub component looks at other alternatives to livestock keeping. It proposes starting up cottage industries such as:

7. Bee Keeping – Bees can sting so should be handled carefully. When harvesting honey, fire should be used well to avoid injury and property loss.
8. Pollution – Cottage industries such as hides and skins may pollute the air and surroundings.
9. Displacement may arise
10. Social conflict may arise
11. HIV/AIDS due to life style change, HIV/AIDS may be a major risk.
12. Human/Wildlife conflict may occur.
Annex C. Format of Project Report As Required by NEMA

Environmental Impact Assessment and Audit Regulations (EIA/EA) - Legal Notice No.121 of 2003.

PART II - THE PROJECT REPORT

7. (1) A proponent shall prepare a project report stating -
   a) The nature of the project;
   b) The location of the project including the physical area that may be affected by the project's activities;
   c) The activities that shall be undertaken during the project construction, operation and decommissioning phases;
   d) The design of the project;
   e) The materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal;
   f) The potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project;
   g) An action plan for the prevention and management of possible accidents during the project cycle;
   h) A plan to ensure the health and safety of the workers and neighbouring communities;
   i) The economic and socio-cultural impacts to the local community and the nation in general;
   j) The project budget; and
   k) Any other information the authority may require.

(2) In preparing a project report under this regulation, the proponent shall pay particular attention to the issues specified in the Second Schedule to these Regulations.

(3) A project report shall be prepared by an environmental impact assessment expert registered as such under these Regulations.

8. A proponent shall submit at least ten copies of the project report to the Authority or the Authority's appointed agent in the prescribed form accompanied by the prescribed fees.
Annex D. Format of ESIA Study Report

Environmental Impact Assessment and Audit Regulations (EIA/EA) - Legal Notice No.121 of 2003.

PART IV - THE ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT

18. (1) A proponent shall submit to the Authority, an environmental contents of impact assessment study report incorporating but not limited to the environmental following information -

a) The proposed location of the project;
b) A concise description of the national environmental legislative and regulatory framework,
c) A concise description of baseline information,
d) And any other relevant information related to the project; the objectives of the project;
e) The technology, procedures and processes to be used, in the implementation of the project;
f) The materials to be used in the construction and implementation of the project;
g) The products, by-products and waste generated project;
h) A description of the potentially affected environment;
i) The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short term and long-term effects anticipated;
j) Alternative technologies and processes available and reasons for preferring the chosen technology and processes;
k) Analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies.
l) An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures;
m) Provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the cause of carrying out activities or major industrial and other development projects;
n) The measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies;
o) An identification of gaps in knowledge and uncertainties which were encountered in compiling the information;
p) An economic and social analysis of the project;
q) An indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures; and
r) Such other matters as the authority may require.

Added components of the ESIA report to ensure World Bank (O P 4.01 Annex B) format is adhered to include:

1. Section on institutional capacity
2. Section on capacity building
3. Section on consultation

(2) The environmental impact assessment study report shall be accompanied by a non-technical summary outlining the key findings, conclusions and recommendations of the study.
and shall be signed by the proponent and environmental impact assessment experts involved in its preparation.

19. A proponent shall submit ten copies and an electronic copy of an environmental impact assessment study report to the Authority in Form 1B set out in the First Schedule to these Regulations accompanied by the prescribed fees.
Annex E. SAMPLE TERMS OF REFERENCE (TOR) FOR AN ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT FOR RPLRP SUB PROJECTS

1. Objectives of the ToR
This section should state the scope of the ESIA in relation to the screening category, and identify the geothermal project the ESIA will apply to. It should prescribe the process and its timing of project preparation, design, and implementation stages in order to adequately address Bank safeguards issues. Further, it should identify constrains (adequacy of existing baseline data and need for additional data) and provide and exact development schedule.

2. Background Information
The ToR should provide pertinent background for preparing the ESIA. This would include a brief description of:
- Statement of the project objectives,
- Implementing agency/sponsor and their requirements for conducting an ESIA,
- Project components, especially those that will finance subprojects;
- Anticipated types of subprojects/components, and what types will not be financed by the project;
- Areas of influence to be assessed (description plus good map)
- Summary of environmental/social setting
- Applicable Bank safeguards policies, and consequent Project preparation requirements, as specified in the approved ISDS.

The ToR should also include a brief history of the project, including alternatives considered, its current status and timetable, and the identities of any associated projects. Also include a description of other project preparation activities underway (e.g., legal analysis, institutional analysis, economic analysis, social assessment, baseline study) since the consultant preparing the ESIA will need to coordinate with other teams to ensure an effective and efficient information exchange.

3. EA Requirements/Regulations
This paragraph should identify any regulations and guidelines which will govern the conduct of the assessment or specify the content of its report. They may include any or all of the following:
- National laws and/or regulations on environmental assessments;
- Regional, provincial or communal environmental assessment regulations;
- Environmental assessment regulations of any other financing organizations involved in the project.
- Relevant international environmental agreements/conventions to which the country is party

4. Study Area and Likely Major Impacts
Specify the area involved and the boundaries of the study area for the assessment (e.g., water catchment). Where appropriate specify the right-of-way (ROW)-width and alignment for pipelines. Similarly, specify locations for transmission substations, pumps.
Identify adjacent or remote areas which should be considered with respect to impacts of particular aspects of the project.

5. **Scope of Work**
In some cases, the tasks to be carried out by a consultant will be known with sufficient certainty to be specified completely in the terms of reference. In other cases, information deficiencies need to be alleviated or specialized field studies or modelling activities performed to assess impacts, and the consultant will be asked to define particular tasks in more detail for contracting agency review and approval.

**Task 1. Description of the Proposed Project.** Provide a brief description of the relevant parts of the project, using maps (at appropriate scale) and including the following information: location of all project related development sites and ROW’s, including offsite investments; general layout; flow diagrams/drawings of facilities/operation design basis, size, capacity, flow-through of unit operations, including pollution control technology; pre-construction activities; construction activities; schedule; staffing and support; facilities and services; commissioning, operation and maintenance activities; required offsite investments; and life expectancy for major components. [Note: there may be particular types of information appropriate in the description of the project category you are concerned with. Please specify them here.]

Include the need for any resettlement plan or indigenous people development plan.

Provide maps at appropriate scales to illustrate the general setting of project-related development sites and ROW’s, as well as surrounding areas likely to be impacted. These maps should include topographic contours, as available, as well as locations of major surface waters, roads, railways, town centers, parks and reserves, and political boundaries. Also provide, as available, maps to illustrate land use, including industrial, residential, commercial and institutional development, agriculture, etc.

**Task 2. Description of the Environment (baseline condition).** Assemble, evaluate and present baseline data on the relevant physical, biological, and socio-economic characteristics of the development area and area of influence. Include information on any changes anticipated before the project commences. [Annotate or modify the lists below to show the critical information for this project category, or that which is irrelevant to it. You should particularly avoid compiling irrelevant data.]

a.) Physical environment: geology (e.g., stratigraphy and seismic history of development areas, integrity of geological layers protecting portable groundwater supplies); topography (e.g., drainage patterns around construction areas); soils (e.g., agricultural value); climate and meteorology; ambient air quality; existing sources of air emissions; surface and groundwater hydrology (e.g., soil erosion and sedimentation potential, flood hazard potential); water resources (e.g., adequacy of water supply) coastal and oceanic parameters; existing water pollution discharges, and receiving water quality (e.g., ability to assimilate effluent discharges and maintain water quality standards for desired uses).

b.) Biological environment: flora (e.g., types and diversity); fauna (e.g., resident and migratory); rare or endangered species within or in areas adjacent to project related development sites or ROW’s; sensitive habitats, including parks or preserves, significant natural sites, etc.; species of commercial importance; and species with potential to become nuisances, vectors or dangerous.
c.) Socio-cultural environment (include both present and projected where appropriate): population; land use (e.g., year-round and seasonal); planned development activities; community structure; employment; distribution of income, goods and services; recreation; public health; cultural properties (e.g., archeological and historically significant sites); indigenous peoples and traditional tribal land; and customs, aspirations and attitudes.

**Task 3. Legislative and Regulatory Considerations.** Describe the pertinent regulations and standards governing environmental quality, health and safety, protection of sensitive areas, protection of endangered species, siting, land use control, etc., at international, national, regional and local levels (The TOR should specify those that are known and require the consultant to investigate for others.) If transboundary impacts are likely, relevant international conventions should be described.

**Task 4. Determination of the Potential Impacts of the Proposed Project.** Predict and assess all significant impacts that the project is likely to generate, in quantitative terms as far as possible. Assess the impacts from changes brought about by the project on baseline environmental conditions as described under Task 2.

In this analysis, distinguish between significant positive and negative impacts, direct, indirect, and cumulative impacts, and immediate and long-term impacts. Identify impacts that may occur due to accidental events. Identify impacts which are unavoidable or irreversible. Wherever possible, describe impacts quantitatively, in terms of environmental costs and benefits. Assign economic values when feasible. Impact analyses for sub projects should be divided between construction impacts and operational impacts.

Characterize the extent and quality of available data, explaining significant information deficiencies and any uncertainties associated with predictions of impact. If possible, give the TOR for studies to obtain the missing information. [Identify the types of special studies likely to be needed for this project category.] For information not be obtainable until after execution, provide TOR for studies to monitor operations over a given time period and to modify designs and/or operational parameters based upon updated impact analysis.

**Task 5. Analysis of Alternatives to the Proposed Project.** Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives which would achieve the same objectives. The concept of alternatives extends to siting, design, technology selection, construction techniques and phasing, and operating and maintenance procedures. Compare alternatives in terms of potential environmental impacts; capital and operating costs; suit-ability under local conditions; and institutional, training, and monitoring requirements. When describing the impacts, indicate which are irreversible or unavoidable and which can be mitigated. To the extent possible, quantify the costs and benefits of each alternative, incorporating the estimated costs of any associated mitigating measures.

Include the alternative of not constructing the project to demonstrate environmental conditions without it. Alternatives should include the following: the “no action” alternative (as mentioned above); alternative means of meeting the energy requirements; the alternative of upgrading existing facilities; alternative routes and sites; alternative design; and alternative methods of construction, including costs and reliability.
Task 6. Development of an Environmental Management Plan (EMP). Recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels. Include measures to address emergency response requirements for accidental events.

Estimate the impacts and costs of those measures, and of the institutional and training requirements to implement them. Consider compensation to affected parties for impacts which cannot be mitigated. Prepare a management plan including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures. Provide environmental protection clauses for application by contractors and consultants.

*The ToR should state that the concerned and affected parties should agree mitigating measures before they are submitted as recommendations in the EMP*

Task 7. Identification of Institutional Needs to Implement Environmental Assessment Recommendations. Review the authority and capability of institutions at local, provincial/regional, and national levels and recommend steps to strengthen or expand them so that the management and monitoring plans in the environmental assessment can be implemented. The recommendations may extend to new laws and regulations, new agencies or agency functions, intersectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting, and financial support.

Task 8. Development of a Monitoring Plan. Prepare a detailed plan to monitor the implementation of mitigating measures and the impacts of the project during construction and operation. Include in the plan an estimate of capital and operating costs and a description of other inputs (such as training and institutional strengthening) needed to implement the plan.

*Depending upon local conditions and predicted impacts upon communities/individuals, there may be a need for a Resettlement Action Plan.*

Task 9. Assist in Inter-Agency Coordination and Public/NGO Participation. Assist in coordinating the environmental assessment with other government agencies, in obtaining the views of local NGO’s and affected groups, and in keeping records of meetings and other activities, communications, and comments and their disposition. (The Terms of Reference [TOR] should specify the types of activities; e.g., interagency scoping session environmental briefings for project staff and interagency committees, support to environmental advisory panels, public forum.). Review the authority and capability of institutions at local, provincial/regional, and national levels and recommend steps to strengthen or expand them so that the management or monitoring plans in the environmental assessment are likely to be implemented. The recommendations may extend to new laws and regulations, new agencies or agency functions, intersectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting, and financial support.

*Relevant material will be provided to affected groups in a timely manner prior to consultation and in a form and language that is understandable and accessible to the groups being consulted. The consultant should maintain a record of the public consultation and the record should indicate: means other than consultations (e.g., surveys) used to seek the views of affected stakeholders; the date and location of the consultation meetings, a list of the attendees and their affiliation and contract address: and summary minutes.*
6. **Report.**
The environmental assessment report should be concise and limited to significant environmental issues. The main text should focus on findings, conclusions and recommended actions, supported by summaries of the data collected and citations for any references used in interpreting those data. Detailed or uninterpreted data are not appropriate in the main text and should be presented in appendices or a separate volume. Unpublished documents used in the assessment may not be readily available and should also be assembled in an appendix. Organize the environmental assessment report according to the outline below. (*This is the format suggested in OP4.01; the ToR may specify a different one to satisfy national agency requirements as long as the topics required in the Bank’s OP are covered.)*

- Executive Summary
- Policy, Legal and Administrative Framework
- Description of the Proposed Project
- Baseline Data (Description of the Environment)
- Significant Environmental Impacts
- Analysis of Alternatives
- Environmental Management Plan
- Environmental Management and Training
- Environmental Monitoring Plan
- Inter-Agency Coordination and Public/NGO Participation
- Appendices: List of Environmental Assessment Preparers References Record of Interagency/Forum/Consultation Meetings (*This is the format suggested in OD 4.01; the TOR may specify a different one to satisfy national agency requirements as long as the topics required in the Bank's directive are covered.)*

7. **Consulting Team**
Environmental assessment requires interdisciplinary analysis. The general skills required of an environmental assessment team are: environmental management planning, ecology, hydrology/hydrogeology, and water quality analysis.

(*Identify in this paragraph which specializations ought to be included on the team for the particular project category.*)

*Note: The team will be required to work closely with specialists undertaking the social analysis and to define arrangements for the final report, especially if the EA and social analysis are to be combined in one report.*

8. **Services, Facilities and Materials to be provided by the Client**
The ToR should specify what services, facilities and materials will be provided to the Consultant by the World Bank and the Borrower, for example:

- The Project ISDS and draft PAD;
- Relevant background documentation and studies;
- Example ESMFs that demonstrate best practice, especially from the region or country;
- Making all necessary arrangements for facilitating the work of the Consultant and to provide access to government authorities, other Project stakeholders, and Project sites.

10. **Schedule and Deliverables**
Specify dates for the consultancy deliverables (e.g. detailed work plan within 2 weeks, interim report within 7 weeks, and final draft report within 10 weeks of contract signature), and the overall duration of the consultancy (e.g. 15 weeks from contract signature).

