

**AGRICULTURAL SECTOR ENVIRONMENTAL
IMPACT ASSESSMENT GUIDELINES**

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PREFACE

Agricultural activities depend on environmental resources such as land, forest, air, water and other natural resources. Poorly implemented agricultural activities have the potential to contribute heavily on environmental degradation, decreasing land productivity and even threatening future sustainability of the industry. Major agricultural projects, which may include intensive farming, irrigation activities, fertilizer and pesticides manufacturing and applications are important to Tanzania's economic development. However, such projects may pose a significant risk to the environment, which must be addressed by developers and/or owners of the projects.

Agricultural activities can generate waste and other products that could lead to pollution, change in landscapes, biodiversity, ecosystem and degradation. Agricultural practices that fail to take into account environmental management can cause damage to the ecological systems including endangering of the human and animal life. As an example, irrigation activities can upset aquatic and wildlife communities and contaminate land and groundwater.

Sustainable utilization and protection of environmental resources is vital for the growth and sustainability of agriculture sector. In order to meet future global demands in terms of agricultural production and productivity and for the sector to remain viable, there are needs to maintain the quantity and quality of the existing resources.

The primary focus of the Ministry of Agriculture Food Security and Cooperatives (MAFC) through its Environment Management Unit is to mainstream environmental issues in its agricultural development projects in line with the Environmental Management Act, 2004 and its Regulations. The referred legislation and guidelines require among

others, each sector including agriculture to develop specific sector EIA guidelines. The sectoral environmental guidelines are to be used in developing and implementing sectoral legislation, regulations, policies, plans, strategies and programs.

This document is designed to provide agricultural projects developers, and all stakeholders engaged in the listed agricultural projects with guidance on how to formulate and implement sound projects that reduce adverse environmental, social and health impacts, in addition, the sector is planning to implement projects under TAFSIP (BRN & SAGCOT), therefore it is expected that the guideline will be very useful on those projects for sustainable development.

The Guideline for the crop sub sector has been developed by the Ministry of Agriculture Food Security and Cooperatives in collaboration with the experts from the Vice President's Office - Division of Environment, National Environmental Management Council and Ardhi University. The Ministry of Agriculture Food Security and Cooperatives would like to thank those who participated in the development of the Guidelines.

The Ministry would like to encourage all stakeholders involved in the listed agricultural projects under this document to effectively use the guidelines when undertaking Environmental Impact Assessments.



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**MINISTER FOR AGRICULTURE FOOD SECURITY AND
COOPERATIVES**

ABBREVIATIONS AND ACRONYMS

ASDP	Agricultural Sector Development Programme
ASDS	Agricultural Sector Development Strategy
ASEAP	Agricultural Sector Environmental Action Plan
BOD	Biological Oxygen Demand
BRN	Big Results Now
CBD	Convention on Biological Diversity
CBO	Community Based Organizations
COD	Chemical Oxygen Demand
DADPs	District Agricultural Development Plans
DDCs	District Development Committees
DoE	Division of Environment
EAC	East African Community
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
EMU	Environment Management Unit
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization
GM	Genetically Modified
GMOs	Genetically Modified Organisms
HEPA	High Efficiency Particulate Air
HIV/AIDS	Human Immunodeficiency Virus/Acquired ImmunoDeficiency Syndrome
I &APs	Interested and Affected Parties
ICT	Information Communication Technology
JKT	Jeshi la KujengaTaifa
LMOs	Living Modified Organisms
LGAs	Local Government Authorities
MAFC	Ministry of Agriculture Food Security and Cooperatives

NCSSD	National Conservation Strategy for Sustainable Development
NEAP	National Environmental Action Plan
NEMC	National Environment Management Council
NGOs	Non-Governmental Organisations
NICTP	National Information and Communication Technology Policy
NIP	National Irrigation Policy
NIMP	National Irrigation Master Plan
OSHA	Occupational Safety and Health Authority
PADEP	Participatory Agricultural Development and Empowerment Project
PEA	Preliminary Environmental Assessment
PIC	Prior Informed Consent
POP	Persistent Organic Pollutants
PPEs	Personal Protective Equipments
PRSP	Poverty Reduction Strategy Paper
RDS	Rural Development Strategy
RBMSIIP	River Basin Management and Smallholder Irrigation Improvement Project
SACCOS	Savings and Credit Cooperative Societies
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SESA	Strategic Environmental and Social Assessment
STDs	Sexually Transmitted Diseases
TAC	Technical Advisory Committee
TAFSIP	Tanzania Agriculture and Food Security Investment Plan
ToR	Terms of Reference
TS	Tanzania Shillings
TSS	Total Suspended Salts
TV	Television
VCT	Voluntary Counseling and Testing
VDCs	Village Development Committees
VOC	Volatile Organic Compound

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GLOSSARY OF TERMS

Act:

Rule or order issued by executive authority or regulatory agency of a government and having the force of law.

Agriculture:

In this guideline, it means crops sub sector.

Biological diversity:

Means the variability among living organisms from all sources including terrestrial ecosystems, aquatic ecosystems and the ecological complexes of which they are part including diversity within species and of ecosystems.

Biosafety:

Means avoidance of risks to the protection of the environment and to human health, as the result of the use for research and commerce of genetically modified organisms.

Community meetings:

Meetings in addition to public hearings, which are held periodically throughout the project impact area. They are just as important as formal public hearings, but may be less formal and smaller, may occur more often and may involve a more diverse audience.

Compliance:

A state of being in accordance with established guidelines specifications, process or legislation.

Developer:

A person who is developing a project which is subject to an environmental impact assessment process under EMA of 2004.

Effect/Impact:

Any change in the physical, biological, natural or cultural environment brought about by a development Project. Effect and Impact are used interchangeably.

Environmental Impact Statement:

A statement produced at the end of the environmental impact assessment process in accordance with EMA, 2004 requirements.

Environmental impact:

Estimate or judgment of the significance and value of environmental effects on physical, biological, social or economic environment.

Environment:

This includes physical factors of the surroundings of human beings including air, water, land, climate, sound, light, the biological factors of animals and plants, cultural resources and social economic factors of aesthetics and includes both natural and the built environment and the way they interact.

Gene:

The fundamental and functional units of heredity; the portion of a DNA molecule that is made up of an ordered sequence of nucleotide base pairs that produce a specific product or has an assigned function.

Genetically Modified Organism (GMO):

A genetically engineered organism, whose genetic material has been changed through gene technology in a way that does not multiply naturally by mating and/or natural combination.

Guideline:

Describing the methodology for implementation of environmental impact assessment or environmental audit requirements adopted by the Council pursuant to section 58 of the Act.

Mitigation:

Measures taken to avoid, reduce or prevent significant impacts of development activities.

Policy:

A non legal document which gives a direction or the way that things are supposed to be done. It acts as the framework or standard of doing something.

Project:

Includes any project, programme or policy that leads to activities which may have an impact on the environment.

Proponent:

Means a person proposing or executing a project, programme or an undertaking specified in the Third Schedule of the EMA.

Public hearing:

Gathering of interested and affected people or whole communities at which information is exchanged and views expressed.

Public participation:

The process of encouraging, enabling and engaging the general population, or members of a community as a whole, to express their interests, discuss concerns and solicit active support in planning, implementing, operating and maintaining a development project.

Public:

An individual, civil society, organization and institutions, community based organizations, public and private institution.

Review:

The process of establishing whether an EIS is adequate for the Competent Authority to use it to inform the decision on development consent.

Scoping:

The process of identifying the content and extent of the environmental information to be submitted to the competent authority under the EIA procedure

Screening:

The process by which a decision is taken on whether or not EIA is required for a particular Project.

Stakeholder:

People and institutions having an interest in the successful design, implementation and sustainability of the project. This includes those positively and negatively affected by the project.

Standard:

Means the limits of discharge or emissions established under the EMA or under regulations made pursuant to the Act or any other written law.

1.0 INTRODUCTION

1.1 Background

Agriculture is the mainstay of the Tanzanian economy contributing about 26.8% of GDP in the year 2012, 30.9 % of export earnings and employs about 75% of the total population. Over the past decade, the agricultural sector grew at an average rate of 4.4%. The rate of growth in agriculture is higher than the average annual population growth rate of 2.9%, implying growth in incomes. Tanzania agriculture is dominated by subsistence farming with low capital investment that operates under rain-fed conditions and farm sizes of between 0.2 to 2.0 hectares. Despite the high potential area for irrigation development which is 29.4 Million hectares, only 363,514 hectares under irrigation are provided with improved irrigation infrastructure, despite the fact that the total area under irrigation including the traditionally irrigated areas is 450,392 hectares as of June 2013.

The commercial large scale sub-sector is very small and produces some of the export crops in the country. Farming operations such as weeding techniques (manual, chemical, mechanical), fertilization (types, application methods, rates), pesticide use (types, application methods, storage, transport, disposal), mechanized farming practices (type of machine, tillage, harvesting), crop management practices, upland farming practices, bottom valley cultivation, crop storage may have potential negative environmental impacts if not practiced in an environmental friendly manner. A multiplicity of such negative environmental impacts has forced many countries to formulate policies to safeguard the environment.

Tanzania has formulated a number of policies to protect the environment.

The policies include both sectoral and cross sectoral. The crop sub sector Environmental Impact Assessment Guidelines provide guidance to EIA practitioners so that proposed agricultural projects comply with both national and international environmental requirements.

Environmental Impact Assessment (EIA) is an important procedure for ensuring that the likely effects of a project or development on the environment are fully understood and taken into account before the development is allowed to go ahead. The EIA is a formal process to predict the environmental consequences of human development activities and to plan appropriate measures to eliminate or reduce adverse effects and to augment positive effects. The EIA provides a unique opportunity to demonstrate ways in which the environment may be improved as part of the development process.

1.2 Objectives of these Guidelines

1.2.1 Overall Objective

The overall objective is to provide guidance to agricultural project developers on the issues related to environment.

1.2.2 Specific Objectives

The specific objectives of the guidelines are to ensure that:

- Agricultural projects are socio-culturally acceptable, economically feasible and environmentally friendly throughout the project life span.
- Stakeholders are fully involved in the determination of potential impacts and identification of mitigation / enhancement measures.
- Shared resource conflicts are considered while defining

codes of conduct for the proposed and ongoing development projects.

1.3 The Need of Guidelines for Development Projects in Agriculture

The primary focus of the MAFC through Environment Management Unit is to mainstream environmental issues in line with the Environmental Management Act, (EMA, Cap 191) and its Regulations including the Environmental Impact Assessment and Audit Regulations, 2005. EMA requires among others each sector to mainstream Environmental issues in the sector; ensures that environmental concerns are integrated into the ministry or departmental development planning and project implementation; to develop specific sector EIA guidelines, systems, procedures and capacity for implementing EIA and to undertake strategic environmental assessment of sectoral legislation, regulations, policies, plans, strategies and programs.

Under section 81(1) and (2), of EMA, requires that any person, being a proponent or a developer of a project or implementing projects specified in the Third Schedule to that Act, to which Environmental Impact Assessment is required to be made by the law governing such projects or undertaking or in the absence of such law, by regulation made by the Minister, shall undertake or cause to be undertaken, at his own cost, an environmental impact assessment study. There are various activities or undertaking in the agricultural sector which may have adverse impact to the environment and human health hence need prior EIA studies. Further, section 82(1) of EMA empowers the Minister responsible for Environment to make regulations and guidelines on how environmental impact assessment shall be conducted under the Act and under any other written law. In this case, EMA entails there should be specific sector EIA standards and guidelines developed under other written laws.

Therefore, the Ministry of Agriculture Food Security and Cooperatives (MAFC) has developed the Agricultural Sector EIA guidelines which among others, will facilitate for the effective implementations of the environmental related laws within the agricultural sector and ensure conservation and sustainable management of agricultural resources including land, water and biodiversity, for national socio-economic development as well as for food security.

1.4 The Scope of the Guidelines

The Guidelines provide guidance for environmental issues to be taken into accounts to relevant ministries, departments and agencies, project developers/proponents, EIA Experts, development organizations, businesses and the public in general, involved in designing, approving and implementing agricultural related development projects. It provides steps to undertake EIA process; defines the role and responsibilities of different stakeholders; identifies environmental impacts, mitigation/enhancement measures in different phases of projects from pre-construction, construction, operation and decommissioning. The agricultural projects included in the guidelines are large scale farming (mono culture and mixed cropping of cash or food crops); intensive farming, irrigation projects, manufacturing and utilization of agrochemicals (pesticides and fertilizers), agro-processing industries and introduction of genetically modified organisms.

1.5 Methodology

The development of these guidelines involved literature review on EIA Guidelines from different countries, data collection from regions which were purposively selected based on seven agro-ecological zones and conducting expert workshops. Regions that were visited include Mbeya, Iringa, Mara, Mwanza, Arusha, Tabora, Shinyanga, Mtwara,

Lindi, Kilimanjaro, Dar es Salaam, Morogoro, Coast, Singida and Dodoma which also involved agricultural research centers in those zones. Within each of the selected regions one to two districts were picked based on the evidence of existence of specific agricultural environmental issues/challenges. In each district two to three projects were randomly selected for visitation and interviews. Primary data were obtained through interviews using questionnaires, focus individual/group discussions and field observations. Primary data collection involved key informants of a multidisciplinary nature at district level including officials from agricultural, environmental, community development, health, land and forest sectors. In research centers and agro processing industries, one official was requested to provide primary information. In order to compliment primary information collected from field surveys, secondary data were collected through documentary review as well as information search from websites, official reports from National Environment Management Council, Vice President's Offices, Ministry of Agriculture Food Security and Cooperatives. Key government policies that were reviewed included policies, plans, strategies and legislations concerning agriculture and environment.

2.0 AGRICULTURAL DEVELOPMENT IN TANZANIA

2.1 Agriculture in Tanzania

Agriculture is the backbone of the Tanzanian economy. It accounts for about 26.8 percent of the national income by the year 2012, three quarters of merchandise exports and is source of food and provides employment opportunities to about 75 percent of Tanzanians. It has linkages with the non-farm sector through forward linkages to agro-processing, consumption and export. It provides raw materials to industries and a market for manufactured goods. About 62 percent of Tanzania's crop area is cultivated by hand hoe, 24 percent by ox plough and 14 percent by tractor. Food crop production dominates the agriculture activities in which, 5.1 million hectares are cultivated annually, of which 85 percent is under food crops. Women constitute the main part of agricultural labour force. The Agriculture growth averaged about 4 percent between 2005 and 2008. The sector's slow growth is a result of a combination of many challenges. These include poor infrastructure to support agriculture, inadequate extension services, poor technology of production, dependence on unreliable and irregular weather conditions, low value addition, lack of appropriate financing mechanism for agriculture, absence of reliable market and prices and environmental degradation.

2.2 Agriculture Policies and Laws

Agriculture is implemented through various Policies, Laws and International Conventions which Tanzania is a Party. Below are some relevant sectoral and cross-sectoral policies, Laws and International Conventions which provide directives on how agricultural activities should be implemented in relation to environmental and socio-economic settings.

2.2.1 Policies

2.2.1.1 National Agricultural Policy (2013)

The Policy recognizes the dependence of agriculture on environmental resources such as land, water, forest, and air. Sustainable utilization of these resources is vital for the growth and sustainability of the sector. Intensification of agriculture, unsustainable farming methods and systems (including deforestation, land clearing and bush fires) exerts pressure on natural resources hence increasing contribution to climate change. Therefore, the agriculture policy objectives promotes integrated and sustainable use and management of natural resources, ensures basic food security and improves standards of nutrition as well as the standard of living in rural areas, promotes access by women and youth to land, credit, education and information. The policy also promotes agricultural practices that sustain the environment and also identifies the need for developing mechanism for linking agriculture sector with other relevant ministries and stakeholders in protection and enhancement of the environment.

2.2.1.2 The National Irrigation Policy (2010)

The National Irrigation Policy provides the basis for a focused development of the irrigation sector in Tanzania. The Policy covers the activities and interventions required for the sector to effectively contribute towards enhancement of production and productivity in agricultural sector. The main objective is to ensure sustainability of water for irrigation and its efficient use for enhanced crop productivity and profitability in order to contribute to food security and poverty reduction.

2.2.2 Laws, Acts and Regulations

2.2.2.1 Fertilizers Act, Cap. 378

This Act makes provision for regulation of manufacturing, importation, exportation, sale and utilization of agricultural fertilizers and to repeal the Fertilizers and Animal Food Stuffs Act, Cap.378. It prohibits the use, storage, discharge, release, placing or cause to be placed any fertilizer or fertilizer supplement in a manner likely to have adverse effect on human health or environment.

2.2.2.2 Plant Protection Act, Cap. 133 R. E 2002

The Plant Protection Act was enacted to prevent the introduction and spread of harmful organisms to ensure sustainable plant and environmental protection, to control the importation and use of plant protection substances, to regulate import and export of plants and plants products and ensure fulfillment of international commitments, to entrust all plant protection regulatory functions to the Government and for matters incidental thereto or connected therewith. It provides for safeguards against pollution of groundwater and the natural environment by plant protection substances.

2.2.2.3 Seed Act, Cap. 308

This Act provides for the control and regulation of standards of agricultural seeds and for matters incidental thereto. The Act regulates importation, exportation, manufacturing, processing and sale of agricultural seeds. Where seeds production is under extensive farming it is a condition requirement that the owner or developer of such project to ensure compliance with the other environmental related legislation. For instance, under the provisions of the Seeds Regulations, 2007, every person dealing with seed processing project, depending on the nature of the undertaking, may be required to conduct Environmental Impact Assessment before starting such project.

2.2.2.4 Tobacco Industry Act, Cap. 202 R.E 2002

The Tobacco Act as amended in 2002 provides regulatory functions of the Tobacco Board under section 5(1) which amongst others is controlling and prescribing measures for the preservation of the environment including avoidance of land degradation through compulsory afforestation and economical use of wood fuel programmes.

Furthermore, section 14(1) provides for conditions for registration of tobacco factories. Among conditions required to be fulfilled for registration of a new processing tobacco factory under paragraph (h) is submission to approved by the Board the Environmental Impact Assessment report. Section 2 of the Act defines “Environmental Impact Assessment” to means a study of environmental impact conducted in accordance with the provisions of the Environmental Management Act. A regulation 16(5) of the Tobacco Industry Regulations, 2011 allows the Tobacco Board to issue from time to time the environmental conservation guidelines for adherence by tobacco growers.

2.2.2.5 The Cotton Regulations, 2011

Regulation 15 of the Cotton Regulations, 2011 imposes the duty to every cotton grower to conserve or protects the environment. The regulations requires every cotton grower to use agrochemicals in an appropriate manner so as not to pose danger to the environment, not to burn farms or field for the purpose of weeding, to grow cotton using good agricultural practices; and take any other appropriate measures to ensure environmental protection. The Regulations empowers the Cotton Board to issue environmental guidelines for adherence by the cotton growers.

2.2.2.6 The Sisal Industry Regulations, 2011

Regulation 10 of the Sisal Industry Regulations, 2011 deals with environmental protection. It provides that every grower shall, in order to conserve the environment:

- (i) Not dump any sisal garbage, residue and other refuse in the sisal field or in water bodies;
- (ii) Transport, use or store agrochemicals in an appropriate manner so as not to pose danger to environment; and
- (iii) Use appropriate farming practices that will ensure environmental protection

This regulation also requires every processor or manufacturer to construct a dumping ground in an appropriate place for the purpose of dumping of garbage, residue or any other refuse likely to pose danger to environmental sanitation. The Regulations designates Sisal Assurance Officers whose responsibilities among others include monitoring water utilization and environmental management in respect of sisal or sisal products.

2.2.2.7 The Biosafety Regulations, 2009

These Regulations domesticate the provisions of the Cartagena Protocol on LMOs and general regulation of GMOs and their related products. Regulation 7(1) provides that, the Minister is responsible among others for the review and approval of all biosafety application for research, confined release, pre commercial release or placing on the market of products of GMOs.

2.3 Implementation of Agriculture Strategies, Programmes and Plans

Agriculture is implemented through different strategies, programmes and plans. Currently agriculture is implemented through a programme

known as Agricultural Sector Development Programme (ASDP) which is the main tool of the Central Government for coordinating and monitoring agricultural development and for incorporating national wide policies including the Tanzania Development Vision 2025 (TDV 2025) and Poverty Reduction Strategy Paper (PSRP). Both macro policies provide guidance on national long-term strategic goal for social and economic development. While TDV 2025 envisages raising the standard of human development of Tanzanians to those of medium income developing country by 2025, the PSRP gives high priority to agriculture and rural development, and targets poverty reduction as the central goal of national development. These will be achieved through increased productivity and competitiveness, increased export earnings and investment in human capital, which are central themes of the ASDP. Subsequently, the Rural Development Strategy (RDS) and the Agricultural Sector Development Strategy (ASDS), both completed in 2001, have redefined the Government's approach in these areas.

Kilimo Kwanza ("agriculture first") resolution is another tool which was adopted in August, 2009 and is a recognition that agriculture can do much more than it has in the recent past, in the right conditions and with the right support. The resolution is a Tanzania's Green Revolution to transform its agriculture into a modern and commercial sector through mobilization of resources into the agricultural sector and ensuring wider private sector investment in the sector. The implementation framework for Kilimo Kwanza is built around Ten Pillars among others includes mainstreaming of environmental factors in all aspects of KILIMO KWANZA.

2.3.1 Agricultural Sector Development Strategy (ASDS)

The objective of the ASDS, 2001 is to achieve a sustained agricultural growth rate of 5 percent per annum primarily through the transformation from subsistence to commercial agriculture through private sector led by improving enabling environment for enhancing the productivity and profitability of agriculture. The ASDS priorities are to create a favorable environment for commercial activities; improve delivery of support services with a delineation of public/private roles; improve the functioning of output and input markets; and strengthen the institutional framework governing the sector.

2.3.2 Agricultural Sector Development Programme (ASDP)

Agricultural Sector Development Programme (ASDP) is the main tool of the Central Government for coordinating and monitoring agricultural development and for incorporating national wide reforms. ASDP is part of the operational response to a set of policies, strategies and initiatives designed to re-orient and re-invigorate the national economy. Among others, ASDP intends to facilitate delivery of agricultural services including enhancing agro processing as well as environmentally friendly farming technologies and practices especially for rural areas. The programme components covers local agricultural investments with a sub-component to support district level agricultural investments based on the District Agricultural Development Plans (DADPs) on a cost-sharing basis. Criteria and procedures to assess the feasibility of proposed investments incorporated under the DADPs guidelines include social and environmental perspectives. Under the Programme, Social and environmental assessments need to adhere to the requirements provided in the Environmental and Social Management Framework (ESMF) and the Resettlement Policy Framework (RPF) which describe the mechanisms for determining and assessing potential environmental and social impacts of all programme activities and set out mitigation measures.

2.3.3 Agricultural Sector Environmental Action Plan (ASEAP)

The ASEAP (2012 – 2017) provide guidance on implementing environmental management and thus enhancing sustainable agriculture production processes. It identifies environmental problems and challenges in agriculture sector and ensures that they are addressed through appropriate interventions by farmers, relevant institution and other sectoral stakeholders.

2.3.4 District Agricultural Sector Investment Project (DASIP)

The project aims at increasing productivity and income of rural households in the project area in Kagera, Kigoma, Mwanza, Mara and Shinyanga regions within the overall framework of the Agricultural Sector Development Strategy (ASDP). Community planning and investment in agriculture is among the project's four components. Two sub-components deal with conducting training on Environmental Impact Assessment and Environmental and Social Management; and training of ward officials on EIA and ESMP issues.

2.3.5 The National Irrigation Master Plan

The main objective of the NIMP is “Sustainable Irrigation Development”, with the emphasis on comprehensive measures through “Effective Use of National Resources”, to largely contribute to attainment of the primary objective of the Agricultural Sector Development Strategy (ASDS).

2.3.6 The National Agricultural Land Use Planning and Management Master Plan

The National Agricultural Land Use Planning and Management Master Plan was prepared in 2007. This master plan is intended to be one of the tools to guide land identification, demarcation, accessibility and effective utilization of agricultural land as addressed in ASDS, ASDP,

the Tanzania Development Vision 2025, and the National Strategy for growth and reduction of poverty 2005 which are key tools for the modernization of agriculture in the country.

2.4 Other Relevant Policies and Laws for Agriculture Development in Tanzania

2.4.1 Policies

In implementation and development of sustainable agriculture in Tanzania there are other Policies which directly or indirectly guide and govern agricultural action throughout the country. These Policies specify constraints within which agricultural activities, programmes and Plans should embark on.

- The National Land Policy (1995)
- The National biotechnology policy (2010)
- The National Cooperatives Development Policy (1997)
- The National Forestry Policy (1998)
- The National Gender Policy (2000)
- The National HIV Policy (2001)
- The National Water Policy (2002)
- The National Energy Policy (2003)
- The National Livestock Policy (2006)
- The National Mineral Policy (1997)
- The National Wildlife Policy (1998)

2.4.2 Laws

2.4.2.1 The Land Act, Cap. 113 R.E 2002 and Village Land Act, Cap. 114 R.E 2002

The Land Act provides the legal framework for two of three categories of Land, namely General Land and Reserved Land.

The Act provides for the basic law for the land other than village land, its management and related settlement of disputes. The Act lays down the fundamental principles that any land user shall ensure that land is used productively and that any such use complies with the principle of sustainable development. The administration of village land is provided for under the Village Land Act.

2.4.2.2 Other Relevant Acts and Regulations

- i. Cashewnuts Industry Act 18,2009
- ii. Cereals and Other Produce Act, 2009
- iii. Tea Regulations, 2009
- iv. Coffee Industry Regulation, 2003
- v. Pyrethrum Regulations, 1997

2.5 International Conventions Relevant to Environment and Agriculture

Integrating environmental concerns into the agricultural policies, strategies and programmes is very important as it aims to head off the risks of environmental degradation and enhancing the sustainability of agro-ecosystems. Since the Earth Summit of 1992 which gave rise to the Rio Declaration on Environment and Development, both at the international and national level, the dominant theme of the environmental protection movement are achievement of sustainable development. According to the National Environmental Action Plan (NEAP), the key policy instruments and strategies for achieving sustainable development will be environmental impact assessment, environmental legislation, economic instruments, environmental indicators and standards, and public participation. It is a moral and ethical obligation to make sure that business and economic activities do not destroy the human and natural environment for both present and future generations of Tanzanians.

Tanzania has signed different International Instruments in order to take onboard environmental concerns in agricultural activities, strategies, programmes and plans for sustainable development. These are as explained below;

2.5.1 Conventions Dealing with Pesticides Management

2.5.1.1 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Chemicals in International Trade

The Rotterdam Convention, 1998 is an international treaty in the field of chemicals management as entered into force on February 24th, 2004. The objectives of the Convention is to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemical, in order to protect human health and environment from potential harm and contribute to their environmentally sound use, by facilitating information exchange about the characteristics of such chemicals, by providing for a national decision- making process on their import, export and by disseminating these decisions to Parties. Tanzania is among the first few countries that signed the convention in 1998 and ratified in 2002. After being signatory to the convention activities were initiated leading to fulfillment to the national obligations.

2.5.1.2 FAO Code of Conduct on the Distribution and Use of Pesticides

The FAO Code of Conduct on the Distribution and Use of Pesticides as adopted in 1985 and revised in 2002 serves as a guiding normative framework on the subject of the pesticides. The Code established voluntary standards of conduct for all public and private entities engaged in, or associated with, the distribution and use of pesticides, including governments, the pesticides industry and international organizations. The Code serves as predecessor of the Rotterdam Convention and its

key feature is that it provides specific guidelines on the development of national laws to address pesticides.