11. Technical Proposal Contents
The ToR should require a technical proposal that at least:

- Demonstrates that the Consultant understands the overall scope and nature of the ESIA preparation work, and what will be required to respond satisfactorily to each component of the ToR;
- Demonstrates that the Consultant and his proposed team have relevant and appropriate experience to carry out all components of the ToR. Detailed curriculum vitae for each team member must be included;
- Describes the overall methodology for carrying out each component of the ToR, including desk and field studies, and data collection and analysis methods; and
- Provides an initial plan of work, outputs, and staff assignments with levels of effort by task.

12. Budget and Payments
The ToR should indicate if there is a budget ceiling for the consultancy. The ToR should specify the payment schedule (e.g. 10% on contract signature, 10% on delivery of detailed work plan, 40% on delivery of interim report, 30% on delivery of final draft ESIA, and 10% on delivery of final ESIA).

8. Other Information
Include here lists of data sources, project background reports and studies, relevant publications, and other items to which the consultant's attention should be directed.
### Annex F: Format of an Annual Environmental Report

#### Environmental Authority:

| Reporting dates: | [ ] |

| District/County: | [ ] |

#### Sub projects approved:

<table>
<thead>
<tr>
<th>Project Investment Title</th>
<th>Activities</th>
<th>Project phase (1)</th>
<th>Environmental Category</th>
<th>ESIA / ESMP completed?</th>
<th>Environmental Permit granted?</th>
<th>Effectiveness of ESMP</th>
<th>Issues (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(name, location, title or reference)</td>
<td>(new construction, rehabilitation, maintenance)</td>
<td>See note below</td>
<td>(A, B or C)</td>
<td>Yes, No or N/A</td>
<td>Yes, No or N/A</td>
<td>Good, poor, or needs improvement</td>
<td>See note below</td>
</tr>
</tbody>
</table>

1
2
3
etc

#### Sub projects rejected:

<table>
<thead>
<tr>
<th>Subproject title</th>
<th>Activities</th>
<th>Reasons for rejection</th>
<th>Remarks (3)</th>
</tr>
</thead>
</table>

1
2
etc
Annex G: Pesticides Management Plan

INTRODUCTION

Introduction
According to FAO (1989), a pesticide is any substance or mixture of substances intended for preventing, destroying, or controlling any pest including vectors of human or animal diseases, unwanted species of plants or animals causing harm during, or otherwise interfering with, the production, processing, storage, or marketing of food, agricultural commodities, wood and wood products, or animal feedstuffs, or which may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. The activities funded under the RPLRP could lead to the increased use of pesticides and therefore to ensure that pesticide use issues are managed in an integrated manner and also to comply with national legislation and World Banks Safeguard Policies, it is imperative to have an effective and sustainable Pesticide Management Plan. The proposed RPLRP sub projects which are likely to use chemicals, including pesticides will have to list all the pesticide products authorised for procurement and they should be products registered by the Pesticide Control and Product Board of Kenya (PCPBK).

Purpose and Scope
The Pest Management Plan is meant to ensure a guided storage, handling and application of pesticides. The plan includes comprehensive strategies for handling, transportation and application of pesticides in compliance with national and international requirements relating to different agrochemicals.

KEY LAWS AND POLICIES

There are many statutes that deal with pests and diseases directly and others that are indirectly connected with pest control and management. These include:

Chapter 324 – Plant Protection Act

This Act makes a provision for the prevention of the introduction and spread of diseases destructive to plants. The most applicable parts of this Act to Integrated Pest Management are specified in Sec. 3, 4, 5, 6, 7 and 8.


Chapter 326 – Seeds and Plants Variety Act

This Act regulates transactions in seeds, including provision for the testing and certification of seeds; for the establishment of an index of names of plant varieties; to empower the imposition of restriction on the introduction of new varieties; to control the importation of seeds; to authorize measures to prevent injurious cross-pollination; to provide for the grant of proprietary rights to persons breeding or discovering new 13 varieties. The act includes subsidiary legislation
on seeds and plant varieties (seeds) regulations, registration of seed growers, seed certification and seed importation and exportation.

**Chapter 347 on Irrigation**

The Act makes regulations for the administration and day-to-day control of national irrigation schemes and standards of good husbandry and the control of pests and diseases in national irrigation schemes.

**Chapter 346: Pest Control Products**

This Act covers the use, application, importation and trade in pest products. It includes regulation on:

(ii) Prescribing for the purposes of this Act the nomenclature of pests, pest control products and classes and kinds of pests and pest control products;

(iii) Prescribing the form in which applications for registration shall be made and the information to be furnished therewith;

(iv) Respecting the registration of pest control products and establishments in which any pest control products are and led by manufacturers or dealers and prescribing the fees therefore, and respecting the procedures to be followed for the review of cases involving the refusal, suspension or cancellation of the registration of any such product or establishment;

(v) Prescribing the form, composition, and all other standards relating to the safe use of pest control products, including toxic residue effects;

(vi) Respecting the manufacture or treatment of any pest control product to facilitate its recognition by change in colouration or other means;

(vii) Respecting the standards for efficacy and safety of any pest control product;

(viii) Respecting the manufacture, storage, distribution, display and use of any pest control product;

(ix) Respecting the packaging, labeling and advertising of pest control products;

(x) Respecting the taking of samples and the making of analyses for the purposes and provisions of this Act;

(xi) Prescribing the information to be supplied and the form of such information in respect of any pest control product that is to be imported into Kenya;

(xii) Prescribing the circumstances and conditions under which pest control products that have met the requirements of the Cattle
Cleansing Act may be deemed to be registered as prescribed under this Act;

**Chapter 343 - Tea**

The Act establishes the Tea Board of Kenya and charges it with various responsibilities and gives it powers to promote the tea industry in Kenya that includes pest control and management.

**Chapter 335 – Cotton**

The Act establishes The Cotton Lint and Seed marketing Board mandated to monitor cotton growing, cotton ginning, and management of cotton diseases and pests;

**Chapter 338 - National Cereals and Produce Board**

This Act regulates and controls the marketing and processing of mainly maize, wheat and scheduled agricultural produce.

**Chapter 364 - Animal Diseases**

This Act provides regulation on matters related to the diseases of animals. The Legislation regulates importation of animals and provisions affecting infected areas such as prohibition of the importation or the exportation of all animals or any specified kinds of animals, or of carcasses, meat, hides, steins, air, wool, litter, dung, semen, live viruses capable of setting up infections in animals, sera, vaccines and other biological or chemical products intended to be used for the control of animal disease or fodder, from any specified country, port or territory.

**Chapter 128 – Chiefs’ Authority**

The Act has two items on pests and diseases:
(i) Section 11 giving the Chiefs powers to issue orders for suppressing or controlling animal or insect pests or plant pests, noxious weeds or diseases and

(ii) Section 12 giving Chiefs power to require work or services in emergency in connection with an emergency consequent on fire, flood, earthquake, violent epidemic or epizootic disease, invasion by animal or insect pests or plant diseases or pests, or arising from circumstances which would endanger the existence of the whole or any part of the population, to be done or rendered, he may, in writing, authorize any chief to issue orders under this section to persons within the jurisdiction of such chief, and any chief so authorized may by any such order require any able-bodied adult person to perform any such work or render any such service as aforesaid specified in such order.

**Chapter 325 - Suppression of Noxious Weeds**

The act regulates declaration of plants as noxious weed (G.N.1721/1955, L.N.173/1960) and to eradicate it The Local Authorities have powers under Cap. 265 (L.N.256/1963) to eradicate any noxious weed from land within its area and for compelling owners or occupiers of land to cause
any such weed to be eradicated from their land, and for such purposes by-laws may appoint or provide for the appointment of inspectors.

**Chapter 265 Local Government**

The act empowers the council to make laws (L.N.22/1984) in respect of all such matters as are necessary or desirable for the maintenance of the health, safety and well-being of the inhabitants of its area or any part thereof and for the good rule and government of such area or any part thereof and for the prevention and suppression of nuisances therein.

As can be seen from these sections of the statutes, there is no central coordinating body in ensuring that all the institutions, statutes and players carry out the pest and disease control in a systematic and coordinated body as each of the legislations specifies the authorized officers to implement these laws. One of the problems that could be facing pest management strategies in Kenya seems to lie in the weak policy, institutional and legal linkages among the key players. This weakness forms one of the major gaps to be addressed in the proposed Integrated Pest Management Framework in this report and especially on the Participatory Monitoring and Evaluation Framework.

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**CLASSIFICATION OF PESTICIDES**

The WHO bases its toxicity ratings on the lowest published rat oral LD$_{50}$, the lethal dose (in milligrams of substance per kilogram of body weight) that kills 50% of the test animals in a standard assay (WHO, 2010). WHO gives a hazard ranking of Ia (Extremely Hazardous) to the most hazardous pesticide active ingredients. While the WHO ratings generally reflect acute toxicity, they also take into account other toxic effects such as reproductive and developmental
toxicity. WHO does not evaluate the fumigants, a class of gaseous pesticides that are generally extremely hazardous, nor does it evaluate pesticides believed obsolete or discontinued (WHO, 2010).

<table>
<thead>
<tr>
<th>WHO Toxicity Classification</th>
<th>Rat LD_{50} (mg of chemical per kg of body weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>Ia</td>
<td>Extremely hazardous</td>
</tr>
<tr>
<td>Ib</td>
<td>Highly hazardous</td>
</tr>
<tr>
<td>II</td>
<td>Moderately hazardous</td>
</tr>
<tr>
<td>III</td>
<td>Slightly hazardous</td>
</tr>
<tr>
<td>Table 5</td>
<td>Unlikely to present acute hazard in normal use</td>
</tr>
<tr>
<td>Table 6</td>
<td>Not classified: believed obsolete</td>
</tr>
<tr>
<td>Table 7</td>
<td>Fumigants not classified by WHO</td>
</tr>
</tbody>
</table>

**PROCUREMENT OF PESTICIDES**

World Bank Safeguard Policy 4.09 on Pest Management: Minimize and manage the environmental and health risks associated with pesticide use and promote and support safe, effective, and environmentally sound pest management.

The procurement of any pesticide in a Bank-financed project is contingent on an assessment of the nature and degree of associated risks, taking into account the proposed use and the intended users. With respect to the classification of pesticides and their specific formulations, the Bank refers to the World Health Organization's Recommended Classification of pesticides by Hazard and Guidelines to Classification (Geneva: WHO 1994-95). The following criteria apply to the selection and use of pesticides in Bank-financed projects:

- They must have negligible adverse human health effects.
- They must be shown to be effective against the target species.
- They must have minimal effect on non-target species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies. Pesticides used in public health programs must be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them.
- Their use must take into account the need to prevent the development of resistance in pests.
The Bank requires that any pesticides it finances be manufactured, packaged, labelled, handled, stored, disposed of, and applied according to standards acceptable to the Bank. The Bank does not finance formulated products that fall in WHO classes IA and IB, or formulations of products in Class II, if:

- The country lacks restrictions on their distribution and use; or
- They are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly.

The Bank also requires that any pesticides it finances be manufactured, packaged, labelled, handled, stored, disposed of, and applied according to standards acceptable to the Bank. The Bank does not finance formulated products that fall in WHO classes IA and IB, or formulations of products in Class II, if:

- The country lacks restrictions on their distribution and use; or
- They are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly.

**MANAGEMENT OF PESTICIDES**

Improper storage, handling, transportation, treatment and disposal of pesticides can be a risk to human health and the environment through leakage of toxins into groundwater, soil, and the atmosphere. Populations may potentially be affected when pesticides are ingested through contaminated water sources and polluted air, and when poor labour practices put workers in direct contact with pesticides. This means, the project will observe a number of measures to ensure proper handling and application of agro-chemicals.

**Routine pesticide store management procedures**

- The storekeeper should put on essential protective clothing (overalls and boots) upon arrival at the pesticide store.
- There should be a quick daily inspection of drums and containers to ensure that there have been no overnight spills or leaks.
- Spilled and leaked pesticide must be cleaned up immediately;
- Drums and containers should be thoroughly inspected monthly for leaking seals, split seams and corrosion.
- Leaking or old drums should be removed and their contents transferred to empty containers. Appropriate protective clothing should be worn and precautions taken. Replacement containers should be sealed and relabelled.
- Transfer of chemicals to new containers should be recorded on the stock record sheet.
- Dates on labels of containers in the store should be checked monthly and outdated stock separated for disposal. Any labels in poor condition should be replaced.

**Arrival of a consignment of agro-chemicals at the store:**
• The back of the transport vehicle should be checked for spills and the containers for leaks or broken seals; the vehicle should be decontaminated of any spills. Chemicals from containers with leaks or split seams should be transferred to empty containers in good condition and relabelled.
• Pesticide containers should be carefully unloaded from the delivery vehicle. The delivery note should be examined and check-list of chemicals arriving at the store should be prepared on a stock record sheet.
• Containers of chemicals placed in the store should be set on floor dunnage and stacked using wooden pallets as necessary.
• The location of chemical containers in the store should be recorded on the stock record list.

Taking agro-chemicals from the store for pest control purposes
• The condition of the transport vehicle should be checked before placing containers of agro-chemicals in it. It should also be ensured that no foodstuffs are to be carried on the same vehicle.
• The removal of agro-chemicals from the store should be recorded on the stock record sheet.
• The stock first deposited in the store should be the first to be taken out.
• Pesticide containers should be carefully loaded on to the dispatch vehicle and the driver provided with a delivery note.

Rules for proper pesticide storage and stock management
• Pesticide stores should not be located near water bodies.
• The storage capacity (total storage surface) should be sufficient to store the total stock of agro-chemicals at any time.
Each store should have at least the following:
• Sufficient ventilation openings to avoid unnecessarily high temperatures;
• Floors be made of, or covered by, impermeable concrete or impervious cement (as a temporary measure, floors may be covered with a large and thick polyethylene sheet);
• Ramps at entrances to contain any major leakage within the store;
• Doors that are lockable and bars across ventilation holes and windows to prevent unauthorized entry.
• The floors of the stores should have a layout of separate blocks with aisles between them. Ideally, the outline of the blocks should be painted on the floor. Each block should contain only one product. There should be sufficient space between blocks to move containers freely, enable the inspection of containers and treat leakages. Drums should be stacked in such a way that each can be inspected from the aisles between the blocks. Drums and bags should be stored on pallets. The number of containers stacked on top of each other should not exceed the stacking recommendations for the type of container concerned. Over stacking may lead to rupture of lower containers down and reduces access to containers.
• Pesticide stores should only contain pesticides. All other goods or objects should not be mixed in the agro-chemical stores.
- Expired and obsolete agro-chemicals should be separated from in use or non-expired stocks.