2.5.1.3 Stockholm Convention on Persistent Organic Pollutants

Stockholm Convention on Persistent Organic Pollutants, 2000 is also an international treaty designed to address international efforts on preventing harms and risks of chemicals and pesticides, it sets forth obligations to reduce and/or eliminate the production and use of certain listed pesticides and industrial chemicals that are persistent organic pollutants (POPs). It specifies specific procedures relating to import, export and use of those substances

2.5.2 Conventions Dealing with Protection of Biodiversity

2.5.2.1 Convention on Biological Diversity 1992

The Convention on Biological Diversity (CBD) is one of the international legal instruments that have effect on innovation in agriculture. The Convention aims at the conservation of biological diversity, the sustainable use of its components, and fair and equitable distribution of benefits accruing from such utilization. Among others, CBD provides a framework for biosafety regulation. For instance, Article 8 (g) of CBD requires each Contracting Party as far as possible and as appropriate to establish or maintain means to regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology which are likely to have adverse environmental impacts that could affect the conservation and sustainable use of biological diversity, taking also into account the risks to human health. CBD has been domesticated to the Tanzanian legislation through EMA, 2004.

2.5.2.2 Cartagena Protocol on Biosafety

The Cartagena Protocol on Biosafety, often referred to as the Biosafety Protocol is the first international agreement regulating trans-boundary trade of genetically engineered organisms. The main objective of the Cartagena is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on trans-boundary. Cartagena Protocol is one of the environmental related instruments which provide guidance on the management of Living Modified Organisms and Genetic Modified technology in all sectors including agriculture.

2.5.2.3 Ramsar Convention

The Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilization of wetlands i.e. to stem the progressive encroachment on and loss of wetlands, now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.

2.5.3 Convention Dealing with Waste Management

2.5.3.1 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

The Basel Convention is an environmental set up obligations for State Parties with a view to: (a) reducing trans-boundary movements of wastes subject to the Basel Convention to a minimum consistent with the environmentally sound and efficient management of such wastes, (b) minimizing the amount and toxicity of hazardous wastes generated

and ensuring their environmentally sound management (including disposal and recovery operations) as close as possible to the source of generation; (c) assisting developing countries in environmentally sound management of the hazardous and other wastes they generate.

2.5.3.2 Bamako Convention

The Bamako Convention (Bamako Convention on the ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa) is a treaty of African nations prohibiting the import of any hazardous (including radioactive) waste.

Impetus for the Bamako Convention arose from the failure of the Basel Convention to prohibit trade of hazardous waste to less developed countries (LDCs), and from the realization that many developed nations were exporting toxic wastes to Africa. The Bamako Convention uses a format and language similar to that of the Basel Convention, but is much stronger in prohibiting all imports of hazardous waste. Additionally, it does not make exceptions on certain hazardous wastes (like those for radioactive materials) made by the Basel Convention. This convention is most relevant on the environmental protection as far as agricultural activities are concerned.

2.6 Regional Instrument

2.6.1 East African Community Treaty (1999)

The promotion of sustainable utilization of the natural resources of the Partner States and the taking of measures that would effectively protect the natural environment of the Partner States is part of commitments of the EAC as stated under Article 5(3)(e) read together with Chapter 19 of the Treaty. The Treaty states categorically that the Partner States recognize that development activities may have negative impacts on the environment leading to the degradation of the environment and

depletion of natural resources and that a clean and healthy environment is a prerequisite for sustainable development.

As far as agricultural and food security are concerned, the EAC Treaty elaborates under its Article 109 (d) that Partner States shall adopt and promote the use of environmentally safe methods of land use. Furthermore through Article 112(1) (e) the Partner States undertake to co-operate in the management of the environment and agree to integrate environmental management and conservation measures in all developmental activities such as trade, transport, agriculture, industrial development, mining and tourism in the Community.

2.7 Environmental Issues in Agricultural Sector

With more than 70% of Tanzania's population involved in agriculture, the integrity of the environment is of key importance to the livelihoods of the vast majority of Tanzanians. The following are environmental issues facing the sector:

2.7.1 Land Degradation

Over two thirds of the country is affected by land degradation as a result of inappropriate land use, caused by overgrazing, deforestation and unsustainable agriculture practices resulting into declining of soil fertility and hence low agricultural productivity.

2.7.2 Salinization and Water logging

Salinization and water logging often occur in irrigated fields that have not taken care of the need for proper drainage. Such practices also provide opportunities for water-related diseases. Areas of irrigated agriculture have been implicated in the increase of environmental and health risks due to bacterial, viral and parasitic diseases. In terms of

health impact and of human suffering, it is infectious diseases associated with water that have the potential to affect the largest number of people.

2.7.3 Loss of Biodiversity

The loss of biodiversity can have a wide range of effects on both natural and managed ecosystems, and on human livelihood. Biodiversity guarantees supply of the raw materials for a huge variety of products, directly relevant to human needs and to businesses of all sizes and in all sectors. It is vital for the development of medicine, industry and agriculture itself. At the level of species diversity, the loss of one insect species may lead to the failure of crops, which depend on it for pollination; while the loss of another may result into outbreaks of pests which it controls. Extinction of some organisms may destroy soil fertility, with unanticipated consequences on human and environmental systems.

2.7.4 Natural Disasters

Land degradation in Tanzania is also aggravated by some natural disasters such as droughts, floods and cyclones. Drought and flood is among natural disasters documented by the disaster management unit in the Prime Minister's Office to have occurred severally and thus contributing to the current status of the environment. Droughts have a major impact on the environment and the lives of both human and other living organisms. Droughts affect the growth of vegetation cover hence making land susceptible to erosion by wind and human activities. Again drought causes destruction of many species of fauna and flora subsequently leading to loss of biodiversity. Floods also contribute significantly to the destruction of the natural resources resulting into socio-economic losses and environmental degradation.

2.7.5 Agricultural Wastes

Agriculture is responsible for a number of environmental issues that increasingly need to be addressed, including organic and inorganic wastes, and chemicals. Much of the waste and by-products arising on farms consists of organic matter, such as manure, slurry, silage effluent and crop residues. Other issues, such as the disposal of plastics and chemicals, are also high on the environmental agenda. However, the level of plastic packaging waste generated on farms is very small in comparison with the plastic waste produced throughout the whole country.

2.7.6 Lack of Agricultural Land Use Planning and Management Plans

Land use and land management practices have a major impact on natural resource including water soil, nutrients, plant and animals. The major effect of inappropriate agricultural land use on land cover includes deforestation, soil erosion, oil degradation, salinization and desertification.

2.7.7 Pollution by Agrochemicals

Pollution by agrochemical is a result of improper handling and overuse of agrochemicals and industrial hazardous waste. In addition use of saline irrigation water or irrigation without proper drainage results in accumulation of dissolved salts and consequently leads to development of soil alkalization or acidification.

2.7.8 Poor Water Management for Irrigation

Irrigation practices in Tanzania is characterized by low water use efficiency, low water productivity and absence of a mechanism for exercising socio economic mobility of water and over dependency on surface water as a major source of water for irrigation development.

2.7.9 Uncontrollable Peri-urban Agriculture

Urban farming is often considered to be negatively affecting the urban environment. Livestock keeping generate waste, smell, noise and health risks. On the other hand, crop cultivation is considered destructive to the environment; the use of chemical inputs is harmful to the air, soil and ground water.

2.7.10 Inadequate Awareness of Environmental Issues

Insufficient knowledge on environmental issues and appropriate handling and use of the agrochemicals by the farmers is one of the factors that contribute to environmental degradation in many parts of the country.

2.7.11 Inadequate Finance to Support Agricultural Industry

Environmental challenges in the agricultural sector face inadequate funding due to low priority given to such activities. The environmental interventions that can be funded are those with direct or immediate impact for increased crop production.

2.7.12 Climate Change Adaptation

Climate change is now the most challenging global problem facing humanity. Its adverse impacts are already being experienced in Tanzania particularly in the agricultural sector. Rainfall and temperature are determinants of crop performance. Fluctuation of rainfall pattern as well as the increase in temperature has affected crop performance e.g. maize and rice

3.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT IN TANZANIA

3.1 The Constitution of the United Republic of Tanzania 1977 (as Amended)

The Constitution being the mother law of the land of which all other laws derive its mandate has vested a duty under Article 27(1) to every person to protect the natural resources of the United Republic, the property of the state authority, all property collectively owned by the people and also to respect another person's property.

3.2 The National Environmental Policy (1997)

The Policy addresses the need to improve crop husbandry through controlled soil erosion and soil fertility improvement; intensification of agriculture; minimization of encroachment of public land; and promotion of integrate and holistic approaches on land use planning and management. The Policy emphasizes the strengthening of environmentally sound use of agrochemicals to minimize pollution of water, efficiency use of water in irrigation, soil erosion and minimization of encroachment in forest, woodlands, wetlands and pastures among others.

3.3 Environmental Management Act, Cap. 191

Recognizing the sensitiveness of environment in Tanzania, the Parliament enacted the Environmental Management Act for the purpose of providing a legal and institutional framework necessary for coordinating environmental activities across sectors taking into consideration accountability and the role of each individual citizen.

As one way of managing the environment section 81 of this Act requires every developer of a project which is likely to impact negatively to the environment to conduct Environmental Impact Assessment before undertaking such project. This requirement is cross sector.

Management of environment in the Ministries is coordinated by the Environment Management Unit which was established by the Environmental Management Act Cap 191 for the purpose among others of monitoring compliance with the requirement of Environmental Management Act 2004.

3.4 Environmental Impact Assessment and Audit Regulations, 2005

One of the policy instruments considered most effective for the achievement of sustainable development is the requirement that environmental impact assessment (EIA) shall be undertaken for all proposed activities that are likely to have significant adverse impacts on the environment and which are subject to a decision of a competent national authority.

The Minister responsible for environment is empowered under the Environmental Management Act to make Regulations. EIA and Audit Regulations are made under section 81 of the Environmental Management Act to provide for procedures and guidelines on conducting Environmental Impact Assessment.

Other regulations used to maintain environmental standards

- i. Environmental Management (Water Quality Standards), regulations, 2007-G.N 239
- ii. Environmental Management (Soil Quality Standards), regulations, 2007 – G.N 238

- iii. Environmental Management (Air Quality Standards), regulations, 2007 – G.N 237
- iv. Environmental Management (Control of Ozone Depleting Substances), regulations, 2007 – G.N. 240

3.5 National EIA Guidelines, 2007

The National EIA and Audit Guidelines aims at facilitating the conduct of EIA process. The Guidelines explains how requirements for EIA of major projects should be incorporated into project approval process. These Guidelines also provide a procedure which enables a developer or proponent to apply for an opinion on whether EIA is needed in a particular case as soon as the necessary information about the project, including the project brief is provided. This must include a plan on which the site of the proposed development is identified, and a brief description of its nature and purpose and of its possible effects on the environment. The developer can of course supplement this with other necessary information.

3.6 Institutional Arrangement of Environmental Management

Environmental management need effective coordination and cooperation among relevant organs of the Government and NonState actors. According to EMA Cap 191 the following institutional arrangement is responsible for environment management in Tanzania.

The National Environmental Advisory Committee: The committee is created to advise the Minister responsible for environment (the Vice President's Office-VPO in this instance) or any sector ministry on any environmental matter referred to it.

- (a) Vice President's Office: guided by the Minister responsible for environment articulates policy guidelines, makes regulations,

guidelines, and designates any institution to perform any function or does any activity within a specified time as stipulated by EMA Cap 191.

- (b) The National Environment Management Council (NEMC): The functions of the Council among others, include carrying out environmental audits, surveys, research; review and recommend for approval of Environmental Impact Assessment; enforce compliance of the National Environmental Quality Standards; initiate procedure for the prevention of accidents which may cause environmental degradation; undertake programmes to enhance environmental education; publish and disseminate manuals relating to environment management; render advise and technical support to entities engaged in natural resources and environmental management; and perform any other functions assigned to it by the Minister responsible for environment.
- (c) The Sector Ministries: Each sector ministry carries out its functions and duties in according to EMA and any other law provided that such law does not conflict with EMA.
- (d) The Regional Secretariat: composed of a Regional Environmental Management Expert (REME) charged with the responsibility to advise the Local Government Authorities of that particular region on matters relating to implementation and enforcement of EMA. The REME links the region with the Director of Environment.
- (e) The Local Government Authorities: Linked to the above institutional arrangements, EMA has vested to the Local Government Authorities the function of environmental

management. It has put in place officers and has also designated to some committees certain environmental functions.

These officers and committees are as follows:-

- (i) Environmental Management Officers: The law has established four categories of officers including City Environmental Management Officer (CEMO), Municipal Environmental Management Officer (MEMO), District Environmental Management Officer (DEMO) and Town Environmental Management Officer (TEMO).
- (ii) Environmental Committees: EMA takes cognizant of Standing Committees on Urban Planning and Standing Committees on Economic Affairs, Works and Environment as designated by the Local Government (Urban Authorities) Act, 1982 and Local Government (District Authorities) Act, 1982 and empowers them to be the city, Municipal, District and town environmental management committees.

4.0 ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES FOR AGRICULTURAL PROJECTS

The guidelines for agricultural projects have been developed by taking into account National Environmental Policy (1997), EMA, (2004), EIA and Audit Regulations(2005) and National EIA Guidelines and Procedures. Furthermore relevant policies, laws, programmes, plans and agriculture projects of the Ministry of Agriculture, Food Security and Cooperatives have been taken into account. The agriculture activities have been categorized into six main groups for the purposes of developing the EIA guidelines. The main groups are as follows:

- Large and medium scale food and cash crop farming projects
- Intensive farming
- Irrigation projects
- Manufacturing and Utilization of Agrochemicals
- Agro processing projects
- Genetic engineering

4.1 Description of EIA Process

Principle 17 of the Rio Declaration states that: “Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority”.

EIA is defined as a process conducted to determine whether or not an activity or a project will have any adverse impacts on the environment during its cycle of implementation (EMA, Cap. 191). EIA aims to:

- Identify, predict and evaluate impacts, both positive and negative;
- Consider project alternatives and mitigation measures
- Optimize positive impacts or– enhancement

EIA involves a systematic evaluation of a project by considering its objectives, onsite and offsite impacts. EIA process has a number of stages including registration, screening, scoping, undertaking full EIA, impacts identification, prediction and evaluation, development of mitigation and enhancement measures, environmental and social management plan, EIA report writing (EIS), review, decision making, implementation, monitoring, auditing, resource evaluation or cost benefit analysis and decommissioning.

The Agricultural EIA guidelines should apply in all six categories of the agricultural activities/projects. The EIA process includes:

4.1.1 Registration

Project developer or owner is required to officially register the project with the NEMC which is the government authority for EIA certificate application.

In reference to EMA Cap 191, the proponent fills in a Preliminary Environmental Assessment Registration Form which is available at the NEMC. Three copies of the completed forms and 10 copies of project brief and an application fee should be submitted to NEMC. The approval of the project brief by the NEMC (as per EIA and Audit Regulations of 2005) is supposed to be completed within 45 days from the time it was submitted. After the approval of the brief, the proponent is required to pay registration fee for project.

4.1.2 Screening

Screening stage, which is done by NEMC involves the determination of the level EIA to be undertaken. A number of factors are used in determining the level of impact assessment including sensitivity of the environment, site location of the project, technology used, public concerns,

general and detailed land use considerations and magnitude or scale of the environmental and social impacts. Screening decision may result into conducting a full EIA, Preliminary Environmental Assessment (PEA), or Initial Environment Examination. Screening might also lead to project not being subjected to EIA or being rejected.

4.1.3 Scoping and Terms of Reference

Project developer is required to contract an Environmental Impact Assessment expert also known as EIA Consultant to conduct scoping. NEMC has a long list for EIA Consultant or experts from various fields in which one can choose based on the required expertise and costs for doing the work. Scoping is done in order to identify the key stakeholders, determine the boundary of the study, establish the main potential impacts, identify project alternatives and develop Terms of References. Scoping is done through desk study, interviews with the key stakeholders and preliminary field visits. The main output of the scoping exercise is scoping report and terms of reference that is normally submitted to NEMC for approval within which is supposed to take 14 days after the submission date.

4.1.4 Undertaking Full EIA

When a full EIA is mandatory, then it follows immediately after the approval of terms of reference by the NEMC. This is normally a detailed study of the EIA where stakeholders' consultation and analysis is done, details alternatives are considered and analysed. In other ways full EIA is a detailed study after the scoping exercise.

4.1.5 Impact Assessment

Based on full EIA, the impact assessment is done by a consultant and has three main sub stages of impact identification, prediction and

evaluation. Impact identification identifies the potentially significant impacts, which are then taken into account during the EIA process. On the other hand, impact prediction is the process that predicts a magnitude of the potential impact. Criteria for prediction should base on the magnitude and likelihood of the impact to occur and its spatial and temporal extent, likely degree of recovery of the affected environment, value of the affected environment, level of public concern, and political repercussions while impact evaluation is a process that assesses relative significance of project impacts. Evaluation is based on magnitude, extent and duration of the impact; assessment normally involves collecting and analyzing physical, social and economic data to establish the significant positive and negative project impacts. Public participation is one of the key requirements in this stage. The Fourth Schedule of the EIA Regulations provides some guidance on conducting impacts assessment.

Impact assessment must involve impact identification, prediction and evaluation to determine significant impacts both positive and negative using the known conventional techniques.

4.1.6 Development of Mitigation and Enhancement Measures

The EIA consultant is required to prepare mitigation and enhancement measures for each identified significant impact. Mitigation entails development of measures against significant negative impacts of a project. It also entails coming up with enhancement measures for the positive impacts. Enhancement refers to the improvement of positive impacts. These positive impacts could be of social, economic or environmental in nature. Mitigation or enhancement measures must be developed for each significant negative or positive impact, respectively. In general terms, mitigation measures can be put into five main categories of avoiding, reducing or minimizing, rectifying and compensating.

4.1.7 Environmental and Social Management Plan (ESMP)

Environmental and Social Management Plan (ESMP) is a plan developed to implement mitigation/enhancement measures known as Impact Mitigation/Enhancement Plan. Another component is Environmental Monitoring plan.

- Based on the mitigation and enhancement measures proposed, a plan for their implementation must be developed. A consultant has to prepare ESMP in order to implement the mitigation/enhancement measures. A typical ESMP has elements of impact, mitigation/enhancement measures, institutional arrangements for implementation and the relative costs.

While environmental management plan is a:

- Systematic compilation of data through a series of repetitive measurements over a period of time.
- It involves the measuring and recording of physical, social and economic variables associated with the project.
- Involves assessment of compliance with the project design, implementation, and environmental standards,
- Establishes the effectiveness of the mitigation measures and the occurrence and magnitudes of impacts.
- Tracks down impacts of development and provides an “early warning” system, and helps to identify and correct unanticipated impacts.

The Fourth Schedule of the EIA Regulations provides some guidance on preparation of the ESMP. The Environmental Monitoring Plan as explained above is used to check environmental compliance of the project during both construction, operational and decommissioning phase. For environmental sensitive projects like, GMO the monitoring could go beyond the decommissioning phase. The monitoring plan includes

details on the significant impact, mitigation/enhancement measures, institutional responsibilities, frequency of monitoring, parameters or indicators of monitoring and costs.

4.1.8 Preparation of Environmental Impact Statement (EIS)

A registered expert is required to prepare the EIS and has to ensure that its contents are as it is stipulated in the EIA and Audit Regulations, 2005. The format of the EIS is as follows; executive summary (and must be translated in to Kiswahili), acknowledgements, acronyms, introduction, project background and description, policy, administration and legal framework and baseline or existing conditions. Others are assessment of impacts and identification alternatives, impact management or environmental mitigation measures, environmental and social management plan, environmental and social monitoring plan, resource evaluation or cost benefit analysis, decommissioning, summary and conclusions, references and appendices.

4.1.9 Submission of EIS for Review to NEMC

About 15 copies of EIS must be submitted to NEMC for review. During the review process, NEMC is assisted by a Cross-sectoral Technical Advisory Committee (TAC). Review task is done based on review criteria as provided in Environmental Impact Assessment and Audit Regulations, 2005. The review criteria have main areas as follows:

- General comments
- Description of development, local environment and baseline conditions
- Policy, legal and institutional framework
- Identification and evaluation of key impacts
- Alternatives, mitigation, ESMP and commitment
- Stakeholders participation and communication of results

After the review process is completed NEMC makes recommendation to the Minister for approval or not approval of the EIA report.

If a project is controversial it may be necessary to involve public hearing which is organized by NEMC in order to gather more information regarding the project to support decision making

4.1.10 Decision making

NEMC after completion of the review process submits its recommendations to the Minister responsible for Environmental affairs to make a final decision on the project. Decision making can be defined as the processes of choosing alternative courses of actions by weighing the benefits and costs and making tradeoffs among a range of considerations. The Minister within 30 days of the receipt of the recommendations makes a final decision on the project by:

- Approving the EIS and issuing an EIA Certificate
- Disapproving the EIS or
- Approving the EIS with conditions and issuing the certificate

4.1.11 Monitoring and Auditing

NEMC, in consultation with MAFC will conduct monitoring for an ongoing project. Monitoring is done in order to evaluate the performance of the mitigation measures as indicated in the ESMP. The developer is also required to conduct an internal monitoring of an ongoing project. The collected data by the developer can be used by both NEMC and MAFC for more guidance and monitoring purposes.

An environmental auditing is an examination to establish compliance or otherwise of expected standards. This examination could be in terms of changes associated with a project. Also the examination should include a comparison of the actual and the predicted impacts and the effectiveness of the impact management that has been agreed upon.

NEMC can conduct three types of auditing as described in Environmental Impact Assessment and Audit Regulations, 2005; these being, implementation/enforcement audit, performance/regulatory and impact prediction audits. Audit information is collected and compiled by NEMC for future use in the improvement of the environmental management systems. According to the Fees and Charges Regulations 2008, there is an annual fee for all projects to facilitate compliance and enforcement audits.

4.1.12 Decommissioning

The Environmental Management Act, 2004, provides that at the expiry of the project, it will be decommissioned by the proponent at own cost. The decommissioning shall involve site rehabilitation and ecosystem restoration. Fulfillment of these conditions shall be the condition for the discharge of environmental performance bond deposited as required by law.

Table 4.1: Summary of Responsibilities and Time Frames for EIA Process

EIA Process	Responsible Institution	Time Frame
Registration	Proponent and NEMC	
Screening	NEMC	45 Days
Scoping	Proponent, MAFC	
Review/approval of ToR	NEMC	14 Days
Impact Assessment	Proponent, MAFC	
Review	NEMC, MAFC	60 Days
Decision making	Minister of Environment	30 Days
Project Implementation (validity of the certificate)	Proponent	Within 3 years
Monitoring and Auditing	Proponent, NEMC, DoE, MAFC, LGAs	
Decommissioning	Proponent, NEMC, MAFC, LGAs	

4.2 Environmental Impacts and Enhancement/Mitigation Measures for Agricultural Projects

4.2.1 Large and Medium Scale Crop Farming Projects

It is an extensive commercial system which is characterized by cultivation of a single crop under rain fed or irrigated system that covers more than 50 ha. The system involves application of farm machinery and intensive use of agrochemicals. Large scale farming also should have permanent employees; the number depends on the scale and type of farming. The production activities should be continuous and large part of produce should be for commercial purposes. Agricultural crops include tea, coffee, tobacco, cotton, sugar, sisal, cashew nuts, and pyrethrum while food crops includes maize, paddy, sorghum, millet, beans, sunflower, sesame, cassava banana and potatoes just to mention a few.

Farm activities carried out in this type of farming, if not well managed may cause a wide range of environmental and socio- economic impacts in different stages of implementation such as pre-construction, construction, operational and decommissioning phases. Impacts which are likely to occur in different stages of implementation can be both positive and negative. Potential positive impacts include increase in food production, employment and income and negative impacts include loss of biodiversity, soil erosion, air, water and soil pollution, and health hazards. Mitigation /enhancement measures for each stage are important to ensure good environmental management. Table 4.2 below shows the detailed environmental impacts and mitigation/enhancement measures for each stage of project implementation.

Table 4.2: Environmental Impacts of Large and Medium Scale Crop Farming

Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
1. Pre construction phase	<ul style="list-style-type: none"> • Land acquisition • Land and soil surveys • Construction of camps • Recruitment of workers 	Socio - economic	<p>Positive Impacts</p> <p>Creation of Employment</p> <ul style="list-style-type: none"> • Priority to be given to local community with relevant skills • Provide salaries/wages timely and as per labour laws. • Provide equal opportunity by gender <p>Creation of business opportunities improved infrastructure such as roads</p> <p>Negative Impacts</p> <p>Loss of land and properties</p> <ul style="list-style-type: none"> • Create conducive environment for business implementation • Improve provision of social services • Build capacity on marketing and value addition • Prepare compensation plan for affected communities and relocation of land
		<p>Positive Impacts</p> <p>Creation of Employment</p> <ul style="list-style-type: none"> • Priority to be given to local community with relevant skills • Provide salaries/wages timely and as per labour laws. • Provide equal opportunity by gender 	
		<p>Creation of business opportunities improved infrastructure such as roads</p>	
		<p>Negative Impacts</p> <p>Loss of land and properties</p> <ul style="list-style-type: none"> • Prepare compensation plan for affected communities and relocation of land 	

Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Loss of residential places and houses</p>	<ul style="list-style-type: none"> • Use participatory methods to include affected people in decision making process • Apply existing land policies, laws and land rights for resettlement Action plan • Provide compensation including disturbance allowance as per country's policy and laws
		<p>Conflict with small holder farmers over land resources</p>	<ul style="list-style-type: none"> • Use participatory methods to include affected people in decision making process
		<p>Accidents/ injuries</p>	<ul style="list-style-type: none"> • Provision of first aid services and protective gears
<p>2. Construction phase</p>	<ul style="list-style-type: none"> • Land preparation • Farm layout 	<p>Positive impacts</p> <p>Creation of employment</p>	<p>Socio-economic</p> <ul style="list-style-type: none"> • Priority should gender equally be given to local communities with relevant skills • Provide salaries/wages timely and as per labour laws

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Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Increase income due to supply of goods and services from local suppliers</p> <p>Negative Impacts</p> <p>Accidents /injuries caused by machine operations</p> <p>Increase rates of infectious diseases such as HIV /AIDS</p> <p>Loss of forest services and products</p>	<ul style="list-style-type: none"> ● Provision of more goods and services ● Establishment of SACCOS <ul style="list-style-type: none"> ● Provide First Aid Kits and enforce use of personal protective gears ● Abide to rules and guidelines of OSHA ● Education and information on HIV/AIDS preventive measures and other diseases ● Improve health services and VCT ● Land use planning should precede project implementation ● Concentrate development activities in the core areas ● Replant trees with the technical advice from the foresters

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Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Environment</p> <p>Negative Impacts</p> <p>Soil erosion</p> <p>Loss of biodiversity</p> <p>Disruption of hydrological cycle</p> <p>Increase stream sedimentation and damage to aquatic ecosystem</p> <p>Air and Noise pollution caused by heavy machineries</p>	<ul style="list-style-type: none"> • Apply appropriate soil and water conservation measures • Avoid use of fire in farm preparation and clearing • Limiting clearance of vegetation to those areas where farming will be conducted only • Preserve surface water hydrology, surface water quality or water resource within or adjacent to project • Abide to the existing rules and regulations • Protect water catchment areas • Use appropriate and regularly services of machineries • Encourage use of protective gears • Use sound proof machines

Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		Contamination of soil due to oil leakage from machineries	<ul style="list-style-type: none"> ● Use appropriate and provide regular services of Machinery and vehicles ● Provide specific area for conducting machine services
		Soil compaction due to heavy machineries	<ul style="list-style-type: none"> ● Use of environmentally friendly Machinery e.g. Sub-soilers and rippers ● Concentrate activities in the project core areas.
3. Operation phase	<ul style="list-style-type: none"> ● Planting ● Weeding, ● Application of agrochemicals ● Irrigation, ● Harvesting, ● Storage, ● Processing ● Transportation 	<p>Socio-economic</p> <p>Positive Impacts</p> <p>Creation of employment</p>	<ul style="list-style-type: none"> ● Priority should be given to the local communities with relevant skills. ● Enforce labour law ● Generate skills through learning by doing ● Promote labour intensive technologies ● Provide salaries/wages timely and as per labour laws. ● Provide equal opportunity by gender.

Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Increased government revenue collected base</p> <p>Increase in income levels</p> <p>Increase crop yield and food security</p> <p>Increase business of agriculture inputs</p> <p>Change of quality of life</p> <p>Change of norms and values</p>	<ul style="list-style-type: none"> • Ensure sustainable crop production by improving extension services and farming technologies • Develop efficient tax collection mechanisms • Provision of more socio-economic services • Increase awareness and skills to surrounding communities on modern farming techniques, • Practice outgrowers and/or joint venture investments, • Educate and introduce on SACCOS • Ensure sustainable production through times available inputs and technologies • Encourage adaptation of good norms and values

Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Negative impact</p> <p>Risks and hazards during operations</p>	<ul style="list-style-type: none"> • Provision of protective gears • Provide regular training to all staff on safety matters • Provide regular medical checkup for workers • Abide to rules and guidelines of OSHA. • Draw up and establish health and safety regulations • Formulating preventive measures for accidents and other human health and safety hazards • Introduce Risk environmental insurance. • Prepare contingency and risk management plans.
		<p>Incidence of diseases such as HIV/AIDS</p>	<ul style="list-style-type: none"> • Provide education and information on health safety measures • Raise awareness of the dangers of HIV/AIDS to workers and visitors • Support voluntary HIV counseling and testing and improve health services.

Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Poor management and operation of the plantation</p>	<ul style="list-style-type: none"> • Provide regular training on maintenance to technical personnel • Recruit staff with relevant trainings training • Institute proper supervision protocol • Ensure adequate funds for running costs, maintenance and utilities • Prepare and implement a regular maintenance schedule for all major equipments
		<p>Increase of crime incidences and other social vice</p>	<ul style="list-style-type: none"> • Establish proper security systems involving the proponent, police and community members in the surrounding areas
		<p>Change in norms and values</p>	<ul style="list-style-type: none"> • Increase awareness on the socio-cultural aspects
		<p>Child labour</p>	<ul style="list-style-type: none"> • Enforce Child labour policy and laws
		<p>Increase incidences of water borne diseases</p>	<ul style="list-style-type: none"> • Provide education and information on preventive measures of water borne diseases

Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Health hazards due to exposure to agrochemicals</p>	<ul style="list-style-type: none"> • Apply best practices guidelines and standards for safe use , handling and disposal of used pesticides containers and outdated stocks • Limit handling of chemicals by inexperienced workers and farmers • Introduce preventive measures that reduces human health risks • Dispose as per manufacturers instruction, • Develop risk/contingency management plan
		<p>Conflict over resources users around the project area</p>	<ul style="list-style-type: none"> • Active participation of beneficiaries in all stages of project implementation • Develop land use plans

Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Environment</p> <p>Negative Impacts</p> <p>Surface and underground water pollution</p> <p>Air pollution due to application of chemicals (pesticides, herbicides)</p> <p>Air pollution caused by dust from heavy machines</p>	<ul style="list-style-type: none"> • Treatment of polluted water • Proper application and handling of agrochemicals • Application of agrochemicals with less residue effects on soils • Proper disposal of solid wastes • Reduce inorganic chemicals by mixing with organic chemicals • Spraying on certain times of the day in weather conditions that will minimize drift • Use appropriate spraying tools and rates • Use protective gears during spraying • Proper packaging during transportation with proper labeling • Encourage use of protective gears • Use of environmentally friendly machines • Avoid spreading during windy hours/ seasons

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Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Soil and water pollution due to pesticides and fertilizers</p>	<ul style="list-style-type: none"> • Apply best practices guidelines and standards for safe application of fertilizers and pesticides • Apply best practices and standards for disposal of used and expired agrochemicals containers • Introduce organic farming or a mix inorganic and organic fertilizers
		<p>Physical soil degradation (soil erosion, compaction and logging)</p>	<ul style="list-style-type: none"> • Introduce measures to minimize soil degradation
		<p>Chemical soil degradation (alkalization and salinization)</p>	<ul style="list-style-type: none"> • Introduce measures to minimize soil alkalinization and salinization • Proper and efficient use of fertilizer
		<p>Biological soil degradation (change in useful microorganisms in soil)</p>	<ul style="list-style-type: none"> • Introduce measures to minimize soil degradation • Application of organic manure and biological control of pests

Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Sedimentation of drainage channels</p> <p>Leaching of soil nutrients</p>	<ul style="list-style-type: none"> • Regularly maintenance and repair of irrigation channels • Encourage integrated plant nutrition systems by combining mineral fertilizers with organic inputs such as farm yard or green manure • Limit fertilizer application to maximum effective rates taking into account the predominant cropping system, soil condition and other intensification factors • Practice crop rotation
		<p>Destruction of beneficial organisms</p>	<ul style="list-style-type: none"> • Apply best practices guidelines and standards for safe application of fertilizers and pesticides • Promote integrated pest management practices
		<p>Increase pesticides resistance</p>	<ul style="list-style-type: none"> • Apply pesticides as per recommendations

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Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
	<ul style="list-style-type: none"> Pesticides spraying during pest outbreak control 	<p>Socio-Economic</p> <p>Negative Impacts Human health risks caused by inhaling and consumption of contaminated substances</p>	<ul style="list-style-type: none"> Provide information in advance on the spraying schedule to surrounding community Safeguard the worker's and community Health by creating awareness and providing protective gears Compliance with National Policies/ Laws, Guidelines regarding pesticides application Proper disposal of materials contained chemicals
		<p>Environment</p> <p>Negative Impacts Air pollution caused by pesticide spraying outside the intended area</p> <p>Soil pollution caused by leaching of chemicals.</p>	<ul style="list-style-type: none"> Compliance with National Policies/ Laws, Guidelines regarding pesticides application Spray on certain times of the day in weather conditions that will minimize drift. Create a buffer zone Conduct rapid Environmental Impact Assessment to identify major impacts and mitigation measures

Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
4. Decommission phase	<ul style="list-style-type: none"> • Selling of farm properties • Dismantle machines • Demolish the structures 	<p>Water pollution arising out of runoff and spilled chemicals.</p> <p>Positive impacts Skills gained by the workers may be applied to run the business of similar nature</p> <p>Negative impacts Loss of revenue to the Government</p> <p>Loss of employment</p>	<ul style="list-style-type: none"> • Introduce polluter pays principle • The Government should provide necessary support for workers to be able to invest using the acquired skills.(credit facilities, facilitate acquisition of land) • The Government should set enabling environment for new investors • Implement decommissioning plan • Provide entrepreneur skills to workers and wise investments of the retirement benefits • Establish SACCOS • Ensure that all employees are members of the National Social Security Fund • Involvement of workers/community including women in implementation of decommissioning plan

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Project Stage	Activity	Potential Impacts	Enhancement/ Mitigation Measures
		<p>Disintegration of Families due to loss of income</p> <p>Loss of aesthetic value due to abandoned infrastructures</p> <p>Change of life style and quality of life</p> <p>Deterioration of social and economic services</p> <p>Positive Impact</p> <p>Restoration of scenic view</p> <p>Negative Impacts</p> <p>Pollution due to solid wastes e.g. metal scrapers, bricks, stones</p>	<ul style="list-style-type: none"> • Empowerment of women to be able to support the family • Either sell the housing estate to any interested bidder or convert it to another use such as hostels for training institutions • Facilitate participation, including women in decision making that directly or indirectly affect them • Provide alternative use of facilities left behind • Creation of awareness on environmental management • Proper management of solid wastes
		Environment	

4.2.2 Intensive Farming

Intensive farming or intensive agriculture is an agricultural production system with the objective of increasing productivity per unit land. It is characterized by high use of capital, technology and inputs in order to maximize crop production e.g. horticulture and floriculture farming. This type of farming may result into potential environmental and social impacts. Such impacts might affect not only the well-being of the communities living close to the project site through air, water and soil pollution but also flora and fauna as indicated in table 4.3 below.

Table 4.3: Environmental Impacts of Intensive Farming Projects

Project Phase	Activity	Socio-economic	Potential Impact	Enhancement/ Mitigation Measures	
1. Pre-construction phase	<ul style="list-style-type: none"> • Surveying the area • land clearing • constuction of camps 		<p>Positive Impact</p> <ul style="list-style-type: none"> • Creation of employment and bussiness opportunities • Availability of fuelwood from fell trees <p>Negative Impacts</p> <ul style="list-style-type: none"> • Accident, injury caused by farm equipments, tools, snakes, insects • Conflicts over land ownership 	<ul style="list-style-type: none"> • Priority should be given to local community with relevant skills. • Employment should be gender equality. • Payments should be timely and as per labour laws. 	
				<ul style="list-style-type: none"> • Provide first aid kit and a car for emergency. • Provide protective gears • Partipatory planning involving stakeholders 	
			Environment	<p>Negative impacts</p> <ul style="list-style-type: none"> • Soil erosion due to vegetation clearance 	<ul style="list-style-type: none"> • Proper management of land resources and the existing flora and fauna • Choose a site which is not located in an area prone to flooding. • Practice conservation agriculture

Project Phase	Activity	Potential Impact	Enhancement/ Mitigation Measures
2. Construction phase	<ul style="list-style-type: none"> Land tilling/levelling Construction of permanent buildings such as office, ware house, cold rooms 	<ul style="list-style-type: none"> Destroying the natural habitats Loss of biodiversity 	<ul style="list-style-type: none"> Abide to land use plan Ensure minimum destruction of vegetation cover
		<p>Positive Impacts</p> <ul style="list-style-type: none"> Creation of employment It boosts the local economy due to population influx of migrant workers Value addition to the land 	<ul style="list-style-type: none"> Employment should be gender equality. Payments should be timely and as per labour laws. Produce good quality products Enhance social services
		<p>Negative Impact</p> <p>Accident, injury due to farm equipments, tools, dusts, snakes, insects</p> <p>Increases incidence of diseases including HIV/ AIDS</p>	<ul style="list-style-type: none"> Provide first aid kit and a car for emergency. Provide protective gears Provide information and education on preventive measures Improve health and VCT

Project Phase	Activity	Environment	Potential Impact	Enhancement/ Mitigation Measures	
		Environment	<p>Negative impacts</p> <ul style="list-style-type: none"> • Pollution into water bodies and groundwater aquifers caused by oil spillage from farm machines • Soil compaction due to heavy machine • Noise and dust from agro-machines 	<ul style="list-style-type: none"> • Frequent maintenance of machines • Make use of sub soilers and rippers • Use of machines with less noise and protective gears 	
			Socio-economic	<p>Positive Impacts</p> <ul style="list-style-type: none"> • Increase of Employment opportunities • Economic growth • Enhance food security 	<ul style="list-style-type: none"> • • • Priority should be given to the local community with relevant skills • Salaries/wages should be timely and as per government labour laws • Ensure sustainable production • Abide with Plant Protection Act and Seed Act • Recycling of packaging materials
			<ul style="list-style-type: none"> • Seeds selection • Planting Irrigating • Weeding Agrochemicals application • Harvesting • Packaging • Storage • Transportation 		
			3.Operation Phase		

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Project Phase	Activity	Potential Impact	Enhancement/ Mitigation Measures
		<p>Negative Impacts Health hazards caused by consumption of contaminated food, inhaling of polluted air and skin irritation</p>	<ul style="list-style-type: none"> • Avoid storing food with agro chemicals • Proper storage of agrochemicals • Educating farmers, consumers, policy makers and company workers and owners on safe use and handling of agrochemicals • Abide to rules and regulations of OSHA • Emergence Preparedness Plan
		<p>Negative Impacts Increases soil erosion through the exposed soil surface Pollution caused by poor handling and misuse or intensive use of agrochemicals Physical soil degradation</p>	<p>Apply soil conservation measures</p> <ul style="list-style-type: none"> • Use recommended rates of agrochemicals and spraying techniques to crops • Application of organic manure • Ensure soil and water management

Project Phase	Activity	Potential Impact	Enhancement/ Mitigation Measures
		<p>Chemical soil change – Alkalinization and salinazation</p>	<ul style="list-style-type: none"> ● Improve drainage system ● Adjust irrigation schedules ● Adjust crop patterns to prevent salt built up/salt tolerant crops ● Consult soil scientists for suitability soils for erosion ● Use recommended rates and types of fertilizer ● Use compost manure for soil fertility
		<p>Biological soil degradation</p>	<ul style="list-style-type: none"> ● Apply organic manure ● Application of Integrated pest management ● Concentrate project activities in the core areas

Project Phase	Activity	Potential Impact	Enhancement/ Mitigation Measures	
4. Decommissioning Phase	<ul style="list-style-type: none"> • Demolition of structures on the site • Diverting of structures to alternative use 	Socio-economic		
		Potential Impact		
		<p>Positive Impact</p> <ul style="list-style-type: none"> • Skills gained by the worker 		<ul style="list-style-type: none"> • Skills gained can be used in similar projects
		<p>Negative Impacts</p> <ul style="list-style-type: none"> • Loss of employment • Health hazards due to air pollution • Loss of revenue 		<ul style="list-style-type: none"> • Encourage establishment of similar projects
			<ul style="list-style-type: none"> • Establish SACCOS 	
			<ul style="list-style-type: none"> • Training on entrepreneurship skills 	
			<ul style="list-style-type: none"> • Ensure timely payment of pension 	
			<ul style="list-style-type: none"> • Workers health tested to know their health status and assist them 	
			<ul style="list-style-type: none"> • Abide to Decommission plan 	
	Environment	Potential impacts		
		Demolition of infrastructure	<ul style="list-style-type: none"> • Encourage agro-forestry 	
			<ul style="list-style-type: none"> • Rehabilitate the site to its original state 	

Project Phase	Activity	Potential Impact	Enhancement/ Mitigation Measures
		<p>Negative Impacts</p> <p>solid waste from destroyed buildings and other structures</p> <p>Dismantle machines/ irrigation structure/ farm implements</p>	<ul style="list-style-type: none"> • Proper disposal of solid waste • Sorting and Recycling when possible • Auction farm machines or provide them to local authority

4.2.3 Irrigation Projects

Irrigation contributes towards enhancement of production and productivity. Irrigation types include traditional irrigation schemes, rain water harvesting schemes, new irrigation schemes, improved/upgraded irrigation schemes, pumped irrigation schemes and rehabilitated irrigation schemes. These irrigation schemes are categorised as small, medium and large scale. Small scale schemes range from 1 to 500 hectares; for medium scale, the area is from 501 to 2,000 hectares and above 2,000 hectares is termed as large scale. These schemes can either be owned by smallholder farmers, private individuals/institutions, companies or government institutions such as the prisons, JKT and the like.