Each store should have the following for dealing with emergencies:
- A few bags of sawdust and/or sand to absorb leaked or spilled pesticides;
- A number of empty containers (preferably salvage drums that can contain a whole 200-litre drum) and empty bags to repack heavily damaged or leaking containers;
- Spade and brush;
- Fire extinguisher;
- First Aid box.
- Protective gear for staff to enable them to deal with emergencies (nitrile rubber or neoprene gloves, rubber boots, overalls, goggles, vapour masks or half-face respirators with organic vapour cartridges)
- Water supply from a tap, or a container of water, to wash hands and face if these become contaminated; and
- Eyewash set.
- The contents of leaking or heavily damaged agrochemical containers should be repacked in appropriate replacement containers. Repacked agro-chemicals should be labelled immediately. Stores should be inspected regularly and any leakage or contamination should immediately be cleaned up.
- Storekeepers should keep a record of the stocks in their custody and such recorded information should include the date of arrival, formulation, quantity, unit size, date of manufacture, supplier, and origin for incoming pesticides. For outgoing pesticides, the date, formulation, quantity, unit size, and destination. Records should also regularly be updated.
- A "first in - first out" principle should be applied consistently. In other words, always finish old consignments before using newly arrived consignments.

**Essential Equipment within a Pesticide Store**
- Thick polyethylene sheeting on floor (if surface is not concrete or otherwise impermeable)
- Floor dunnage (bricks, timber)
- Wooden pallets
- Ramps at entrance to contain leakage
- Entrance door with lock to prevent unauthorized entry
- Bars across windows and ventilators to prevent unauthorized entry
- Container of absorbent sand, sawdust or dry soil
- Shovel
- Long-handled brush with stiff bristles
- Short-handled brush and pan
- Water supply, or container of water, with soap
- Detergent solution
- Drum spanners
- Metal funnels
- Protective clothing:
- Empty pesticide containers (preferably salvage drums that can contain a whole 200-litre drum)
- Empty bags to repack heavily damaged or leaking containers
- Self-adhesive warning labels for marking drums
- Stock record sheets

**Stacking Positions and Heights**

Agro-chemical stock be arranged in such a manner that, the oldest first ("first in first out" principle) and to prevent expired/obsolete stock from accumulating in the store. Containers are to be arranged to minimize handling and thus, avoid mechanical damage giving rise to leaks. Floor spaces should be uncluttered, with marked, 1-m wide, gangways between shelves or stacks that permit easy inspection and allow free air flow. This also enables immediate clean-up in the event of any leakage or spills, which can be seen quickly. Climbing on pesticide containers to reach other containers should not be necessary - damaged or corroded metal drums can easily give way under a person's weight and this leads to potentially fatal gross contamination with pesticide.

Dunnage (timber and bricks) should be used so that, containers are not placed directly on the floor. Stacked containers should be on pallets. Any possible corrosion resulting from rising damp or leaking chemicals should be promptly detected and timely addressed. Dust, granule and wettable powder formulations should be kept in cartons during storage to avoid caking. Concentrate formulations, especially those in glass bottles, should also be kept in cartons to avoid breakage. Storage shelves should not exceed a height of 2 m to avoid the use of ladders. Containers should not exceed a height of 107 cm on each pallet. Containers and cartons should be stacked at safe heights ensuring that they are stable.

<table>
<thead>
<tr>
<th>Package type</th>
<th>Number of layers on basal pallet</th>
<th>Palletized: number of packages on each pallet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel drums (200 l)</td>
<td>1</td>
<td>3-4</td>
</tr>
<tr>
<td>Steel drums (smaller than 200 l)</td>
<td>2</td>
<td>3-4</td>
</tr>
<tr>
<td>Fibre drums (200 l)</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Fibre drums (smaller than 200 l)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Plastic drums (200 l)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Plastic drums (smaller than 200 l)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Paper sacks</td>
<td>4-5</td>
<td>3</td>
</tr>
<tr>
<td>Plastic sacks</td>
<td>4-5</td>
<td>3</td>
</tr>
<tr>
<td>Fiber case containing tins</td>
<td>4-6</td>
<td>3-4</td>
</tr>
<tr>
<td>Fiber case containing</td>
<td>4-6</td>
<td>2</td>
</tr>
</tbody>
</table>
**Record Keeping**

Since a number of agro-chemicals tend to have a limited shelf-life, it is essential that only sufficient pesticide will ordered for requirements and that issues are made on a "first in -first out" basis. This is aimed at ensuring that, no huge amounts of agro-chemicals accumulate due over-stocking etc. and slow pace of usage. Records will be kept separate from the pesticide stock so that they are not destroyed in the event of a major disaster (such as fire, flood, earthquake, hurricane or destruction during civil unrest).

Records will be kept as sheets in a ledger or in card index form. Duplicate records adjacent to the stock itself may also be required, perhaps in simplified form. Again, a supply of material safety data sheets will be requested from the supplier or manufacturer. Records are to be accurate and with sufficient details to enable a replacement storekeeper to take over responsibility without necessarily having to refer to the previous storekeeper. This will enable smooth operations of the stores.

As noted, agro-chemicals have a limited shelf-life, and stock batches bought at different times may vary in formulation and packaging. It is important that a completely separate record be allocated to each consignment of different agro-chemicals as it is received by the store. The national authority responsible for the procurement of agro-chemicals needs to be regularly updated on stocks kept in various locations in the country and stores should be able to supply this information.

A possible layout for a pesticide store record sheet is given below. The store record sheet allows the progress of each consignment of a particular pesticide to be followed from receipt, through inspections, stocktaking and checking to issues, analysis of stock after the shelf-life has expired and disposal when deterioration has been established.

The store supervisor should ensure that there is an adequate system being followed by the storekeeper at all times. The storekeeper should be trained in the use of the records system and must be responsible for its upkeep.

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### Sample pesticide store stock record sheet

<table>
<thead>
<tr>
<th>Pesticide group</th>
<th>Insecticide OP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ref. no.</td>
<td>Inv 29/5[R3]</td>
</tr>
<tr>
<td>Common name</td>
<td>Chlorpyrifos</td>
</tr>
<tr>
<td>Trade name</td>
<td>Dursban</td>
</tr>
<tr>
<td>Formulation/concentration</td>
<td>% EC, 400 g/litre</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Manufacturer/supplier</td>
<td>Dow Elanco, USA</td>
</tr>
<tr>
<td>Quantity (agreed issuing quantity/package)</td>
<td>1 000 2.5-litre plastic containers</td>
</tr>
<tr>
<td>Primary packaging quantity</td>
<td>Four containers of 250 cartons</td>
</tr>
<tr>
<td>Date received</td>
<td>20 December 2013</td>
</tr>
<tr>
<td>Use-by date</td>
<td>1 December 2015</td>
</tr>
</tbody>
</table>

Workers Safety and Protection
There are certain measures which should always be undertaken by pesticide operators to help protect against contamination during the handling and application of pesticides. These measures should always be followed.

Reading and Understanding Labels
The first principle is to always read and follow the label recommendations on the pesticide container. If the label information cannot be read or understood for any reason, then the operator should find someone who can explain the instructions to him. Apart from the written instructions, the operator should also look for pictorial information on the label which will indicate the degree of hazard presented by the pesticide formulation. Similarly, warning symbols, such as skull and crossbones, give information on the type of chemical hazard.

Know how to read the pesticide label i.e. common, active ingredient (chemical), and trade name of the pesticide on the label.
- Know how to identify the percentage of active ingredient in the pesticide formulation; and
- Understand the hazard levels associated with pesticides ions e.g. quantity, pests, dates, locations etc.

Things to know on pesticide labels include:
- Trade (Product) Name, every manufacturer has a specified commercial trade name for their product. The trade name may indicate the type of formulation and the percentage of active ingredient (chemical in the pesticide responsible for the pesticidal activity). For example: Diazinon 60EC is the trade name and it contains 60% of Diazinon as the active ingredient and it is an emulsifiable concentrate (EC). Diazinon can also be marketed as “Sunzinon 60EC” or “Trisudin 60EC”.
- Ingredient Statement. Every pesticide label should have the name and the percentage of the active ingredient (AI) and any inert ingredients which is usually not named. Inert ingredients do not possess pesticide activity and are usually added to serve as a carrier for the AI Classification Statement.
- “Restricted Use” means that the pesticide is for retail sale only and to be used only by certified operators or persons under their direct supervision. Unclassified pesticides are common general use pesticides which can be purchased and used by the general public.
- Type of Pesticide. The type of pesticide is listed on the front panel of the pesticide label. For example: “Insecticide for the control of insects on vegetables and ornamentals”.

- Net Contents usually expressed as grams for dry formulations or liters for liquid formulations.
- Signal Word and Symbols, most pesticides should have a signal word which indicates approximately how toxic the pesticide product is.

**Avoiding Contamination** - Direct exposure of the skin, nose, mouth or eyes should be avoided or minimized when working with pesticide products to reduce the chances of personal contamination.

When pouring and mixing the concentrated product, every effort should be made to avoid splashing or spilling onto skin or clothing. If any product falls on the skin, or into the eyes, then this should be washed off as soon as possible. Heavily contaminated clothing must be removed and washed with detergent and water.

The likelihood of contamination can be greatly reduced by using suitable equipment for measuring out and transferring the product. In particular the hands must never be used as scoops nor should the hands or arms be used to stir liquids.

The most appropriate application technique should be selected to control the pest problem. It is very important that the application equipment is in a good state of repair and that it is properly maintained and calibrated.

When spraying the diluted product the applicator should always work upwind of the spray to avoid coming into contact with it. He should also avoid contact with freshly sprayed foliage as far as possible.

**Personal Hygiene** - Another basic principle of personal protection is good hygiene when working with pesticides. This is to ensure that if any contamination occurs then it is removed in good time. In addition personal habits will help avoid direct contamination in itself.

Operators should not eat, drink or smoke during work and should not touch their face or other bare skin with soiled hands or gloves. They should always wash their hands and face after handling pesticides and before eating, drinking, smoking or going to the toilet. When they have finished work for the day they should then wash themselves thoroughly. Their work clothes should also be washed after work, separately from other clothing, and then dried.

**Safety Gear** - For the effective safety and protection of the workers handling agro-chemicals, the provision of the following is deemed necessary.

- Helmet or cloth cap
- Safety spectacles, goggles or face shield (attached to helmet)
- Dust or light fume masks
- Emergency vapor masks or half-face respirators with organic vapor cartridges
- Nitrile rubber or neoprene gloves or gauntlets
- Overalls
- Nitrile rubber or neoprene aprons
- Strong rubber or neoprene boots
In hot weather conditions, wearing of additional protective clothing and other equipment can cause severe discomfort and even physical distress due to heat stress if they are made of inappropriate materials. In addition, because of the discomfort, operators may dispense with protective apparel and become subject to greater exposure and possible contamination. There are certain measures which can help reduce this problem, namely:

a) Where possible using a pesticide formulation which does not require the wearing of additional items of protective clothing;

b) Applying the pesticide in the cooler hours of the day when it is more comfortable to wear protective equipment.

Given the climate in Kenya, cotton may be the most comfortable material for making up protective garments and should be readily available on the market. The protection given by cotton depends upon its weight and thickness, therefore it is advisable to choose garments with the material as thick and as heavy as can be worn with reasonable comfort in the prevailing climate.

Another alternative material for wearing in the hot and humid conditions includes non-woven polypropylene. This material is as comfortable as cotton in these conditions but is less durable and therefore will have to be replaced more often according to the type of work involved.
Fire Emergencies

Pesticides, especially those formulated as liquids, present major fire hazards because the solvents used in formulations (oils and petroleum distillates) have low flashpoints and may be readily vaporized at normal temperatures. In poorly ventilated stores heavy vapors may likely accumulate near the floor if drums are left open or if leaks and spills are not cleared up. An electrical spark, naked flame or even the sun's rays concentrated by a glass container can potentially cause an explosion which can trigger and spread fire.

It is also important to note that, some wettable powders can start fires through spontaneous combustion, while sodium chlorate (used as a herbicide, defoliant, desiccant and soil sterilant) is a powerful oxidizing agent that easily catches fire and should only be supplied with a fire suppressant in the formulation (once sodium chlorate containers have been opened their entire contents should be used immediately).

The outside of pesticide stores should bear prominently displayed WARNING NOTICES stating "DANGER PESTICIDES: AUTHORIZED PERSONS ONLY" AND "NO SMOKING: NO NAKED FLAME" AS WELL AS HAZARD SYMBOLS. It is important that, rules governing the operations of the agro-chemical stores be strictly followed by all project staff.

The pesticide storage area must have a warning sign prominently displayed at the entrances bearing, in clearly visible, block letters, the words:

- Warning;
- Authorized Persons Only and
- Chemical Storage or Pesticide Storage

![Warning Signage Outside the Store](image1.png)

![SMOKING SIGN in and outside the stores](image2.png)

This is possible by training of staff on safety aspects of agro-chemical storage, handling and application.
Fire extinguishers (powder or carbon dioxide, not water) should be available in the reach of the store and should be regularly checked. Static or running water (required, together with soap, for decontamination purposes) should also be available and buckets of sand or earth (also required for absorbing any liquid pesticide spills or leaks) are useful for putting out small fires.

In the event of a fire, it is essential to try to contain the agro-chemicals that leak from burning and exploding containers in the store. Hence, the need for bunding to be done around the store to prevent the water used to fight the fire, which inevitably becomes contaminated with pesticides, from contaminating the neighborhood and thus the environment generally.

Management of Pesticide Spills and Leaks

Leaks
Containers may leak for a number of reasons; for example, strong sunlight can degrade some plastic containers, including bottles and plastic sacks. Rodents may damage paper, board or fibre containers. Termites may equally attack paper and card in chemical stores. Stores should be inspected regularly, at least every two months. Old, rotting and leaking containers are extremely difficult to move safely, so any leaking containers should be dealt with immediately. Usually, the only way to deal with a leak is to repack the material in a sound container. New containers are preferable; if available, but old containers of various types and sizes may be used for this purpose (old containers are also useful for temporarily storing the products of spills). They must have been thoroughly decontaminated (see next section) and their old labels completely removed.

Agro-chemicals will be repacked in containers made of the same materials as the original containers as some chemicals are not compatible with different materials. Ideally a drum that contained the same product should be used. If unavailable, the container must have been properly cleaned of previous contents to avoid cross-contamination. New labels must be written out immediately with all the information on the old label and fastened securely to the new container. Write the date of repacking (and the date of the original receipt) on the replacement container and ensure that the repacked material is used first.