On the other hand and in the context of this guidelines, large scale irrigation is defined as those over 300 ha; medium scale are those, between 50 ha and 300 ha; and small scale are those, less than 50 ha and with no resettlement.

Irrigation projects may have potential impacts to the environment. Different types of irrigation will have different impacts. Most impacts occur during construction, operation and maintenance stages. Potential impacts include land degradation, water use conflicts, resettlement issues, water borne diseases, siltation of water reservoirs, intake and irrigation canals. These impacts will also vary according to the stage of implementation and location.

Table 4.4 below describes the most common impacts and mitigation measures associated with irrigation projects.

Table 4.4: Environmental impacts Irrigation Projects

Project stage	Activity	Potential impacts	Enhancement/mitigation measures	
1. Pre-construction phase	<ul style="list-style-type: none"> ● Surveys and studies including topographical survey, soil survey, land use planning, environmental, economic and social studies; geotechnical investigation ● Stakeholder consultation ● Designing (Preliminary and detailed engineering) 	Socio-economic	<p>Positive Impacts</p> <ul style="list-style-type: none"> Creation of employment <p>Negative Impacts</p> <ul style="list-style-type: none"> Foreign influence on cultural values and norms to the community Infringement on property and access rights 	<p>Enhancement/mitigation measures</p> <ul style="list-style-type: none"> Encourage local participation and gender consideration Involve participatory planning by all stakeholders Awareness creation to the locals on maintaining cultural values Compensation as per provisions of the Resettlement Action Plan Framework
		Environment	<p>Negative Impacts</p> <ul style="list-style-type: none"> Disturbance of unique or endangered ecosystems and species (including wildlife and migration routes) 	<ul style="list-style-type: none"> ● Avoid or minimize disturbances to ecologically sensitive areas, habitats and endangers species ● Undertake a thoroughly research on these species

Project stage	Activity	Potential impacts	Enhancement/mitigation measures	
2. Construction Phase	<ul style="list-style-type: none"> ● Mobilization of resources, equipment ● land clearing ● construction 	Socio-economic	<p>Potential Impacts</p> <p>Positive Impacts</p> <p>Economic growth in the project area</p> <p>Employment opportunities</p> <p>Negative Impacts</p> <p>Competition for land and other services due to population influx</p> <p>Change in norms and values</p> <p>Increase of crime</p> <p>Increased incidence of diseases including HIV/AIDS</p> <p>Infringement on property and access rights</p>	<p>Enhancement/mitigation measures</p> <p>Create conducive environment for potential business opportunities</p> <ul style="list-style-type: none"> ● Ensure gender consideration and local employment priority ● Ensure fair and timely payment as per national labour policies <p>Identify, provide, and improve land and housing and other social services</p> <p>Awareness creation on cultural values</p> <p>Enhance security and encourage local participation</p> <p>Provide information and education on preventive measures</p> <p>Prepare compensation and resettlement plan for affected communities</p>

Project stage	Activity	Potential impacts	Enhancement/mitigation measures
		<p>Accident, injury due to farm equipment, tools, snakes, insects</p>	<ul style="list-style-type: none"> • Provide first aid kit and a car for emergency • Provide protective gears
		<p>Environment</p> <p>Negative Impacts</p> <p>Removal of vegetation cover</p> <p>Increase in soil erosion</p>	<ul style="list-style-type: none"> • Minimal disturbance to vegetation cover • Concentrate on core area • Careful site selection • Creation of a buffer zone along water conveyance system around dams
		<p>Soil compaction</p> <p>Loss of biodiversity</p> <p>Dust and noise pollution</p>	<p>Use appropriate land clearing and conservation techniques and equipments</p> <p>Abide to land use plan</p> <p>Abide with noise standards Provide protective gears Water sprinkling</p>

Project stage	Activity	Potential impacts	Enhancement/mitigation measures	
3. Operation Phase	<ul style="list-style-type: none"> ● Irrigation ● Infrastructure ● Maintenance ● Monitoring of farm operations ● Rehabilitation 	Socio-economic	<p style="text-align: center;">Potential Impacts</p> <p>Positive Impacts</p> <ul style="list-style-type: none"> Enhanced and sustained household food security and improved household income Increased household income <p>Negative Impacts</p> <ul style="list-style-type: none"> Health risks e.g. Incidence of malaria, schistosomiasis and other water borne diseases 	
				<ul style="list-style-type: none"> Ensure proper operation and maintenance of irrigation infrastructure
				<ul style="list-style-type: none"> ● Adopt value chain concept ● Improve rural market and rural road infrastructure
				<ul style="list-style-type: none"> ● Use of treated mosquito nets ● Health and sanitation education ● Design of irrigation infrastructure should ensure provision of sanitation facilities ● Cleaning of irrigation canal

Project stage	Activity	Potential impacts	Enhancement/mitigation measures
		<p>Reduced river flow and increase in water use conflicts</p>	<ul style="list-style-type: none"> ● Basin Water Offices should issue water use permits based on available water ● Water use permits should be reviewed periodically ● Establish irrigators organization to ensure equitable distribution of water ● Price water efficiently based on economic principles
		<p>Vandalism of irrigation infrastructures</p>	<ul style="list-style-type: none"> ● Involvement of beneficiaries from the planning ● Enforce by-laws ● Strengthen security
		<p>Child accidents</p>	<ul style="list-style-type: none"> ● Awareness raising to avoid accidents ● Put warning signs

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Project stage	Activity	Potential impacts	Enhancement/mitigation measures
		<p>Environment</p> <p>Positive Impacts</p> <ul style="list-style-type: none"> ● Promote irrigation technologies that facilitate soil infiltration and reduction in runoff / soil erosion(drip irrigation) ● Minimal water loss (drip irrigation) <p>Negative Impacts</p> <p>Low crop productivity due to saline water</p> <p>Change in river course resulting from cultivation, and tree cutting on the river bank</p>	<p>Encourage use of drip irrigation where necessary</p> <ul style="list-style-type: none"> ● Irrigate only necessary water ● Use the most appropriate technologies that are locality specific <p>Water quality tests and regular monitoring of water quality</p> <ul style="list-style-type: none"> ● Flushing of excessive salts ● Awareness creation on river bank protection ● Enforcement of 60m buffer zone as per EMA, 2004 ● Prepare and enforce specific by laws or operation procedures for buffer zone protection

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Project stage	Activity	Potential impacts	Enhancement/mitigation measures
		<p>Inundation of properties (dams)</p> <p>Soil erosion at livestock watering point (dam)</p> <p>Loss in soil fertility due to poor water management</p> <p>Breeding sites for pathogens due to stagnant water</p>	<ul style="list-style-type: none"> • Prepare compensation and resettlement plan for affected communities • Erosion control measures at watering point • Avoid concentration of livestock at one point • Enforce land use plans • Ensure good water management for irrigation • Improve soil fertility by preserving top soils and using good land husbandry to increase organic matter in the soil • Promote integrated soil fertility management • Design canals with proper slope, increase water velocity

Project stage	Activity	Potential impacts	Enhancement/mitigation measures
		<p>Loss of irrigation water due to unlined irrigation canals</p> <p>Water logging; Soil salinization/alkalization</p> <p>Poor water conveyance due to clogging of infrastructure</p> <p>Water pollution for downstream users caused by irrigation return flow quality</p> <p>Lowering of water table (For underground source of water)</p>	<ul style="list-style-type: none"> • Irrigation canals should be lined wherever possible • Better water management with adequate drainage • Regular cleaning of canals • Monitoring of irrigation return flow quality • Construction of artificial wetlands to receive irrigation return flow • Treat water before releasing where applicable • Installation of peizometers to monitor underground water table • Price water efficiently

Project stage	Activity	Potential impacts	Enhancement/mitigation measures	
4. Decommissioning Phase	Dilapidated irrigation infrastructures	Socio-economic	<p>Negative Impacts</p> <p>Loss of employment</p> <ul style="list-style-type: none"> • Payment of retirement benefits on time • Provide training skills on alternative employment opportunities • Build capacity on SACCOS and Entrepreneurship 	
		Environment	<p>Positive Impacts</p> <p>Site rehabilitation to its original state</p> <p>Negative Impacts</p> <ul style="list-style-type: none"> • Plant indigenous trees or grass 	
			Reduced area under production (idle land)	<ul style="list-style-type: none"> • Change use of land
			Dilapidated structures	<ul style="list-style-type: none"> • Alternative use of dilapidated structures
			Solid wastes	<ul style="list-style-type: none"> • Safe disposal of wastes as per EMA, 2004. • Sorting, recycling and reuse where necessary
				<ul style="list-style-type: none"> • Restore environmental to the original status where applicable

4.2.4 Manufacturing and Utilization of Agrochemicals

Agrochemical is a term referring to combination of various *agricultural chemical* products used in agriculture. Usually, *agrochemical* means a range of pesticides, including insecticides, herbicides, and fungicides. In addition agrochemicals include synthetic fertilizers, hormones and other chemical growth agents. The main categories based on chemical formulation are organophosphates, carbamates, and organochlorines. According to their uses pesticides can be categorized into eight main groups of insecticides to control insects, acaricides (mites and ticks), herbicides (weeds), avicides (birds), fungicides (fungus), nematocides (nematodes), molluscides (snails and slugs) and rodenticides (rodents). The uses of pesticides have indeed led to the increased agriculture production all over the world but also they led to serious environmental and health impacts. The principal pollutants are active ingredients of pesticides, solvents and other chemicals, therefore manufacturers should abide to rules and regulations during production. Table 4.5 shows the impacts and enhancement/mitigation measures of agrochemicals manufacturing and utilization at different phases.

Table 4.5: Environmental Impacts of manufacturing and Utilization of Agrochemicals

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
1 Pre - construction phase	<ul style="list-style-type: none"> • Land acquisition • Land survey • Mobilization of materials for construction 	<p>Socio- economic</p> <p>Positive Impacts</p> <ul style="list-style-type: none"> • Creation of employment <p>Negative Impacts</p> <ul style="list-style-type: none"> • Land loss 	<ul style="list-style-type: none"> • Priority to be given to local community with relevant skills • Promote labour intensive technologies • Provide equal opportunities by gender • Comply with recommended scales of payment <ul style="list-style-type: none"> • Reallocation, resettlement and compensation • Abide to land use plans at all levels • Compensate fairly as per existing laws

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Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
		<p>Environment</p> <p>Negative impacts</p> <ul style="list-style-type: none"> Loss of biodiversity 	<ul style="list-style-type: none"> Minimum disturbance to biodiversity Follow/establish land use plans at all levels (national, district, village) Rehabilitation
		<ul style="list-style-type: none"> Air pollution due to vehicle smoke and dust 	<ul style="list-style-type: none"> Regular maintenance of the vehicles and construction machines Road watering to reduce dust during transportation of materials Comply with air quality standard

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
2. Construction Phase	<ul style="list-style-type: none"> ● Immigration ● Construction 	<p>Socio-economic</p> <p>Positive Impacts</p> <ul style="list-style-type: none"> ● Creation of employment ● Increased income to local communities and government revenue 	<ul style="list-style-type: none"> ● Liaison with local community for suitable timing of noisy activities ● Regular maintenance of the vehicles and construction machines ● Comply with noise standard
		<ul style="list-style-type: none"> ● Priority should be given to local communities with relevant skills ● Improve socio-economic services ● Build skills through learning by doing 	

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
			<ul style="list-style-type: none"> • Pay according to the national laws and policies • Enforce labour law • Promote labour intensive technologies • Gender issues should also be considered
		<p>Negative Impacts</p> <ul style="list-style-type: none"> • Increase spread of HIV/AIDS and communicable diseases 	<ul style="list-style-type: none"> • Create awareness among the community and Provide HIV/AIDS preventive measures

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Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
		<ul style="list-style-type: none"> • Competition over social services due to migrants • Child labour • Noise pollution • Safety and health hazards due to air and water pollution 	<ul style="list-style-type: none"> • Provision of socio services and facilities • Enforce Employment Policy and Laws • Proper choice of plant and machinery fitted with silencer or reducers • Create awareness on safety and health issues • Proper selection of machines and equipment which produce less emissions and regular service of vehicles, machines and generators • Provide first aid kits on site • Provide and enforce use of Personal Protective gears

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
			<ul style="list-style-type: none"> Abide to OSHA rules and Regulations Confining the construction site with corrugated iron sheets Provide social services (e.g. health centers) Enforce polluter pays principle
		<p>Environment</p> <p>Negative Impacts</p> <ul style="list-style-type: none"> Air pollution from construction machines and equipment Noise pollution from construction machines and equipment 	<ul style="list-style-type: none"> Proper selection of machines which produce less emission and regular services of vehicles, machines and generators Afforestation around the project sites Proper choice of plant and machines fitted with silencer or reducers Abide with noise standard

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Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
3. Operation Phase	<ul style="list-style-type: none"> ● Manufacturing ● packaging 	<p>Socio-economic</p> <p>Positive Impacts</p> <p>Increase employment opportunities</p>	<ul style="list-style-type: none"> ● Water pollution ● Proper handling of waste oil ● Ensure proper water use and management ● Monitoring of water quality
			<ul style="list-style-type: none"> ● Solid waste generation ● Proper disposal of solid waste ● Re-use, recycle, reduce and refuse solid waste ● Comply with local by-laws on waste disposal ● Employment preference to local communities with relevant skills ● Ensure contribution to social security funds ● Improve training capacity for local communities

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
		<p>Negative Impacts</p> <ul style="list-style-type: none"> Health hazards caused by pollution 	<ul style="list-style-type: none"> Construction of infrastructure should adhere to environmental standards Installation of ventilation hoods or isolation devices where toxic materials are handled Provision and enforcement of Personal Protective Equipment(PPEs) and proper use Installation of ventilation systems with High Efficiency Particulate air (HEPA) filters in areas of biopesticides manufacturing

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
			<ul style="list-style-type: none"> • Liquid transfer and separation, solid and liquid filtration, granulation, drying, milling and blending should be carried out in well ventilated areas • Granulators, dryers, mills and blenders should be enclosed and vented to air control devices • Liquid pesticides packs should not be overfilled, and filling devices should be designed to avoid splashing/foaming • Use of vacuum cleaners with HEPA filters during cleaning operations of areas and equipment where hazardous substances are manufactured

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
		<ul style="list-style-type: none"> Health hazards caused by pathogen exposure 	<ul style="list-style-type: none"> Provide health insurance to the workers Regular health check up of the workers Develop in industrial developed zones Non- pathogenic microbes should be selected Processing equipment should be enclosed and spent broth treated before discharge Appropriate biohazard control measures should be in place Installation of downward and inward, laminar flow biological safety hoods

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
		<ul style="list-style-type: none"> Health hazards caused by explosion hazards 	<ul style="list-style-type: none"> Raise awareness on handling of bio-agents Proper labeling and handling of bio-agents containers Provision and enforcement of Personal Protective Equipment(PPEs) and use Installation of fire and smoke detectors and emergency alarms Training of staff on fire drills Establish an emergency assembly point at the project site and awareness creation on its importance Ban smoking in and around project facilities

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
			<ul style="list-style-type: none"> • Install and place fire fighting on strategic areas • Provide local fire department with list of products on the premises • Control potential effect of fires or explosions by segregation and distancing of process, storage, utility and safe areas • Reduce solvent flammability by dilution with water in filtration and recovery steps • Use explosive-proof equipment to control risks associated with explosive pesticide dust, • Fair compensation for the affected persons

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
		<p>Environment</p> <p>Negative Impacts</p> <p>Soil pollution caused by:</p> <ul style="list-style-type: none"> ● Residues and filtrates from chemical process ● Off specification products ● Used air filter media ● Packaging waste ● Dry sludge from waste water treatment facility ● Wastes from laboratory activities ● Filter cakes from fermentation process ● Inorganic salts ● Organic by products and Metal complexes by products. 	<ul style="list-style-type: none"> ● Use substitute material to reduce generation of hazardous waste ● Sterilize equipment from fermentation activities ● Use distillation, evaporation, decantation, centrifugation and filtration to maximize recycling of solvents ● Use of metering to control active ingredients to minimize waste. ● Use of automated filling systems for reactors, tanks and drums to minimize spills ● Re-use waste as raw material whenever possible ● Enforce polluter pays principle.

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
		<p>Water pollution caused by pesticides contamination during:</p> <ul style="list-style-type: none"> ● Chemical processes ● Solvent processes, ● Stream wash water, ● Product wash water, ● Spent acid and base streams, ● Condensed water from strippers and sterilization 	<ul style="list-style-type: none"> ● Treat, reuse and recycle waste water whenever appropriate ● Institute onsite waste water management and disposal system ● Installation of equalization systems before waste water treatment to manage flow and concentration spikes ● Institute recovery of solvents ● Installation of reverse osmosis or ultra filtration systems to active ingredients ● Installation of pH neutralization systems

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
			<ul style="list-style-type: none"> ● Use of filtration and settling ponds to reduce Total Suspended Solids (TSS) and Biochemical Oxygen Demand (BOD) ● Installation of biological treatments e.g. activated sludge to control BOD, Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS) concentrations and degrade organic matters ● Enforce polluter pays principle ● Compensate fairly for the affected persons

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
		<p>Air pollution caused by :</p> <ul style="list-style-type: none"> ● Volatile Organic Compounds (VOC) from reactor pumps, filtering systems and dryers ● Particulate matter from material handling, pesticide formulation and packaging ● Exhaust gases from combustion of gas or diesel in turbines, boilers compressors and pumps 	<ul style="list-style-type: none"> ● Use non-halogenated and non- aromatic solvents which contain and enclose batch reactors ● Install feed systems and undertake regular monitoring of emissions from pipes, valves, seals and tanks ● Implement vapour balancing during design and operations ● Regulate operating temperatures ● Install nitrogen blanketing on pumps storage tanks and during formulation process

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
			<ul style="list-style-type: none"> ● Install process condensers in the process equipment to support a vapour to liquid phase change to recover solvents ● Use closed equipment during cleaning of reactors and other equipments ● Collect VOC during solvent handling activities and processes ● Provide health insurance for the workers ● Compensate fairly the affected persons

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
	<ul style="list-style-type: none"> • Transportation • Distribution 	<p>Socio-economic</p> <p>Positive Impacts</p> <ul style="list-style-type: none"> • Employment opportunity • Availability of agrochemicals for use <p>Negative Impacts</p> <ul style="list-style-type: none"> • Fire risks 	<ul style="list-style-type: none"> • Priority should be given to local communities with relevant skills • Pay timely and rates based on their labour law • Ensure availability of proper trucks <ul style="list-style-type: none"> • Control methods for fire exposure • Control potential effect of fires or explosions by segregation • Installation of fire and smoke detectors and emergency alarms • Training of staff on fire drills • Ensure labelling of explosive materials

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
		<ul style="list-style-type: none"> • Increase of human transmission diseases e.g. HIV/AIDS 	<ul style="list-style-type: none"> • Awareness raising about human diseases such as HIV/AIDS. • Improve health facilities and VCTs
		<ul style="list-style-type: none"> • Health hazards caused by inhaling and contamination 	<ul style="list-style-type: none"> • Provide and ensure use of protective gears • Education and Information on proper handling of agrochemicals • Proper packing and labeling, • Compensate the affected persons, • Provide health insurance for the affected

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
		<p>Environment</p> <p>Negative Impacts</p> <ul style="list-style-type: none"> Air, soil and water pollution caused by spillage of toxic material, fire and explosion 	<ul style="list-style-type: none"> Transportation of agrochemicals should be in compliance with country and international laws Procedures for transportation of hazardous material should be strictly followed including proper labeling, shipping manifest to clearly describe the contents of the load and its associated hazards, vehicles used to transport the materials should meet required specifications Employee involved in transportation of the material should properly be trained

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
			<ul style="list-style-type: none"> ● Hazard assessment should be conducted before the materials are transported ● An emergency preparedness and response plan should be put in place before the materials are transported
	<ul style="list-style-type: none"> ● Storage ● Disposal ● Preservation, and management of agrochemicals ● Packaging materials 	<p>Socio-economic</p> <p>Negative Impacts</p> <ul style="list-style-type: none"> ● Health risks caused by use of chemical containers for food packaging ● Exposure to poison/chemicals without proper protective gears 	<ul style="list-style-type: none"> ● Proper disposal of agrochemical containers ● Frequent health examination and treatment where applicable

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activity	Environment	Potential Impact	Enhancement /Mitigation Measures
			<p>Negative Impacts</p> <ul style="list-style-type: none"> • Poor housekeeping practices leading to leaking, spillage and air pollution • Accidental spillages caused by poor housekeeping and floor • Pollution caused by solid and liquid waste 	<ul style="list-style-type: none"> • Proper housekeeping practices • Appropriate location of storage facility (away from residential areas) • Provision of Personal Protective Gears to workers • Appropriate disposal system of hazardous materials and packaging containers • Emergency preparedness and response plan (first aid toolkit) • Fire fighting equipments

Project Stage	Activity	Potential Impact	Enhancement /Mitigation Measures
4. Decommissioning Phase	<ul style="list-style-type: none"> • Demolition of structures • Alternative use of the structure • Dismantle of machines • Removal/ disposal of unused materials 	<p>Socio-economic</p>	<p>Potential Impacts</p> <ul style="list-style-type: none"> • Skills gained by the workers <p>Negative Impacts</p> <ul style="list-style-type: none"> • Loss of employment • Improper/ illegal use of the structures
		<p>Positive Impacts</p> <ul style="list-style-type: none"> • Knowledge and skills gained applied to the projects of similar nature <p>Negative Impacts</p> <ul style="list-style-type: none"> • Establish SACCOS • Train entrepreneurship skills • Abide to decommission plans • Ensure payment of employment benefits 	
		<p>Environment</p>	<p>Negative Impacts</p> <ul style="list-style-type: none"> • Accumulation of solid waste from demolished building • Habitat change <p>Enhancement /Mitigation Measures</p> <ul style="list-style-type: none"> • Proper management of scrap and spoil materials • Encourage reuse and recycle of solid waste • Rehabilitation or restoration

4.2.5 Agro Processing Projects

Agro-processing includes post-harvest activities involved in the transformation, preservation and preparation of agricultural produce for intermediary or final consumption. These include industries such as coffee, tea, tobacco, sisal, cashew nut, oil processing, ginneries, sugar, milling and fruits. Processing intends to add value on the products to enhance farm and national income. Construction and operationsof these industries may cause a wide range of environmental and socio-economic impacts on the number of receptors. The impacts are categorized into positive or negative and some of mitigation or enhancement measures are suggested as shown in the table 4.6 below.

Table 4.6: Environmental Impacts of Agro-Processing Industries

Project Stage	Activities	Potential Impact	Enhancement /Mitigation Measures
1. Pre - construction phase	<ul style="list-style-type: none"> ● Land acquisition ● Permits acquisition ● Land survey ● Mobilization of materials for construction ● Recruitment ● Immigration ● Land clearing 	<p>Socio-economic</p> <p>Positive Impacts</p> <ul style="list-style-type: none"> ● Creation of employment <p>Negative Impacts</p> <ul style="list-style-type: none"> ● Land loss ● Spread of diseases including HIV/AIDS ● Security threat ● Delay/refusal of the project 	<ul style="list-style-type: none"> ● Priority to be given to local community with relevant skills ● Pay according to the labour laws ● Improve skills through learning by doing <ul style="list-style-type: none"> ● Relocation and fair compensation ● Create awareness on infectious diseases and provide information on preventive measures ● Deter influx of people by putting posts indicating “no job” ● Participatory planning and timely acquisition of relevant permits

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activities	Potential Impact	Enhancement /Mitigation Measures
		<p>Environment</p> <p>Negative impacts</p> <p>Loss of biodiversity</p> <p>Air pollution due to vehicle smoke and dust</p> <p>Noise pollution</p>	<ul style="list-style-type: none"> • Minimum disturbance to biodiversity • Follow/establish land use plans at all levels (national, district, village) • Concentrate project activities in the core areas • Regular maintenance of the vehicles • Road watering to reduce dust during transportation of materials • Provide gravel or tarmac roads • Liaison with local community for suitable timing of noisy activities • Regular maintenance of the vehicles

Project Stage	Activities	Potential Impact	Enhancement / Mitigation Measures
2: Construction Phase	<ul style="list-style-type: none"> • Land clearing • Immigration • construction 	<p>Socio-economic</p> <p>Positive Impacts</p> <ul style="list-style-type: none"> • Creation of employment opportunity • increase income to local communities <p>Negative Impacts</p> <p>Increase spread of HIV/AIDS and other diseases due to migrants</p>	<ul style="list-style-type: none"> • Priority should be given to local communities with relevant skills • Generate skills through on job training • Pay according to the national laws and policies • Enforce labour law • Promote socially acceptable technologies <ul style="list-style-type: none"> • Create awareness among the community and Provide information on preventive measures • Improve health services and VCTs

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Project Stage	Activities	Potential Impact	Enhancement /Mitigation Measures
		<p>Pressure on social services</p> <p>Child labour</p> <p>Air born diseases</p>	<ul style="list-style-type: none"> Improvement on social services and facilities Enforce Employment policy and Labour Laws Proper selection of machines and equipment which produce less emission Regular service of vehicles, machines and generators Use of fuels with low emission factor
		<p>Noise disturbance to societies</p> <p>Increase solid and liquid waste generation</p>	<ul style="list-style-type: none"> Proper choice of plant and machines fitted with silencer or reducers Sorting and reusing/recycle Treatment of liquid waste before disposing

Project Stage	Activities	Potential Impact	Enhancement / Mitigation Measures
		<p>Safety and health risks</p>	<ul style="list-style-type: none"> • Provide awareness on safety issues • Provide first aid kits on site • Provide and enforce use of personal protective gears • Provision of social services (e.g. health centers)
		<p>Negative Impacts</p> <p>Loss of habitat for some fauna and flora species</p>	<ul style="list-style-type: none"> • Site selection based on planned land use • Concentrate agricultural activities in industrial located areas
		<p>Air pollution from smokes</p>	<ul style="list-style-type: none"> • Proper selection of machines which produce less emission and regular service of vehicles, machines and generators