Liquid spills

The spill should not be hosed down as this merely disperses the pesticide over a wider area. A supply of absorbent sawdust, sand or dry soil should be kept in a container in the store. Nitrile rubber protective gloves and face-mask should be worn. Sawdust, sand or dry soil should be scattered over the area of the spill and left for a few minutes to soak up the chemical. The sawdust, sand or dry soil containing absorbed spilled chemical should be swept or shoveled up and placed in a marked container for disposal. After sweeping, more than once if necessary, a scrubbing brush at the end of a stick should be used to scrub down the area of the spill with water and strong soap or detergent. Excess soapy water should be removed with a rough floor cloth and not hosed down.

Solid spills
Dusts, wettable powders or granules can create dust when swept up without the use of an absorbent material. A supply of absorbent sawdust, sand or dry soil should be kept in a container in the store where they can easily be reached for use in an emergency.

Nitrile rubber protective gloves and face-mask should be worn. The sawdust, sand or dry soil should be dampened and applied with a shovel over the area of the spill.

The damp sawdust, sand or soil containing spillage material should be swept or shoveled up carefully and placed in a marked container for disposal.

After sweeping, more than once if necessary, a scrubbing brush at the end of a stick should be used to scrub down the area of the spill with water and strong soap or detergent. Excess soapy water should be removed with a rough floor cloth and not hosed down.

Disposal of Pesticide Containers

Accidents have reportedly been caused by empty pesticide containers which sometimes end up being used to store water and food. An empty pesticide container can never be cleaned completely of pesticide and should be disposed of in a way that ensures it cannot be used for other purposes. It is, however, wise to retain samples of various types of container, which have been carefully cleaned, in the pesticide store for use in repacking the contents of damaged containers and storing cleaned up leaks and spills prior to final disposal.

Empty containers awaiting disposal should be stored in a special, secure area in the pesticide store to ensure that they are not stolen and used for other purposes. Empty containers should always be cleaned out, as far as is practicable, before disposal to minimize both hazard and waste of residual pesticide.

Containers that have contained EC or wettable powder (WP) formulations should be rinsed with water several times and the rinsing added to the spray tank before it is topped up to the required volume. Following this, containers can be washed out with a mixture of water, detergent and caustic soda. Containers of liquid formulations may be cleaned with kerosene (paraffin) or diesel fuel and the washings (small quantities of about 5 liters) collected for sending later to a central location for disposal by the national authority in a safe and environmentally sound manner.

As long as they are not heavily contaminated paper, cardboard and fiberboard containers should be burnt on a fire in the open. However, cartons that have contained phenoxy acid herbicides should not be burnt because the combustion products can damage crops at long distances. Highly contaminated cardboard, paper and jute materials should be collected and sent to the central disposal centers along with other toxic waste.

NOTE: LABEL INSTRUCTIONS SHOULD BE FOLLOWED FOR THE PROPER DISPOSAL OF THE RESPECTIVE PESTICIDE CONTAINERS!

Disposal of expired agro-chemicals

Occasions will arise when it will be necessary to dispose of agro-chemicals concentrates, either because the stock is outdated or has been found to be unusable or because the product is no
longer registered for the original purpose. Where very large quantities are to be disposed of, professional advice must be sought from the suppliers and national authority.

If only a few kilograms or liters of pesticide are involved, they should be collected for sending later to a central location for disposal by the national authority. Larger quantities of agro-chemicals are best disposed of by burning in a special incinerator (at 1,200°C) - this does not mean that it would be safe to burn them at a lower temperature on a fire. Incineration requires special equipment with provision for "scrubbing" the combustion products, but this is beyond the capacity of agro-chemicals storekeepers and should be referred to the relevant national authority.

Other means of disposal are to return the pesticide to the supplier or pass it on to a specialist disposal agent elected by the national authority.

Returning the pesticide to the supplier or to the national authority is the safest means of disposal. Disposal involves chemical methods such as alkaline and acid hydrolysis. Oxidation, reduction and spraying on to the ground or allowing escaping into the atmosphere may also be employed, but require specialist skills. The end product in most cases is still toxic. Storekeepers should not become directly involved with pesticide disposal and should refer to the relevant national authority.
Annex H ESMF Quarter and Annual Reporting Form

1. General
Location of the subproject [Type here – Specific location of each subproject can be written in the remark column corresponding each subprojects]
County: [Type here]
Reporting Quarter/Year: [type here]
Date of the report: [Type here]

2. Project’s summary:
Here, short description of the subprojects which are implemented during the reporting period will be done focusing on to how many of them are screened; ESMP, RAP, PMP and other instruments prepared; field appraisal done; ESIA carried out; reviewed; approved and other aspects of the implementation of the ESMF. Capacity building activities, challenged faced, and lesson learned will also be described in short here.

3. In the table below, fill and tick for a number of subprojects/activities (screened, reviewed and approved) described below against the column question

<table>
<thead>
<tr>
<th>Type of Subprojects/activities</th>
<th>Number of subprojects in this category</th>
<th>County where the subproject located</th>
<th>Approved this quarter/year</th>
<th>Application included ESMF checklist (Annex I)</th>
<th>Subprojects for which</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desk review/appraisal undertaken</td>
<td>ESMP prepared</td>
<td>Field appraisal undertaken</td>
<td>RAP prepared</td>
<td>PMP prepared</td>
<td>Full ESIA Carried out</td>
<td></td>
</tr>
<tr>
<td>Natural Resources Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of watershed based different soil and water conservation structures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establishment of nursery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantation of multipurpose trees</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Page 205  RPLRP Environmental and Social Management Framework - ESMF
<table>
<thead>
<tr>
<th>Type of Subprojects/activities</th>
<th>Number of subprojects in this category</th>
<th>County where the subproject located</th>
<th>Approved this quarter/year</th>
<th>Application included ESMF Checklist (Annex I)</th>
<th>Subprojects for which</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of micro dams</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of weir</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of farm pond</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of HDW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of other WH structures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of water supply structures (bore hole and others)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Market center development
- Construction of primary market center
- Construction of secondary market center
- Construction of tertiary market center
- Upgrading/strengthening/construction of veterinary clinic
- Upgrading/strengthening/construction of veterinary laboratories
- Construction/strengthening slaughterhouses
- Others (specify)

3. Livelihood support
- Animal fattening
- Milk production (dairy farm)
- Milk processing (dairy processing)
- Poultry production
- Aquaculture
<table>
<thead>
<tr>
<th>Type of Subprojects/activities</th>
<th>Number of subprojects in this category</th>
<th>County where the subproject located</th>
<th>Approved this quarter/year</th>
<th>Application included ESMF checklist (Annex I)</th>
<th>Subprojects for which</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bee keeping</td>
<td></td>
<td></td>
<td></td>
<td>Desk review/appraisal undertaken</td>
<td>ESMP prepared</td>
<td></td>
</tr>
<tr>
<td>Honey processing</td>
<td></td>
<td></td>
<td></td>
<td>Field appraisal undertaken</td>
<td>RAP prepared</td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td></td>
<td></td>
<td></td>
<td>PM prepared</td>
<td>Full ESIA Carried out</td>
<td></td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Have communities been involved in the identification of subprojects? Tick [x]

[ ] Yes  [ ] No
If yes, describe:
[type here]

Please explain any participatory issues that have impacted the ability of the communities to identify subprojects
[type here]

5. Were there any unforeseen environmental or social problems associated with any subprojects approved and implemented this year? If so, please identify the subprojects and summarize the problem(s) and what was or will be done to solve the problem(s). Use a summary table like the one below.

<table>
<thead>
<tr>
<th>Subproject</th>
<th>Key gaps or areas of non-compliance (problems)</th>
<th>Key action taken</th>
<th>Follow up activities recommended (action to be taken)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Is the project [type the name of the project here] positively contributing to the environment in this County?

[ ] Yes  [ ] No  [ ] Too early to say
Please explain:
[type here]

7. Did the subproject improve the welfare of women and youth in this County?

[ ] Yes  [ ] No  [ ] Too early to say
Please explain:
[type here]
8. Has there been any analysis of cumulative environmental and social impacts of RPLRP projects in this County? Tick [x]

[     ] Yes              [      ] No
If yes, describe:

[type here]

9. Have there been any environmental and/or social analyses undertaken in this County in connection to RPLRP projects? Tick [x]

[     ] Yes              [      ] No
If yes, describe:

[type here]

10. Training
Please the types of training given at your County.

[type here]
Please list the types of training needed to ensure the effectiveness of the ESMF in your County.

[type here]

11. Completed by: [Name]
   Position: [type here – positions of all contributors]
   Date: [type here]
Annex I. Environmental and Social Checklist Form

In this section the potential environmental and social impacts of all RPLRP subprojects and their associated potential mitigation measures are described in detail. Overall, the proposed RPLRP subproject activities/operations will impact positively on the biophysical environment, and on the rural community as well, as investments are planned through a participatory watershed development approaches and include various soil and water conservation measures. However, improper design and implementation of the project activities may have negative environmental and social impacts. As a result the following mitigation measures may be required to help avoid or reduce the potential adverse impacts from implementing the subprojects.

1. Small Scale Irrigation (SSI)

RPLRP improve the security of water availability in the project Counties in order to enhance agricultural productivity including livestock through the use of improved water storage, conveyance, lifting and application technologies related to surface, ground and rain water management. For this, RPLRP will finance development and rehabilitation of water resources structures for crop production and to support dry season grazing reserves (Micro dam, river diversion weir, hand dug well, manual well tubing). The project also finance for the construction and rehabilitation of water resources for water supply (Micro dam, Sand dam, community water pans, bore hole, rehabilitation and upgrading of existing water supply structures).

Table 1 and 2 below detail the potential environmental and social impacts and mitigation measures for agricultural water and community water supply development and management subprojects. Table 1 is for (a) improvement and/or upgrading of traditional schemes; (b) improvement and/or rehabilitation of malfunctioning and partially functioning existing SSI schemes; (c) construction of new SSI schemes such as micro-dams, gravity and pump diversions, and groundwater development (shallow wells), whereas, table 2 is for construction of small dams and other water harvesting and storage structures for irrigation purpose.

**Table 1: Potential environmental and social impacts of and mitigation measures for SSI projects**

<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Potential mitigation measures</th>
</tr>
</thead>
</table>
| Waterlogged soil (Vulnerability to water logging) due to overwatering; inadequate drainage | • Assess soil characteristics and either avoid or provide adequate drainage for areas prone to water logging  
• Use good irrigation management, matching water demand and supply by location  
• Design a high water-efficient irrigation system/methods like drip irrigation systems  
• Encourage farmers to value water resources by establishing a system of water user fees tied to consumption  
• Use of lined canals or pipes to prevent seepage wherever applicable  
• Regulation of water application to avoid overwatering (including controlled turn-out to allow cutting off water supply to irrigation ditches) |
<p>| Water storage requirement and viability (soil permeability) | • Test the soil percolation and ensure and impermeable layer in the structure design |</p>
<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Potential mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt build-up on irrigated land</td>
<td>• Assess the potential for high salinity and employ alternative irrigation methods and schedules</td>
</tr>
<tr>
<td></td>
<td>• Install and maintain subsurface drainage system</td>
</tr>
<tr>
<td></td>
<td>• Incorporate soil additives. Add gypsum to either the irrigation water or the soil before irrigating</td>
</tr>
<tr>
<td></td>
<td>• Plant salt-tolerant catch crops</td>
</tr>
<tr>
<td>Crops wilting or dying as a result of Changes to soil chemistry, including</td>
<td>• Monitor soil chemistry.</td>
</tr>
<tr>
<td>acidification and alkalization</td>
<td>• Identify indicator plant species.</td>
</tr>
<tr>
<td></td>
<td>• Consult soil scientists.</td>
</tr>
<tr>
<td></td>
<td>• Apply soil nutrients, conditioners and chemicals where feasible.</td>
</tr>
<tr>
<td>Soil erosion (furrow, surface)</td>
<td>• Proper design and layout of furrows or field avoiding too steep a gradient</td>
</tr>
<tr>
<td></td>
<td>• Land levelling</td>
</tr>
<tr>
<td></td>
<td>• Design of terraces on hillside minimizing surface erosion hazard</td>
</tr>
<tr>
<td>Scouring of canals</td>
<td>• Design of canal system to minimize risk and use of lined canals</td>
</tr>
<tr>
<td>Clogging of canals by sediment</td>
<td>• Design and management of canals to minimize sedimentation</td>
</tr>
<tr>
<td></td>
<td>• Provision of access to canals for removal of weeds and sediments</td>
</tr>
<tr>
<td></td>
<td>• Measures to minimize erosion on field</td>
</tr>
<tr>
<td>Clogging of canals by weeds</td>
<td>• Design and management of canals to minimize weed growth</td>
</tr>
<tr>
<td></td>
<td>• Provision of access canals for treatment and removal of weeds</td>
</tr>
<tr>
<td>Dry wells for drinking water and irrigation</td>
<td>• Implement different ground water recharge activities like water conservation work/watershed management</td>
</tr>
<tr>
<td></td>
<td>• Limitation of withdrawal so that it does not exceed “safe yield” (recharge rate)</td>
</tr>
<tr>
<td></td>
<td>• Encourage farmers to value water resources by establishing a system of water user fees tied to consumption</td>
</tr>
<tr>
<td>Water quality deteriorated or made unusable by upstream land use and pollutants discharge</td>
<td>• Control of land use in watershed areas</td>
</tr>
<tr>
<td></td>
<td>• Prevention and control of pollution sources</td>
</tr>
<tr>
<td></td>
<td>• Water treatment prior to use</td>
</tr>
<tr>
<td>Deterioration of river water quality below irrigation project and contamination of</td>
<td>• Improved water management; improved agricultural practices and control of inputs (particularly biocides and chemical fertilizers)</td>
</tr>
<tr>
<td>local ground water (higher salinity, nutrients, agrochemicals) affecting fisheries</td>
<td>• Implementing soil erosion from the irrigation field to prevent washout of agrochemicals and fertilizer</td>
</tr>
<tr>
<td>and downstream users</td>
<td>• Imposition of water quality criteria</td>
</tr>
<tr>
<td>Existing water sources supply/yield depletion</td>
<td>• Assess water supply and existing demands, and manage sustainability</td>
</tr>
<tr>
<td>Sensitive downstream habitats and water bodies</td>
<td>• Identify and avoid effects of diversion or extraction on downstream ecosystems that depend on the surface or groundwater supply</td>
</tr>
<tr>
<td>Reduced water quantity for downstream users, waterways and wetlands; intermittent</td>
<td>• Reassess water available for irrigation; may need to irrigate a smaller area</td>
</tr>
<tr>
<td>streams run dry</td>
<td>• Use pipes instead of open canals wherever feasible to prevent water loss from evaporation</td>
</tr>
<tr>
<td></td>
<td>• Promote local and regional watershed management</td>
</tr>
<tr>
<td>Introduction or increase in incidence of water born or water related diseases</td>
<td>• Avoidance of stagnant or slowly moving water</td>
</tr>
<tr>
<td></td>
<td>• Use of straight or slightly curving canals</td>
</tr>
</tbody>
</table>
### 2. Dam, Ponds, Tanks and Other Water Harvesting Structures for Irrigation Purpose

**Table 2: Potential environmental and social impacts of and mitigation measures for dam, ponds, tanks and other water harvesting structures for irrigation**

<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Potential mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Water pollution from construction and waste disposal</td>
<td>• Careful location of camps, buildings, borrow pits, quarries, spoil and disposal site</td>
</tr>
<tr>
<td>• Soil erosion</td>
<td>• Precaution to minimize soil erosion</td>
</tr>
<tr>
<td>• Destruction of vegetation, sanitary and health problems from the construction camp</td>
<td>• Land reclamation of pit/quarry site</td>
</tr>
<tr>
<td><strong>Loss of land (agricultural, forest, range, wetland) by inundation to form reservoir</strong></td>
<td><strong>Sitting of dam to decrease loses; decrease of size of dam and reservoir; protect equal areas in region to offset losses</strong></td>
</tr>
<tr>
<td><strong>Formation of sediment deposit at reservoir entrance creating backwater effect and flooding and water logging upstream</strong></td>
<td>• Sediment flushing, sluicing</td>
</tr>
<tr>
<td>• Upper catchment treatment using soil and water conservation measures including area closure</td>
<td>• Constructing silt trap</td>
</tr>
<tr>
<td>• Poor land use practices in catchment areas above the reservoir resulting in</td>
<td>• Land use planning efforts which include watershed area above the dam/reservoir/pond</td>
</tr>
<tr>
<td><strong>Environmental sensitive areas disturbed</strong></td>
<td><strong>Identify and avoid forest, riparian and wetland habitats with particular biodiversity</strong></td>
</tr>
<tr>
<td><strong>Increased inequitable access to irrigation water</strong></td>
<td><strong>Establish a water users committee through the local government and equitable rules for water allocation</strong></td>
</tr>
<tr>
<td><strong>Hinterland effect due to increased migration into area due to successful Project</strong></td>
<td><strong>Ensure adequate social and other infrastructure to meet needs of immigrants</strong></td>
</tr>
<tr>
<td><strong>Informal land uses displaced or access restricted</strong></td>
<td><strong>Avoid interference with informal land users, and take measures to provide access to alternative lands or resources</strong></td>
</tr>
<tr>
<td><strong>Increased social tensions/conflict over water allocation</strong></td>
<td><strong>Establish a water users committee through the local government and equitable rules for water allocation</strong></td>
</tr>
<tr>
<td><strong>Local incapacity/inexperience to manage facilities</strong></td>
<td><strong>Establish an operations and maintenance manual, authority and provide training to persons responsible for operating the system</strong></td>
</tr>
<tr>
<td><strong>Local incapacity/inexperience with irrigated agriculture</strong></td>
<td><strong>Provide training to farmers on sustainable irrigated agriculture</strong></td>
</tr>
</tbody>
</table>

**Potential impacts**

- Installation of gates at canal end to allow complete flushing
- Filling or drainage of borrow pits along canals or roads
- Disease treatment

**Potential mitigation measures**

- Avoid occupied land. Prepare procedures to ensure equitable resolution
- Avoid occupied land. Resettlement scheme ensuring at least equal standards of living
- Sitting of projects to minimize the effects
- Design and manage system to improve access by “tail-enders” (users whose fields are farthest from the water source).
- Establish and enforce a volume-based water fee.
- Improve system management, including maintenance of main canals.
<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Potential mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>increased siltation and loss of storage capacity</td>
<td>• Control of land use in watershed (especially prevention of conversion of forest to agriculture)</td>
</tr>
</tbody>
</table>
| Creation of quarry sites or borrow pits (to get selected materials for construction) that cause spread of vector born disease, safety hazard on the animals of the community | • Identify the most environmentally sound source of materials that is within budget  
• Develop logging, quarrying and borrowing plans that take into account cumulative effects  
• Site quarries and gravel pits so that they are not visible to travelers on the roads  
• Decommission/restore area so it is suitable for sustainable use after extraction is completed  
• Install drainage structures to direct water away from pit  
Discuss with local community the option of retaining quarry pits as water collection ponds for watering cattle, irrigating crops or similar uses |
| Scouring of riverbed below dam                                                  | Construction and maintenance of protection structure below the dam to protect the river bed scouring                                                                                                                                  |
| Increase of water-related diseases                                              | • Design and operation of dam/reservoir/ponds/other water harvesting structures to decrease habitat for vector  
• Vector control  
• Disease treatment                                                                                                                                                                                                 |
| Loss of life and property of the downstream community, and erosion problem due to Dam failure | Implementing the small dam safety guideline prepared for the project                                                                                                                                                                                                 |
| Loss of property and life entering into water harvesting structures/ponds       | Fencing the structures                                                                                                                                                                                                                                                                     |
| Water loss due from water harvesting structures/ponds/reservoir through seepage and/or evaporation | • Assess soil characteristics to avoid cracking of the water harvesting structures  
• Designing properly in such a way that loss of water is avoided                                                                                                                                                                   |
| Conflicting demands for irrigation water use                                   | Planning and management of dam/reservoir in context of the local development plans; equitable allocation of water among small holders farmers                                                                                             |
| Social disruption and decrease in standard of living of resettled people        | Maintenance of standard of living by ensuring access to resources at least equalling those lost; provision of health and social services                                                                                                                                                   |
| Land Acquisition                                                               | • Avoid occupied land. Prepare procedures to ensure equitable resolution                                                                                                                                                                                                                  |
| Private assets displaced                                                        | • Avoid occupied land. Resettlement scheme ensuring at least equal standards of living  
• Sitting of projects to minimize the effects                                                                                                                                                                                                                                             |
| Environmental degradation from increased pressure on land                       | • Choice of resettlement site to avoid surpassing carrying capacity of the land  
• Increase of productivity or improve management of land (agricultural, range, forest management)                                                                                                                                 |
| Environmentally sensitive areas disturbed                                       | Identify and avoid forest, riparian and wetland habitats with particular biodiversity                                                                                                                                                                                                     |
| Damage to downstream ecosystems from reduced water quantity                    | Use dam/reservoir operations to mitigate changes in flow regimes of rivers and prevent weeds and diseases                                                                                                                              |
3. Watershed Management/Soil and Water Conservation

This activity will support implementation of best practices for soil and water conservation to improve soil fertility and soil moisture in the system. The implementation of sub-projects under this activity will be carried out within the larger framework of sustainable watershed development and management. In almost every case, application of soil and water conservation technologies is expected to have a positive impact on the environment, either by preventing erosion and run-off or by contributing to the rehabilitation of a degraded site.

Support under this activity will focus on protecting and rehabilitating watersheds where small-scale irrigation and/or water harvesting and micro-irrigation schemes are envisaged. Activities that will be supported by RPLRP include: Terracing (hillside terrace, bench terrace, soil and stone bund, fanyaaju) gully rehabilitation (check dams, gabions, reshaping, gully re-vegetation, SS dam construction, and cultivation with multi-purpose perennial trees, shrubs, and grasses), area closure, plantation of multipurpose trees, construction of waterways and cut of drain, nursery establishment, and groundwater recharge interventions in areas where groundwater development is ongoing or planned.

Potential environmental social impacts and mitigation measures

Given the above benefits of implementing watershed based soil and water conservation activities, due to improper planning, technology selection, design and implementation of the technologies; and lack of proper monitoring plan sometimes these activities may have their own negative environmental and social impacts.

Table 3: Potential environmental and social impacts and potential mitigation measures for watershed development projects

<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Potential mitigation measures</th>
</tr>
</thead>
</table>
| Damage to downstream community and environment (land degradation, landside, gully formation and flooding) as a result of failure of the physical soil and water conservation structures (Check dam, cut off drain, different terraces, SS Dam and other ground water recharge structures) | • Identify and evaluate the degradation processes  
• Select the appropriate soil and water conservation technologies to that specific situation (based on climate and watershed characteristics ); properly design and follow up the construction of the technologies (flood protection structures-cut off drain, water ways, gully treatment structures-check dam, terraces and others physical structures) to avoid the breach of the structures  
• Avoid the generalized use of empirical approaches to select and apply soil and water conservation practices for all situations  
• Plan for the maintenance of the structures and to monitor the same,  
• Involve/participate local communities throughout the project cycle in order them own the project so that they can contribute to the project and keep it in a sustainable manner |
| New access (road) construction                                                      | Ensure drainage controls on new roads and rehabilitate temporary access following subproject implementation |
| Wet season soil disturbance                                                        | Schedule activities for the dry season                                                      |
| Potential for debris flows or landslides                                           | Prepare a watershed plan that identifies and address drainage/slope instability             |
| Removal of native plant/tree species                                              | Protect and encourage regeneration of endemic species                                       |
| Introduced plant/tree species invasion of native species                           | Ensure non-native species are compatible with native species                                |
### Potential impacts

<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Potential mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spread of plantation species outside of plantation becoming a nuisance, competing with native species and becoming weeds in agricultural fields.</td>
<td>Species choice to avoid ones that will grow out of control from desired site</td>
</tr>
<tr>
<td>Wildlife habitats or populations disturbed</td>
<td>Identify and avoid effects on habitats and migration routes of key species</td>
</tr>
<tr>
<td>Environmentally sensitive areas disturbed</td>
<td>Identify and avoid activity in forest, riparian and wetland habitats with particular biodiversity</td>
</tr>
<tr>
<td>Social disruption and decrease in standard of living of resettled people</td>
<td>Maintenance of standard of living by ensuring access to resources at least equalling those lost; provision of health and social services</td>
</tr>
<tr>
<td>Land Acquisition</td>
<td>• Avoid occupied land. Prepare procedures to ensure equitable resolution</td>
</tr>
<tr>
<td>Private assets displaced</td>
<td>• Avoid occupied land. Resettlement scheme ensuring at least equal standards of living</td>
</tr>
<tr>
<td>Informal land uses displaced or access restricted</td>
<td>• Sitting of projects to minimize the effects</td>
</tr>
<tr>
<td>Insufficient capacity to manage catchment ponds</td>
<td>Avoid interference with informal land users, and take measures to provide access to alternative lands or resources</td>
</tr>
<tr>
<td>Insufficient capacity to prohibit or control open grazing</td>
<td>Establish a water users committee, where appropriate, and/or community bylaws and provide training to water users</td>
</tr>
<tr>
<td>Insufficient capacity to manage new plantations/pasques</td>
<td>Establish a watershed committee, where appropriate, and/or community bylaws and provide alternative sources of fodder</td>
</tr>
</tbody>
</table>

### 4. Market Center Development and Management

To support a more competitive livestock sector, one which translates growing demand, both nationally and regionally, into livelihood opportunities for pastoralists, the project focuses on demand-driven infrastructure investment packages to improve national systems for livestock marketing and trade. The main activities for the subproject are paving the market site, constructing market shed, constructing community warehouses, facilities (water supply and toilet) construction/upgrading, establishing market information center and constructing access roads and drainage structures.

**Table 4: Potential environmental and social impacts and their potential mitigation measures**

<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Potential mitigating measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>New access (road) construction</td>
<td>Ensure drainage controls on new roads and rehabilitate temporary access following subproject implementation</td>
</tr>
<tr>
<td>Absence of or delaying installation of the drainage structures which:</td>
<td>• Install drainage structures wherever necessary during construction instead of after construction, and consider this during planning, design and construction</td>
</tr>
<tr>
<td>• Cause soil erosion, gully erosion, land slide</td>
<td>• Stabilize outlet ditches (inside and outside) with small stone riprap and/ or vegetative barriers placed on contour, to dissipate energy and to prevent the creation or enlargement of gullies</td>
</tr>
<tr>
<td>• Degrade water quality</td>
<td>• Extend run out drains far enough to allow water to dissipate evenly into the ground</td>
</tr>
<tr>
<td>• Alter hydrology</td>
<td>• Visually spot-check for drainage problems by looking for</td>
</tr>
<tr>
<td>• Damage valuable ecosystems and habitats</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Potential mitigating measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accumulation of water on road surfaces. Do this immediately after first heavy rains and again at the end of the rainy season. Institute appropriate corrective measures as necessary.</td>
<td></td>
</tr>
<tr>
<td>Wet season soil disturbance</td>
<td>Schedule construction for the dry season</td>
</tr>
<tr>
<td>The generation of construction and demolition waste contaminate soil, groundwater or surface water from demolition waste containing residual amounts of toxic materials (e.g. leaded paint especially for tertiary market center)</td>
<td>Determine whether toxic materials are present. Manage as per the country law to manage the hazardous and solid waste</td>
</tr>
<tr>
<td>Produce areas of bare soil which cause erosion, siltation,</td>
<td>- Design infrastructure so that it will create least impact</td>
</tr>
<tr>
<td></td>
<td>- Minimize disturbance of native flora during construction</td>
</tr>
<tr>
<td></td>
<td>- Remove, without destroying, large plants and ground cover where possible</td>
</tr>
<tr>
<td></td>
<td>- Use erosion control measures</td>
</tr>
<tr>
<td></td>
<td>- Replant recovered plants and local flora as soon as possible</td>
</tr>
<tr>
<td>Spread vector-borne diseases when stagnant water accumulates in active or abandoned quarries or borrow pits and breeds insect vectors</td>
<td>- Identify the most environmentally sound source of materials within budget</td>
</tr>
<tr>
<td></td>
<td>- Develop logging, quarrying and borrowing plans that take into account cumulative effects</td>
</tr>
<tr>
<td></td>
<td>- Monitor adherence to plans and impacts of extraction practices</td>
</tr>
<tr>
<td></td>
<td>- Fill in quarries and pits before abandoning</td>
</tr>
<tr>
<td></td>
<td>- Control runoff into pit</td>
</tr>
<tr>
<td>Increased number of water users due to improvements</td>
<td>Assess water supply and existing demand, and manage sustainably</td>
</tr>
<tr>
<td>Contamination of soil and water from sewage/toilet and solid waste</td>
<td>- Site human waste and solid waste disposal systems to avoid surface and groundwater contamination, taking soil characteristics and historical groundwater and surface water conditions into account</td>
</tr>
<tr>
<td></td>
<td>- Install adequate and appropriate sewage and solid waste disposal systems (e.g., use above-ground composting latrines in areas with high water tables)</td>
</tr>
<tr>
<td>Health hazards due to lack of sanitation facilities (water, sewage and solid waste disposal)</td>
<td>- Sanitation facilities must be included in the project design.</td>
</tr>
<tr>
<td></td>
<td>- Ensure that all sanitation facilities are installed and running before the before the start of the center</td>
</tr>
<tr>
<td>Cultural or religious sites disturbed</td>
<td>Identify and avoid cultural or religious sites. If disturbance unavoidable, agreement on mitigating measures must first be reached with stake holders concerned (eg. Community, mosque, church). If excavation encounters archaeological artifacts, halt construction and notify relevant authorities.</td>
</tr>
<tr>
<td>Land Acquisition</td>
<td>- Avoid occupied land. Prepare procedures to ensure equitable resolution</td>
</tr>
<tr>
<td>Private assets displaced</td>
<td>- Avoid occupied land. Resettlement scheme ensuring at least equal standards of living</td>
</tr>
<tr>
<td></td>
<td>- Sitting of projects to minimize the effects</td>
</tr>
<tr>
<td>Informal land uses displaced or access</td>
<td>Avoid interference with informal land users, and take measures to</td>
</tr>
<tr>
<td>Potential impacts</td>
<td>Potential mitigating measures</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>restricted</td>
<td>provide access to alternative lands or resources</td>
</tr>
<tr>
<td>In-migration/settlement induced by facilities development</td>
<td>Control unplanned settlement near the facilities</td>
</tr>
<tr>
<td>Local incapacity/inexperience to manage facilities</td>
<td>Establish/strengthen local committees, where appropriate, provide appropriate procedures and training to maintain the facilities</td>
</tr>
</tbody>
</table>

5. **Livestock breed improvement**

RPLRP will support to provide improved technologies and livestock breeds to improve the productivity of the livestock sector. The project will finance for the provision of improved animal breeds. Related to this activity, the project also finances for the construction of breed improvement centers.

The environmental policy of Kenya states that all biological material, which is self-regenerative and impossible to control once allowed to get out of control may result in the most insidious and damaging form of pollution which is biological pollution, thus the importation and use of biological material including those genetically engineered should be under stringent regulations. In the environmental impact assessment guideline documentation, it is indicated that the introduction of new breed, species of crops, seeds or animals fall under schedule 1 activity which may have adverse and significant environmental impacts, and may, therefore, require full ESIA.

**Potential environmental impacts**

The introduction of exotic livestock breed may result in loss of genetic diversity in livestock species. Breeds may have traits conferring resistance to emergent or future pathogens, or have other favorable adaptations to local environments. The consistent replacement of local breeds with more productive imported ones can contribute to the extinction of that breed and of all the genetic diversity harbored within its population. The introduction of exotic livestock breed may also result in the introduction of new pathology.

**Potential mitigation measures**

Introduction of a new breed into an area should be approached with caution. The new breed may bring with it diseases that can decimate local livestock herds and wildlife. The long term full costs and benefits of introducing a given new livestock species into a particular environment should be assessed. The following issues have to be taken into account before introducing the exotic breed.

- Quarantine law has to be seriously followed to avoid the potential adverse consequences of exotic species introduction,
- Thoroughly research new species of livestock. Determine their grazing/browsing preferences and compare them to those of current livestock species,
- Pilot-test new breeds and species before introducing them in a broad program, and monitor their impacts over time,
- If local breeds can meet specified needs, strongly consider their use. In particular, even if local breed is a relatively low producer, weigh this drawback against the breed’s disease resistance and hardiness in the local environment,
- Evaluate the risks of introducing new diseases that might be transferred to wildlife.
### Table 5: Potential environmental impacts of and mitigation measures for construction of breed improvement centers

<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Potential mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>The generation of construction and demolition waste contaminate soil,</td>
<td>Determine whether toxic materials are present. Manage as per the country law to manage the hazardous and solid waste</td>
</tr>
<tr>
<td>demolition waste contaminate soil, ground water or surface water from</td>
<td></td>
</tr>
<tr>
<td>demolition waste containing residual amounts of toxic materials (e.g., leaded</td>
<td></td>
</tr>
<tr>
<td>paint)</td>
<td></td>
</tr>
<tr>
<td>Health hazards due to lack of sanitation facilities (water, sewage and solid waste</td>
<td>● Sanitation facilities <em>must</em> be included in the project design.</td>
</tr>
<tr>
<td>disposal)</td>
<td>● Ensure that all sanitation facilities are installed and running before the center start work</td>
</tr>
<tr>
<td>Unsafe potable water supplies</td>
<td>● Ensure siting of supply systems and choice of supply technologies to minimize health hazards</td>
</tr>
<tr>
<td></td>
<td>● Conduct seasonal testing of water quality, particularly for coliform bacteria and arsenic. Assess long-term and seasonal shifts in water quantity and quality</td>
</tr>
<tr>
<td>Breeding grounds for insect vectors (e.g., standing water in borrow pits;</td>
<td>● Excavate and rebury trenches quickly. Arrange for construction or demolition debris to be permanently disposed of away from watercourses</td>
</tr>
<tr>
<td>demolition debris)</td>
<td>● Fill borrow pits or assure their drainage. Use shallow wells or streams for construction water rather than diverting natural flows to the construction site</td>
</tr>
<tr>
<td>Erosion during construction of houses and access roads</td>
<td>Soil conservation measures must be included in the design and implemented during construction.</td>
</tr>
<tr>
<td>Cultural or religious sites disturbed</td>
<td>Identify and avoid cultural or religious sites. If disturbance unavoidable, agreement on mitigating measures must first be reached with stake holders concerned (eg. Community, mosque, church). If excavation encounters archaeological artifacts, halt construction and notify relevant authorities.</td>
</tr>
<tr>
<td>Local incapacity/inexperience to manage facilities</td>
<td>Establish/strengthen local committees, where appropriate, through the community and provide appropriate procedures and training to maintain the facilities</td>
</tr>
<tr>
<td>Land Acquisition</td>
<td>● Avoid occupied land. Prepare procedures to ensure equitable resolution</td>
</tr>
<tr>
<td>Private assets displaced</td>
<td>● Avoid occupied land. Resettlement scheme ensuring at least equal standards of living</td>
</tr>
<tr>
<td>Informal land uses displaced or access restricted</td>
<td>● Sitting of projects to minimize the effects</td>
</tr>
<tr>
<td></td>
<td>Avoid interference with informal land users, and take measures to provide access to alternative lands or resources</td>
</tr>
</tbody>
</table>

### 6. Fertilizer use

Farmers use more fertilizer for their irrigated agriculture to increase agricultural productivity. Although the essential plant nutrients play a vital role in providing adequate food supplies and protecting our environment, some pose an environmental risk with improper management. The
two nutrients most often associated with mismanagement and non-point source environmental concerns related to fertilizer use are nitrogen (N) and phosphorus (P).

Much of the concern about nitrogen in the environment is due to the potential movement of unused or excess nitrate-N through the soil profile into groundwater (leaching). Because of its negative charge, nitrate-nitrogen is not attracted to the various soil fractions. Rather, it is free to leach as water moves through the soil profile.

Phosphorus has been associated with environmental pollution through the eutrophication of lakes and non-flowing water bodies. The symptoms are algal blooms, heavy growths of aquatic plants and deoxygenation. Since phosphorus is insoluble relative to other essential nutrients, environmental degradation is associated largely with phosphorus movement when soil erosion occurs. Except on some organic soils, very low concentrations of phosphorus are found in drainage waters as the result of leaching.

Fertilization causes few direct but many indirect effects which impair ecosystems. The eutrophication of rivers, lakes and other water bodies like wetlands is considered as one of the important environmental problems, generating or/and supporting oxygen deficiency, production of toxic NH$_3$, algal blooms, change in spatial distribution of water body organisms, increase and depletion of fish stocks, change in reproduction conditions for fish and aquatic fauna etc.

**Potential mitigation measures**

Prevention of soil erosion from the farm land and proper application and use of fertilizer, use of other soil fertility improvement technologies like using bio-fertilizer, conservation agriculture, improved agronomic practices, best management practices (BMP), and other mitigation measures should be designed to reverse the above mentioned effects.

Some of the BMPs that help to mitigate the environmental impact of fertilizer use are:

1. Conservation Tillage - the practice of leaving harvested plant materials on the soil surface to reduce runoff and soil erosion;
2. Crop Nutrient Management - managing all nutrient inputs helps ensure that nutrients are available to meet crop needs while reducing nutrient run off;
3. Conservation Buffers - using vegetation strips to provide additional barriers of protection which prevent potential pollutants running off into surface waters;
4. Irrigation Management - increasing irrigation efficiency can reduce nonpoint source pollution of ground and surface waters;
5. Erosion and Sediment Control - using practices to conserve and reduce the amount of sediment reaching water bodies, overall protecting agricultural land and water quality.
6. Use fertilizers wisely
   - Apply at the right time and in the right amounts,
   - Fertilizer with slow release nitrogen is better for the environment,
   - Get a soil test to see what the soil needs,
   - If more fertilizer is applied than the grass can utilize, it can wash into nearby streams and lakes,
By putting BMPs into practice, nitrogen and phosphorus losses from agricultural soils can be controlled. Implementing these BMP strategies is both economically and environmentally desirable for the farmer. The integration of these BMPs increases crop yield potential, input efficiency and improves profit potential.

7. Laboratory Chemicals/Reagents

In the PAD, it is indicated that the project will finance the provision of drugs and vaccines to improve the productivity of livestock. In this regard, the project will finance the provision/purchase of chemicals and drugs for vector borne diseases - the disease trypanosomiasis, tick borne diseases and other ecto-parasitic diseases). Sometimes, there will be unused and expired drugs, chemicals and vaccines in store. This has to be managed properly. It is also mentioned in the PAD that the project will finance the upgrading of the National Veterinary Laboratory Services through provision of laboratory chemicals and reagents and equipments.

These laboratory chemicals/reagents which are used for the analysis of different pathogens, as they are hazardous in nature, have significant environmental and health impacts. They need proper handling, utilization, storage, transport and disposal. Any waste from animal health care clinics and post, which have similar characteristics with that of domestic waste and generated in the laboratory, contaminated with hazardous chemicals/waste and sample fluid (blood) of the animals become hazardous and infectious, and need proper management like any hazardous and infectious wastes. All ranges of the chemical and chemical waste management technologies and principles have to be followed and implemented.

The proper identification of the environmental impacts related to laboratory operation is important so as to define effective mitigation and management practices. This has a beneficial effect not only on overall environmental performance but also on the safety and health of the laboratory personnel and related community.

Potential environmental impacts of laboratory chemicals and associated chemically loaded wastes

Although animal healthcare posts and clinics activities provide many important benefits to the community, they can also unintentionally do great harm through poor design and management of waste management systems. The waste generated from these institutions pose serious problem. If handled, treated or disposed of incorrectly it can spread disease, poison people, livestock, wild animals, plants and whole ecosystems.

Water Pollution

Animal health service laboratories use a wide range of chemicals, disinfectants and samples. Direct release, without treatment and segregation of any of these chemicals and hazardous wastes to the drainage/sewer system without treatment can contaminate water body and create health risks for the general public, directly or indirectly. Such pollution is also detrimental to aquatic life.

Air Pollution
The operation of laboratories may result in a number of hazardous emissions to the air from fume hoods and vents, sterilization / disinfection technologies; refrigerants (Ozone depleting substances) and treatment technologies (incinerators, if any). Open and incomplete burning of wastes can create hazardous air emissions such as dioxins.

**Soil Contamination**
The disposal of untreated and un-segregated solid waste (containing organic, degradable mixed with hazardous chemicals) can result in contamination of the soil.

**Handling & Disposal of Chemicals and hazardous wastes**
Improper handling of hazardous chemicals is a health hazard for the laboratory workers and its indiscriminate disposal can have environmental risks as detailed above. The same applies for other substances, such as untreated and expired chemicals, treated samples of body fluid of animals and soil samples, and sharps (needles, syringes, broken laboratory glassware etc). Indiscriminate dumping of wastes can also result in illegal and dangerous recycling of chemicals, sharps and other substances, which can become a public health hazard.

**Potential mitigation measures for laboratory chemicals/reagents and associated wastes**
Many of the pollution problems associated with laboratory wastes stem from the types of materials and chemicals used. Establishing good purchasing and procurement practices is the first step in effective pollution control. Ensuring the selection and implementation of environmentally sound and cost-effective treatment technologies is an important element in the process. The option for final disposal of infectious and hazardous will be decided in consultation with the environmental protection agency of the region. Planning of a waste management system will take into consideration pollution prevention, waste minimization and recycling activities.

**The following potential mitigation measures in general are envisaged**
- Have a plan in place for the use, handling, storage and disposal of hazardous materials and waste;
- Maintain an inventory of the types and locations of hazardous materials and waste;
- Each laboratory needs to have health and occupational safety guidelines;
- Have safety requirements in place for the handling, storage, and response to spills or exposures;
- Clearly segregate and label hazardous materials and waste;
- Treat and dispose hazardous materials and waste in accordance with applicable laws and regulations.

8. **Animal Husbandry**
The RPLRP will finance investments like income generating sub-projects. These include: animal fattening (cattle, small ruminants – sheep and goats), milk production, poultry production, and others. Animal husbandry plays a vital role in the rural economy by generating substantial income to rural population where employment is scarce. This is a type of subprojects that can be established successfully if they are sited, designed and operated properly; however, have the potential to cause environmental harm if not sited, designed and operated properly. When
planning for subprojects of this kind, one should consider the risk of environmental impacts and devise approaches to minimize or eliminate their occurrence through sitting, design, operation and maintenance of the facilities; and management of waste of all types.

**Potential environmental impact**

*Contamination from manure*

Livestock manure contains relatively high concentrations of nutrients, solids, enteric bacteria and other microorganisms, and organic material. The manure from small scale animal husbandry subproject operations is often discharged or “leaked” into water bodies, because it cannot be economically transported to replenish crop fields. When this occurs, the nutrients can cause eutrophication (rapid plant growth in water bodies), solids can create sedimentation, and organic material leads to oxygen depletion (BOD) of the water. There is an urgent need to review and assess current manure management practices and develop manure management guidelines that are appropriate for adoption by local animal producers.

*Harm to human health*

Where water is scarce, either chronically or seasonally, the diversion of water to sustain livestock potentially limits its availability for other purposes such as bathing, washing, cooking, and drinking. Moreover, as mentioned above, excessive contamination by enteric microorganisms, toxic pesticides to manage parasite or nitrates in may render water unfit for human consumption and may be especially dangerous to children. Pesticides or other vector control treatments used on livestock represent threats to the health of livestock managers, their families, and others exposed directly or through water use. These substances may be toxic, cause birth defects, alter children’s proper development, promote cancer, or slowly poison one or more organ systems.

*Odor*

Concentrated manure stored at the farm site can generate strong and unpleasant odors, damaging the quality of life of nearby residents. This problem is most evident when site are located in densely populated areas.

**Potential environmental and social impacts and their mitigation measures**

<table>
<thead>
<tr>
<th>Potential impact</th>
<th>Potential mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Human health hazards</em></td>
<td></td>
</tr>
<tr>
<td>• Introduction of diseases to humans and contamination of water bodies for human use by animal manures and urine;</td>
<td>• Collect and store manure for composting and later application to fields;</td>
</tr>
<tr>
<td>• Pollution and environmental disruption from inappropriate use of pesticide for livestock disease control;</td>
<td>• Keep manure and urine away from household areas and water bodies;</td>
</tr>
<tr>
<td>• Spreading of disease as a result of contact with contaminated domestic animals/birds, carcasses or slurry.</td>
<td>• Consider using a biogas system;</td>
</tr>
<tr>
<td></td>
<td>• Provide protective clothes to minimize danger to workers applying pesticide;</td>
</tr>
<tr>
<td></td>
<td>• Avoid overuse of pesticide;</td>
</tr>
<tr>
<td></td>
<td>• Apply pesticides at recommended times and doses;</td>
</tr>
<tr>
<td></td>
<td>• Consider integrated pest management;</td>
</tr>
<tr>
<td></td>
<td>• Control farm animals, equipment, personnel, and wild or domestic animals entering the facility (e.g. quarantine periods for new animals, washing and disinfecting crates, disinfection and coverage of shoes before entry into livestock zones, providing protective clothing to personnel,</td>
</tr>
<tr>
<td>Potential impact</td>
<td>Potential mitigation measures</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>and closing holes in buildings to keep out wild animals);</td>
</tr>
<tr>
<td></td>
<td>Sanitize animal housing areas;</td>
</tr>
<tr>
<td></td>
<td>Identify and segregate sick animals and develop management procedures for adequate removal and disposal of dead animals).</td>
</tr>
<tr>
<td><strong>Water quality problem</strong></td>
<td>Use biological pest controls before chemical controls to reduce adding toxic residues to the environment;</td>
</tr>
<tr>
<td></td>
<td>Fence off water bodies from grazing animals;</td>
</tr>
<tr>
<td></td>
<td>Mange manure and waste properly preventing from entering into water bodies.</td>
</tr>
<tr>
<td><strong>Air quality problem</strong></td>
<td>Consider composting of manure to reduce odor emissions;</td>
</tr>
<tr>
<td></td>
<td>Reduce emissions and odors during land application activities by applying a few centimeters below the soil surface and by selecting favorable weather conditions (e.g. wind blowing away from inhabited areas).</td>
</tr>
<tr>
<td><strong>Climate change problem</strong></td>
<td>Improve the productivity and efficiency of livestock production (thus lowering the methane emissions per unit of livestock) through improvements in nutrition and genetics. This need special consideration from County office of agriculture in providing technical support in this matter.</td>
</tr>
<tr>
<td></td>
<td>Supplement livestock diets with nutrients, as necessary (e.g. increasing the level of starch and rapidly fermentable carbohydrates, use of urea supplements). Production of feed supplements, may also, however, result in production of GHGs;</td>
</tr>
<tr>
<td></td>
<td>Control the temperature, humidity, and other environmental factors of manure storage to reduce methane and nitrous oxide emissions. This may involve use of closed storage tanks, or maintaining the integrity of the crust on open manure storage ponds / lagoons;</td>
</tr>
<tr>
<td></td>
<td>Consider various techniques to manage methane emissions from manure including controlled anaerobic digestion (to produce biogas), flaring / burning, use of biofilters, composting, and aerobic treatment. Use of anaerobic digestion may also reduce emissions of nitrous oxide.</td>
</tr>
<tr>
<td><strong>Occupational Health and Safety</strong></td>
<td>Instruct staff in correct livestock care, to reduce the incidence of bites and kicks;</td>
</tr>
<tr>
<td></td>
<td>Avoid and control exposure to any pesticide/chemicals;</td>
</tr>
</tbody>
</table>
### Potential impact

| disinfecting agents, antibiotic, hormonal products to control parasite;  
| Exposure to biological agents (bacteria, fungi, mites, and viruses transmitted from live animals, manure, animal carcasses, and parasites and ticks). |

### Potential mitigation measures

| Train personnel that apply chemicals/pesticide;  
| Inform workers of potential risks of exposure to biological agents and provide training in recognizing and mitigating those risks;  
| Provide personal protective equipment to reduce contact with materials potentially containing pathogens. |

### 9. Small Slaughterhouse Facilities

Animal slaughter can take place on a wide variety of scales from small-scale operations occurring on farms or at butcher’s premises to large-scale abattoirs processing thousands of animals a day. Generally, small-scale operations make limited use of automation and extensive use is made of all by-products meaning that there is little waste and pollution generated. However, unless these wastes and by-products are managed properly, the environmental and social impacts related to these subprojects are serious.

The activities at slaughterhouses may include:

- Receiving area for live animals prior to slaughter;
- Retention area some hours (12-24 hrs) for animals prior to slaughter;
- stunning and killing of animals;
- Bleeding of animals - the objective is to kill the animal with minimal damage to the carcass and to quickly remove as much blood as possible;
- Hide removal and treatment;
- Evisceration (removal of internal organs);
- Carcass dressing and washing;
- Handling and transport of carcasses and meat;
- Casings (intestinal tract) and edible offal separation;
- Refrigeration and/or frozen storage;
- Rendering of inedible products, e.g. bone, fat, heads, hair, and condemned offal into animal feed and tallow.

### Key environmental, health and safety risks

The most significant environmental issues associated with small scale slaughterhouse operations are typically water consumption, emissions of high organic strength liquids to water, waste handling to control odour, waste disposal and recovery and the energy consumption associated with refrigeration and heating water.

### Product Contamination

Meat can become contaminated as a result of the vegetable matter consumed by the grazing species (e.g. radioactive isotopes, dioxins and pesticides) through a process known as bio-accumulation and during processing and transport (microbiological contamination). Veterinary
inspection and screening of raw materials will identify any sick or diseased animals and food hygiene standards will need to be considered in order to reduce the risk of microbiological contamination.

- Carcasses awaiting collection should be appropriately stored to prevent putrefaction;

- Specified risk materials (SRM), i.e. tissues in cattle that may contain the agent responsible for transmission of diseases must be carefully separated from carcasses before processing into commercially valuable products and disposed of appropriately;

- Procedures should be in place to prevent processing of waste materials for same species feeding.

**Water consumption**
Slaughterhouses and Animal by Product processors typically use a lot of water. This is partly due to the hygiene requirements, which require potable water to be used for most washing and rinsing operations and mandatory cleaning criteria are set which limits opportunities for recycling and re-use of water.

In slaughterhouse, large quantities of fresh water are used for numerous purposes, including:

- livestock watering and washing;
- truck washing;
- scalding and hide finishing of pigs;
- washing of casings, offal and carcasses;
- transport of certain by-products and wastes;
- cleaning and sterilising of knives and equipment;
- cleaning floors, work surfaces, equipment etc.

**Effluent discharge**
One of the most obvious environmental issues common to all abattoirs is the discharge of large quantities of effluent. Abattoir effluent contains blood, fat, manure, undigested stomach contents and cleaning detergents. The volume of effluent generated is a reflection of the volumes of water used, since 80–95% of water used in abattoirs is discharged as effluent. Slaughterhouses effluents generally exhibit the following properties:

- high organic loads due to the presence of blood, fat, manure and undigested stomach contents;
- high levels of fat;
- fluctuations in pH due to the presence of caustic and acidic cleaning agents;
- high levels of nitrogen, phosphorus and salt (originates from manure and undigested stomach contents and from blood);

In urban areas it is normally discharged to municipal sewage treatment systems if there is otherwise it has to be treated on site using appropriate technologies and methods. In rural areas
Effluent may be treated on site and irrigated to land. If poorly managed, this irrigation could result in the pollution of groundwater.

Blood has the highest COD strength of any liquid effluent arising from slaughterhouses and its collection, storage and handling is a key issue for assessment and control, both in terms of odour and effluent treatment.

Discharge of the effluent directly to water bodies is discouraged as it can pollute them causing damage to wildlife and the effluent may also contain viruses, bacteria, and parasites which are harmful to humans and animals. The management of the effluent should be in consultation with the County government having ESMP prepared.

**Checklist of ideas for reducing effluent loads**
- Maximise the segregation of blood by designing suitable blood collection facilities and allowing sufficient time for bleeding;
- Sweep up solid materials for use as by-products, instead of washing them down the drain;
- Fit drains with screens and/or traps to prevent solid materials from entering the effluent system;
- Use offal transport systems that avoid or minimise the use of water;
- Use water sprays with a pressure of less than 10 bar for carcass washing to avoid removing fat from the surface;
- Use dry cleaning techniques to pre-clean process areas and floors before washing with water;
- Segregate high-strength effluent streams, such as wastewaters from casings and paunch washing and treat them separately.

**Energy Consumption**
Energy is consumed in abattoirs in two ways:
- Thermal energy in the form of hot water used for cleaning, sterilizing and rendering;
- Electricity for refrigeration, lighting and production of compressed air.

**By-products**
By-products from the slaughter of livestock can cause environmental problems if not managed correctly. They are highly putrescible and can cause odour if not heat treated in a rendering process or removed from site within a day of being generated. For small slaughterhouses, the handling of animal by-products can be an important waste management issue.

**Checklist of ideas for maximizing utilization of by-products**
- Segregate all by-products;
- Ensure that by-products are not contaminated with water or materials that would limit or prevent their reuse;
- Store by-products correctly to maintain quality and maximize the viability of reuse opportunities.
Odour
Odour can be a serious problem for slaughterhouses if by-products and effluent streams are not managed correctly, particularly when the slaughterhouse is located near a residential area or in a hot climate. The main sources of atmospheric odour are:

- Untreated effluent;
- Animal wastes (skin, hides, hooves), unprocessed material and any other solid waste;

Sharp Edges and Machinery
Sharp tools are used to process meat including knives, mincers and packaging equipment. Cuts may also occur from sharp bones and equipment edges. All equipment should have safety guarding and workers should be issued with appropriate Personal Protective Equipment (PPE) to protect against unavoidable sharp items and edges.

Solid Wastes
The main wastes of small scale slaughterhouses includes blood, rumen contents, bones, horns, hoofs, urinary bladder, gall bladder, uterus, rectum, udder, fetes, snout, ear, meat trimmings, hide and skin trimmings, condemned meat, condemned carcass, esophagus, hair and poultry offal’s (feathers, head). Only few of these by-products can be used directly.

Hazardous Substances
The cleaning and disinfecting of process areas and livestock areas uses materials that if inappropriately used and stored could result in chemical contact burns to employees, inhalation of harmful/toxic fumes or ingestion of harmful substances.

Ammonia, which is commonly used as a replacement for Chlorofluorocarbons (CFC’s) in refrigeration systems, is toxic if inhaled at high concentrations and can cause frostbite when released to the atmosphere. Facilities using ammonia refrigeration should be aware of the potential hazards of ammonia releases and of the steps that can be taken to prevent such releases.

<table>
<thead>
<tr>
<th>Potential environmental and social impacts and their mitigation measures</th>
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<tbody>
<tr>
<td><strong>Health hazard from sharp Edges and Machinery</strong></td>
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<tr>
<td><strong>Mitigation measures</strong></td>
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<tr>
<td>● Provision of personal protective equipment (PPE) that is fit for the task to prevent injury and maintain hygiene standards. Staff should be trained in the correct selection, use and maintenance of PPE; the training should include the reasons for its use and the dangers of not using it. PPE should be inspected regularly and maintained or replaced as necessary;</td>
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<tr>
<td>● Train workers in correct use of machinery and safety devices;</td>
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<tr>
<td>● Separation of people from moving equipment;</td>
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<td>● Install escape routes for employees in livestock handling areas;</td>
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<td>● Walking and working surfaces should be kept clean and dry and workers provided with anti-slip footwear. Floor cleaning should be scheduled for a time when work is not in progress or has finished;</td>
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<td>● Ensure correct cleanup programmes for liquids: restrict access</td>
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<tr>
<td>Potential Environmental Impacts</td>
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<tr>
<td><strong>Reception of livestock</strong></td>
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<tr>
<td>Effluent containing manure wastes significant contributor to phosphorus loads to pollute downstream water bodies.</td>
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<tr>
<td><strong>Stunning and bleeding</strong></td>
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<tr>
<td>• If effluent with high organic load (especially if blood is discharged) is discharged to the effluent stream without pre-treatment, the effectiveness of any downstream effluent treatment system will be greatly affected due to the increased organic loads. It is also main contributor to nitrogen loads in effluent and hence cause eutrophication problems downstream;</td>
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<tr>
<td>• Generation of fat loaded effluent blind screens in the effluent treatment system/in the sewer system, resulting in the need for greater use of hot water to clean them.</td>
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<td>• Fat interceptors should be installed on all drains and should be inspected and cleaned regularly;</td>
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<tr>
<td><strong>Splitting and evisceration</strong></td>
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<tr>
<td>• High water and energy consumption;</td>
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<td>• Downstream water bodies pollution from high organic load wastewater.</td>
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<tr>
<td><strong>Paunch and stomach washing</strong></td>
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<td>• Water consumption in the casing process can be very high;</td>
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<tr>
<td>• Paunch manure contains high concentrations of organic solids and other pollutants causing downstream water bodies pollution.</td>
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<tr>
<td>Potential Environmental Impacts</td>
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<tr>
<td><strong>Refrigeration</strong>&lt;br&gt;• High energy consumption;  &lt;br&gt;• Fugitive losses of refrigerants like CFCs or ammonia contribute to the depletion of the ozone layer;  &lt;br&gt;• Occupational, health and safety problem for workers from ammonia and glycol leaks.</td>
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<tr>
<td><strong>Casing and offal processing</strong>&lt;br&gt;• Very high water consumption;  &lt;br&gt;• Effluent with very high organic load.</td>
</tr>
<tr>
<td><strong>Rendering</strong>&lt;br&gt;• Effluent with very high organic load downstream water bodies pollution;  &lt;br&gt;• High odor generation may leads health problem to the surrounding dwellers;  &lt;br&gt;• High energy consumption.</td>
</tr>
<tr>
<td><strong>Cleaning</strong>&lt;br&gt;• High water consumption;  &lt;br&gt;• Water pollution due to high organic load;  &lt;br&gt;• Chemical pollution water from usage of detergents for cleaning. There is also health hazard on staffs handling and managing the detergents (acids and bases).</td>
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<tr>
<td>Land Acquisition</td>
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</table>
10. Pest Management

Farmers use pesticides and other chemicals (herbicide, insecticide, fungicide and others) to increase agricultural productivity. Pesticides have played an important role in creating and sustaining the agricultural revolution. Because of their toxic nature, however, pesticides pose a risk to humans, animals, and the environment when they are not handled properly. Absence of safety precautions can result in accidents, affecting the producer, the employees, their families, and farm animals, sometimes with serious consequences. Many pesticides, especially those available and used very heavily in the developing world, are not specific to the pest on which they are used, and are highly toxic to a broad array of living things. Those at greatest risk are those who experience the greatest exposures—typically smaller-holder farmers, farm workers and their families. These populations are also often the poorest members of society. Larger-holders are more likely to have received training on pesticide risk avoidance; however, laborers hired by them may not.

Table 6: Potential pesticide impacts on environmental and social components

<table>
<thead>
<tr>
<th>Pesticide impact on</th>
<th>Potential impact</th>
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</table>
| Water               | • the death of fish and also have other ecological impacts  
                     | • change in the organoleptic properties of water (its odor, taste)  
                     | • negative effect on the process of oxygen formation by phytoplankton, on the vital activities of the inhabitants of the water ecosystems  
                     | • impacts that transmitted along the food chains, and accumulate in food products  
                     | • direct toxic action (acute or chronic toxicity) and indirectly (dimensioning of the content of oxygen dissolved in the water, a change in the chemical composition of water, extermination of water insects, etc)  
                     | • disturbing aquatic ecology  
                     | • Adverse effects on wetlands aquatic flora, etc. |
| Air: pesticides related air pollutants and their effects on health | • Respiratory illness, including chronic bronchitis and asthma; heart diseases  
                                                                       | • Heart diseases; respiratory problems including pulmonary emphysema, cancer, eye burning, headache, etc.  
                                                                       | • Pneumoconiosis, restrictive lung diseases, asthma, cancer, etc.  
                                                                       | • Lung irritation, viral infection, airway resistance, chest tightness, etc.  
                                                                       | • It causes immunotoxicity, carcinogenicity, asthma, anemia, unconsciousness etc.  
                                                                       | • Impaired lung function, chest pains, coughing, irritation of eyes, nose etc.  
                                                                       | • CO poisoning cause cherry lips, unconsciousness, death by asphyxiation etc.  
                                                                       | • It causes decreased hemoglobin synthesis, anemia, damage the nervous and renal (kidney) systems etc. |
| Soil                | • Kill and severely reduce the essential soil macro- and microorganisms, including earthworms, insects, spiders, mites, fungi, essential mycorrhizae, and bacteria, thus reducing or stopping important nutrient cycling  
<pre><code>                 | • Accidental spills on soil, which are usually associated with pesticide mixing and loading |
</code></pre>
<table>
<thead>
<tr>
<th>Pesticide impact on</th>
<th>Potential impact</th>
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</thead>
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<tr>
<td>operations, can result in localized but severe soil contamination if not contained and dealt with rapidly and adequately</td>
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<tr>
<td>Human health</td>
<td>• Acute poisoning (death, light to severe sickness, respiratory problems, etc.)</td>
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<td>• Chronic poisoning (cancer, birth defects, reproductive disorders, skin problems, impairment of immune system capabilities, etc.)</td>
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<tr>
<td>Wild life and livestock (non-target species)</td>
<td>• population decline through the use of pesticides over large areas</td>
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<td>• Reproductive effect such as egg shell thinning, deformity and birth defects</td>
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<td></td>
<td>• Metabolic changes</td>
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<td>• tumors and cancer</td>
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<td>• behavioral changes</td>
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<td></td>
<td>• abnormally functioning thyroid glands</td>
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<td></td>
<td>• Sub-lethal or lethal poisoning of mammals and other vertebrate</td>
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<td>• through extinction of the pest population -losses of food sources for many birds; particularly migratory species</td>
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<td>• toxicity to bees which are pollinators, with adverse effects on the production of certain crops</td>
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<td></td>
<td>• long-term negative effects on the reproductive processes of birds of prey and aquatic species of certain insecticides eg DDT)</td>
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<td>• high mobility and biological amplification of persistent pesticides</td>
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<tr>
<td>Socio-Economic Impact</td>
<td>Positive impacts</td>
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<td></td>
<td>• increased income and/or security of yield for farmers</td>
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<td>• Increased employment opportunities and</td>
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<td>• Improved food supply</td>
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<td></td>
<td>Negative impacts</td>
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<tr>
<td></td>
<td>• Risk of human contamination to dealers, formulators, applicators and farmers</td>
</tr>
<tr>
<td></td>
<td>• Health risks and associated economic impacts from contamination of surface; and ground potable water supplies contaminated by pesticides containing wastes</td>
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<td></td>
<td>• Acute health effects resulting from contamination of food and water stored in pesticide containers, from the transportation of pesticide and food stuffs in the same transportation means</td>
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<td></td>
<td>• Health risks from pesticide residues remaining on a crop after application</td>
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<tr>
<td></td>
<td>• Loss of revenue from cash crops if these cannot be sold on world markets because of illegal residue levels</td>
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<td></td>
<td>• Crop losses due to the emergence of new and/or more resistant pests (insects, plant pathogenic fungi, bacteria), spread of disease vectors and emergence of a ‘pesticide treadmill’, whereby farmers obliged to pay more and more for a control program that does less and less good</td>
</tr>
<tr>
<td></td>
<td>• In general short term benefit long term side effect</td>
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</tbody>
</table>

**Major causes of pesticides impact on the environment and human health**
The major causes of pesticide impact are related to lack of awareness, improper transport, storage, handling, use of pesticides, weak enforcement, lack of Integration, weak institutional setup, and poor networking and exchange of information among key stakeholder, obsolete pesticide accumulation, disposal problems, pesticide residues, and absence of ideal type of pesticides.
Potential mitigation measures
The Government of Kenya supports the use of integrated pest management approach (IPM) to reduce reliance on agricultural chemicals. Integrated Pest Management (IPM) refers to a mix of farmer-driven, ecologically based pest control practices that seek to reduce reliance on synthetic chemical pesticides. It involves (a) managing pests (keeping them below economically damaging levels) rather than seeking to eradicate them, (b) relying, to the extent possible, on nonchemical measures to keep pest populations low; and (c) selecting and applying pesticides, when they have to be used, in a way that minimizes adverse effects on beneficial organisms, humans, and the environment.

Integrated pest management (IPM) is being promoted throughout the world as an alternative approach to pest management. Core elements of all IPM approaches are minimizing pesticide use and minimizing health and environmental risk when pesticides are used.

Model Approach to IPM
- Evaluate pests’ impact before control programs are implemented, to identify pests, size of problems and possible natural controls
- Evaluate non-pesticide management options, including a range of preventive measures and alternative pest control methods (physical, mechanical, and biochemical)
- Evaluate whether synthetic pesticides are necessary or not, whether less toxic varieties are available for the purpose, and how to minimize exposure for users and the environment.

Potential Mitigating Measures for Pesticide Dangers
If there are no feasible alternatives to pesticides, take the following measures to mitigate and reduce their risks to human health and the environment. Note that risk is a function of both toxicity and exposure. Reducing risk means (1) selecting less toxic pesticides and (2) selecting pesticides that will lead to the least human exposure before, during and after use.

1. Screening Pesticides
The use of any pesticide should be based on an assessment of the nature and degree of associated risks, taking into account the intended users. With respect to the classification of pesticides and their specific formulations, the Bank refers to the World Health Organization's Recommended Classification of Pesticides by Hazard and Guidelines to Classification.

The Bank requires that the following criteria apply to the selection and use of pesticides:
   a. They must have negligible adverse human health effects.
   b. They must be shown to be effective against the target species.
   c. They must have minimal effect on non-target species and the natural environment. The methods, timing, and frequency of pesticide application are aimed at minimizing damage to natural enemies. Pesticides used in public health programs must be demonstrably safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them.
   d. Their use must take into account the need to prevent the development of resistance in pests.
e. They do not fall in WHO classes IA and IB, or formulations of products in Class II if (a) country lacks restrictions on their distribution and use; or (b) they are likely be used by, or be accessible to, lay personnel, farmers, or others without training, equipments, and facilities to handle, store, and apply these products properly.

2. **Reduce exposure time or the degree of exposure**

**Before using** *(transporting, packaging and storing)*

**Transporting**
- Separate pesticides from other materials being transported
- avoid private distribution—it’s dangerous
- Never transport leaking or badly deteriorated containers
- Do not transport food, beverages or animal feed together with pesticides. Load and unload pesticides very carefully to minimize the chance of dropping containers.

**Packaging**
- follow international and national norms and guidelines
- use packaging adapted to needs
- eliminate re-use of packaging materials (even when cleaned, pesticide containers are too dangerous to re-use
- The container for the product shall be of sufficient strength and shall provide all the necessary protection against compaction, atmospheric moisture, oxidation, loss by evaporation and contamination to ensure that the product suffers no deterioration under normal conditions of transit and storage, etc.

**Storing**
- develop strict guidelines for village-level storage
- ensure permanent, well-marked labeling
- follow and respect national norms
- follow and respect FAO norms
- use appropriate language and approved pictograms
- use and respect appropriate toxicology color
- should be located far from human dwellings, and personal use items
- should be sited far from rivers and bodies of water, to prevent chemical contamination from entering and poisoning the water
- should not be sited in an area subject to flooding, especially during seasonal rains
- be secured from public access
- have a warning sign affixed to the exterior door, entrance or gate of the storage facility
- have a floor or base that is protected from pesticide absorption

**Labeling**
The purpose of a labeling is to convey a message about what the product is, who makes it and how it may be used safely and effectively. Label should specifically indicate:
- Ingredient statement
- Type of formulation
- Net content of the package
• purpose for which it is to be used
• Name and address of manufacturer, distributor
• Registration or license number
• directions for use
• safety precautions
• warnings and statements of good practice
• Hazards to humans and domestic animals
• Environmental hazards
• Physical and chemical hazards
• first-aid instructions and advice to health personnel
• Storage and disposal directions
• Warranty statement
During use (training should be continuous for farmers, application, protective equipments and clothing, mixing of chemicals, and others)

Pre-application

- Read and understand labeled instructions and any other information provided with either the agrochemical, the application equipment or the protective clothing
- Assess the risks of application to people, animals and the environment and decide what action is necessary to reduce or eliminate them
- Ensure that the user is competent and that he or she has received effective training in application techniques and the precautions to be observed
- Arrange health monitoring as may be necessary for certain hazardous agrochemicals based on their frequency of use
- Check application equipment to ensure that it operates satisfactorily without leaking or spilling and is calibrated for the necessary application rates
- Check that protective clothing and other safety equipment including breathing apparatus, if required, is complete, is of the correct quality and is in good condition. Replace any items that are worn or missing. And is in good condition. Replace any items that are worn or missing
- Decide how the work is going to be done and set up an action plan to cover its implementation, together with any emergencies that may arise.
- Check that weather conditions are satisfactory, particularly to avoid excessive wind speeds and consequent spray drift
- Ensure the safe disposal of empty containers, tank washings and surplus pesticides

During application

- Do not apply agrochemicals without adequate training
- Wear appropriate protective clothing as prescribed on the label or information sheet for handling concentrated products
- Avoid blow-back from granule or powdered materials when transferring container contents into the application unit. A slow, steady release causes least disturbance of air and reduces the risk of particles becoming airborne and being inhaled
- Mix only the correct amount of agrochemical required for a particular task so as to avoid the need to dispose of any surplus.
- Handle containers carefully to prevent gurgling or spillage during pouring into an applicator. Pour correctly from large containers with the spout uppermost so as to allow air to flow into the container at the same rate as the contents flow out
- If two or more agrochemicals have to be mixed, ensure that they are compatible and without risk of a chemical reaction that would cause a "tank mix" operator hazard
- Do not eat, drink or smoke while applying agrochemicals
- Ensure that dangerous practices such as putting a blocked nozzle to the mouth to blow it clear are prohibited. Clean the nozzle with water or a soft probe, such as a grass stem
- Do not allow other workers in the field, particularly when pesticides are being applied. Take particular care to observe that children are neither allowed to spray nor are exposed to pesticides.
- Take notice of changing weather conditions, such as an increase in wind speed. This would cause drift and could blow the spray towards sensitive areas such as a drinking-water supply, resulting in health hazards. It may also blow the spray towards the operator, causing an inhalation hazard.

After using (know, respect and enforce any exclusion period after application-time during which humans, livestock, etc., must be kept away from the treated area; assure proper cleaning and rinsing off of; and develop a workable monitoring and evaluation system). The following precautions have to be followed after applying the pesticide:

- Thoroughly wash hands, face and neck as well as other parts of the body which may have become contaminated. If gloves have been worn, wash them before removal.
- Return unused pesticide to safe storage and safely dispose of empty containers and any surplus in the application equipment.
- Decontaminate application equipment by washing it thoroughly. The washings should be drained into a soak-away or similar chamber to be safely confined and without risk to the environment.
- Decontaminate protective clothing by thoroughly washing items such as apron, boots and face shield. Launder the work clothing each day after spraying. Gloves should be washed inside and out and allowed to dry. Respiratory protection equipment should be wiped clean.
- Bathe or wash thoroughly again after completing the above four actions.

Disposal of unused and obsolete pesticide, and empty pesticide containers
The safe management and disposal of pesticide-related waste (unused and obsolete pesticide, and empty pesticide container) should be provided and coordinated by regulatory authorities, pesticide distributors and suppliers. Other organizations that support and advise pesticide users, such as extension and health promotion services, non-governmental organizations (NGOs), agricultural colleges and schools, also have important roles to play.

Governments and their agencies, including ministries of agriculture, health, environment and education, are responsible for regulating the manufacture, import, distribution and use of pesticides. These responsibilities should be extended to include the management of pesticide-related waste products, including empty containers, which are often overlooked. A mechanism has to be designed to collect all empty pesticide containers from farmers and safely disposed and never reused. It is extremely dangerous to use them for anything else. Consult the pesticide label, the manufacturer, or the manufacturer’s representative for specific recommendations regarding container cleanup and disposal.

Management plan has to be prepared when there is the plan to use pesticide to mitigate all the impacts associated with the pesticide using the above mentioned measures. The
implementation of the plan has to be supervised, monitored and audited, and monitoring plan has to be prepared.