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activities	Potential Impact	Enhancement /Mitigation Measures
3. Operation phase	<ul style="list-style-type: none"> • Collection of raw materials • Processing (e.g drying and refining) • Storage and • Transportation 	Noise pollution from machines	<ul style="list-style-type: none"> • Proper choice of plant and machines fitted with silencer or reducers
		Water pollution from fuel and oils	<ul style="list-style-type: none"> • Limiting refueling on designated areas and proper handling of exhausted oils
		Increase solid waste generation	<ul style="list-style-type: none"> • Proper disposal of solid waste • Sorting and find alternative use
		<p>Positive Impacts</p> <ul style="list-style-type: none"> • Increase revenue to the government • Increase foreign money through exports of value added products • Increase income and enhance food security 	<ul style="list-style-type: none"> • Sustainability of the processing industries through sustained raw materials supply by farmers through improved extension service and farming technologies • Improve tax collection mechanisms • Improve cross border trade

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activities	Potential Impact	Enhancement / Mitigation Measures
		<p>Increased employment</p>	<ul style="list-style-type: none"> • Make employment information available to the local communities • Priority to be given to local community with relevant skills • Improve training capacity for local communities to take up the upcoming employment opportunities
		<p>Market for agricultural produce for the surrounding community</p>	<ul style="list-style-type: none"> • Sensitize more production through improved farming practices, • Produce good quality products • Add market value through packaging and processing
		<p>Learning opportunity and practical training for students</p>	<ul style="list-style-type: none"> • Avail information on the opportunities for students to access information and practical trainings

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Project Stage	Activities	Potential Impact	Enhancement / Mitigation Measures
		<p>Negative Impacts</p> <p>Change in norms and values</p> <p>Accidents caused by operating machines</p> <p>Child labour</p> <p>Increase population</p> <p>Fire hazards (e.g in tobacco)</p>	<ul style="list-style-type: none"> • Create awareness on maintenance of norms and values • Provide appropriate working tools and protective gears • Abide to rules and regulations at working place • Abide to Manufactures operating instructions of the machines • Enforce Employment policy and Labour Laws <p>Improve social services and facilities</p> <ul style="list-style-type: none"> • Regular inspections and provide fire insurance and fire fighting technologies

Agricultural Sector Environmental Impact Assessment Guidelines

Project Stage	Activities	Potential Impact	Enhancement / Mitigation Measures
		<p>Incidence of infectious diseases such as HIV/AIDS</p> <p>Health hazards due to air and water pollution</p>	<ul style="list-style-type: none"> • Provide information and education on HIV/AIDS and other infectious diseases • Improve health services including VCT • Create awareness on safety issues • Use appropriate technologies to clean the smoke • Provide and enforce use of personal protective gears • Proper disposal of solid and liquid wastes • Encourage recycling, reuse and water harvest • Price the utilities efficiently based on demand and supply

Project Stage	Activities	Potential Impact	Enhancement / Mitigation Measures
		Environment Air and Noise pollution	<ul style="list-style-type: none"> • Proper choice of plant and machines with less effect • Use appropriate technologies to clean the smoke • Install recommended stack height
		Decreased security	Strengthen security in the locality
		Deforestation i.e. tobacco drying	<ul style="list-style-type: none"> • Introduce tree planting programme • Introduce improved technologies which consume less wood • Use alternative source of energy
		Increase in waste water generation	<ul style="list-style-type: none"> • Ensure treatment of waste water and recycling

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Project Stage	Activities	Potential Impact	Enhancement / Mitigation Measures
		<p>Increase solid waste generation</p>	<ul style="list-style-type: none"> • Utilize solid waste to generate clean energy (electricity, biogas) where applicable • Use biodegradable solid waste to produce compost manure for agriculture and gardening • Incinerate or dispose dangerous and hazardous products as per manufacturer's instructions • Collect and dispose remnant materials • Encourage reuse and recycling
		<p>Increase pressure on the utilities such as electricity, water and waste water disposal</p>	<ul style="list-style-type: none"> • Generate electricity from by products • Improve water supply and waste water disposal systems

Project Stage	Activities	Potential Impact	Enhancement / Mitigation Measures
4. Decommission Phase	<ul style="list-style-type: none"> Demolition of the industrial related infrastructure Transform the building 	<p>Water pollution due to use of chemicals in refinery process</p> <p>Negative Impacts</p>	<ul style="list-style-type: none"> Price efficiently the water and electricity utilities Encourage recycling/reuse of f water Promote water harvesting Generate biogas from waste (e.g. biogradable) Water treatment and recycling Enforce polluter pays principle

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Project Stage	Activities	Potential Impact	Enhancement / Mitigation Measures
		<p>Loss of employment</p>	<ul style="list-style-type: none"> • Introduce alternative income generating activities • Train entrepreneurship skills to overcome the lost employment • Transfer of manpower to other similar projects • Timely payment of pension to the workers • Establish SACCOS
		<p>Loss to the government revenues</p>	<ul style="list-style-type: none"> • The Government should set enabling environment for new investors
		<p>Disintegration of Families due to loss of income</p>	<ul style="list-style-type: none"> • Empowerment of women so that they can take care of the family
	<p>Environment</p>	<p>Negative Impacts</p> <p>Generation of liquid solid waste</p>	<ul style="list-style-type: none"> • Dispose waste in appropriate disposal facilities/find alternative use
		<p>Disposal of remained processing chemicals</p>	<ul style="list-style-type: none"> • Proper disposal of remained processing chemicals • Handle dangerous chemicals as per manufactures instructions

4.2.6 Genetic Engineering

Variety development or breeding through conventional or genetic engineering are the common methods used in developing improved varieties. Conventional breeding has been used over the years and generally it can be said that it does not have significant environmental concerns. This is in contrast with genetically modified organisms (GMO`s) developed through genetic engineering techniques. Genetic engineered crops even though have big potential in improving yields and profits; they still have environmental and health risks. The process of developing and using Genetic engineered crops can be divided into three main stages that include laboratory transformation in which varieties are developed through genetic engineering, confined field trials and commercialization, whereby seeds are released to the public. Each of this stage has a number of socio economic and environmental impacts. Table 4.7 shows environmental impacts associated with different stages of genetic modification and commercialization process.

Table 4.7: Environmental Impacts of Genetic Engineering Processes

Project Stage	Socio Economic	Potential Impact	Enhancement /Mitigation Measures
1. Laboratory gene Transformation Processes (Confined Environment)		Positive Impact	<ul style="list-style-type: none"> • Create training opportunities for local experts on genetic engineering Emphasize the use of biosafety regulations and guidelines
		Transfer of knowledge to the local experts	
		Facilitation of intra specific hybridization between two different species	
		Introduction of new technologies	
		Negative Impacts	<ul style="list-style-type: none"> • Put in place measures to ensure the development and strengthening of institutional and human capacities in genetic engineering
		Religious/ethical and cultural perceptions	
		Positive Impact	<ul style="list-style-type: none"> • Create awareness on benefits of genetic modification • Avoid using controversial sources of genes
		Reduce possibility of gene escape and contamination	
		Improve containment facilities	
		Identify specific locations for the related activities	<ul style="list-style-type: none"> • Emphasize on the implementation of laboratory regulations recommended for genetic engineering laboratories
		Emphasize on the implementation of laboratory regulations recommended for genetic engineering laboratories	

Project Stage	Potential Impacts	Enhancement / Mitigation Measures
	<p>Negative impacts</p> <p>Accidental spillage of the materials</p> <p>Toxicity, allelegenicity and casinogenecity</p>	<ul style="list-style-type: none"> • Ensure international and local regulations and standards are adhered • Ensure adherence to protocols and standards • Avoid sources that trigger the occurrence of the mentioned impact
2. Confined Trials	<p>Positive impacts</p> <p>Socio economic</p> <p>Employment opportunities</p> <p>Gain experience in development of similar projects in other areas</p> <p>Establishment of potentials of genetically modified variety in less risky environment</p>	<ul style="list-style-type: none"> • Create jobs • Increase training opportunities for genetic engineering • Involve local experts in the trials • Involve local experts in the trials
	<p>Negative Impact</p>	

Project Stage	Potential Impact	Enhancement /Mitigation Measures
	Vandalism and theft	<ul style="list-style-type: none"> Strengthen security in the confined field trials Create public awareness and risks associated with genetic modified organism
	Change of settlement due to temporal change of land use	<ul style="list-style-type: none"> Compensation and relocation of affected communities
	Reduce possibility of gene escape	<ul style="list-style-type: none"> Improve confinement and security
Environment	Positive impacts	
	Introduction of new variety of crop	<ul style="list-style-type: none"> compatibility of new variety in the surrounding ecosystem and social acceptability
	Negative impacts	
	Possibilities of contamination of traditional varieties / land races	<ul style="list-style-type: none"> Strengthen confinement and security
Socio-economic	Positive impacts	
	Employment opportunities	<ul style="list-style-type: none"> Provision of more socio economic services

Project Stage	Potential Impact	Enhancement /Mitigation Measures
	Transfer of knowledge to the local experts and local farmers	<ul style="list-style-type: none"> • Create training opportunities to local experts on genetic engineering • Increase training opportunities for genetic engineering
	Increases crops yield and food security	<ul style="list-style-type: none"> • Provision of more socio economic services
	Increase profits to farmers and national income	
	Improvement of food processing industries	
	Improvement in nutritive value (vitamin uptakes in poverty stricken areas)	
	Minimize farm workers exposure to pesticides	<ul style="list-style-type: none"> • Promote varieties which uses less pesticides
	Negative Impacts	
	Breakdown traditional farming practices	<ul style="list-style-type: none"> • Documentation of indigenous knowledge
	Loss of traditional varieties	<ul style="list-style-type: none"> • Institute measure to protect traditional varieties

Project Stage	Potential Impact	Enhancement /Mitigation Measures
	<p>Religious/ethical and cultural perceptions</p> <p>Affect seed storage capability to farmers</p> <p>Uncertainties concerning human health risks</p> <p>Loss of markets due to uncertainties</p> <p>Acceptance of limited liability</p> <p>Capital intensive</p>	<ul style="list-style-type: none"> ● Labeling of GMOs products ● Use source of gene which are not controversial ● Harmonization of best local varieties ● Capacity building to local genetic engineering laboratories ● Government subsidization of imported genetically modified seeds ● Labeling GMOs products ● Create awareness on potential benefits of GMOs ● Labeling GMOs products ● Apply local laws and regulation to protect farmers and other users ● Raise awareness of the farmers on contractual arrangements with GMO companies ● Undertake only on necessary and priority areas.

Project Stage	Environment	Potential Impact	Enhancement /Mitigation Measures
		<p>Positive Impact</p> <p>Fewer/reduced application of pesticides and herbicides</p>	
		<p>Negative Impacts</p> <p>Development of resistance weeds and insects</p>	<ul style="list-style-type: none"> • Institute measure to protect traditional varieties against gene contamination • Identify any compatible native relatives in the release area
		<p>Contamination of non genetic modifies varieties</p>	<ul style="list-style-type: none"> • Institute measure to protect traditional varieties against gene contamination

Project Stage	Potential Impact	Enhancement /Mitigation Measures
	Loss of biodiversity	<ul style="list-style-type: none"> • Conduct biodiversity assessment
	Toxicity, allergenicity and carcinogenic	<ul style="list-style-type: none"> • Use source of genes which do not trigger Toxicity, allergenicity and carcinogenic
	Transgenic pollution	<ul style="list-style-type: none"> • Conduct studies on gene flow/out crossing potential • Conduct monitoring • Create buffer zone between Genetically Modified and non-Genetically Modified crops
	Loss of traditional varieties and loss of crop wild relatives	<ul style="list-style-type: none"> • Conduct biodiversity assessment • Identify any compatible native relatives
	Interferences of organic products	<ul style="list-style-type: none"> • Put in place mechanisms for labeling GMOs products

5.0 ROLES AND RESPONSIBILITIES OF DIFFERENT STAKEHOLDERS IN ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Several stakeholders are involved in the EIA process; these include MAFC, NEMC, Developer, EIA Expert and Public as indicated in the following sub sections:

5.1 Ministry of Agriculture Food Security and Cooperatives

MAFC through EMU as per EMA 2004 is responsible for managing the EIA process within the sector and can provide valuable technical information to EIA experts during EIA studies and are involved in the technical review process. Also MAFC will provide advice to different stakeholders in the different stages of a project i.e. Pre-feasibility study, Project development and design, EIA study, Issuance of project license and Project construction and operational stage.

5.1.1 Pre-feasibility, Project Development and Design Phases

MAFC can advise project developers and designers on the policy and legal requirements of each project. This means the project proponents will be informed of the relevant sectoral and cross sectoral policies and laws they have to consult so as to mainstream environment issues during project design.

5.1.2 EIA Study Phase

MAFC will advise on different stages during this phase i.e. scoping, full EIA undertaking, impact assessment, EIS review, and monitoring, auditing and decommissioning activities. MAFC will be involved as a key stakeholder in agricultural projects. Therefore, MAFC will have to provide data, information and expert opinion on the key findings of the consultants, also will advise to the consultants on project specific impacts

and mitigation measures, relevant policies and laws that have to be consulted for each type of project and a list of other key stakeholders that have to be consulted. Also during the EIS review, MAFC as a member of Cross Sectoral Technical Advisory Committee may advise NEMC on the completeness of the EIS and project specific impacts and mitigation measures.

5.1.3 License Issuance Phase

Ministry will have to advise the Minister on adequacy of environmental issues addressed in project design or in mitigation and the fulfillment of the sector policy and legal requirements before an EIA Certificate is issued to the developer. If the EIA process is completed successfully, Environmental Impact Assessment certificate will be issued by the Minister responsible for environment to the developer for submission to the various licensing authorities (e.g. TFRA, PHS, Water Basin Office, etc) to obtain other relevant permits.

5.1.4 Construction and Operation Phase

MAFC together with NEMC and developer will monitor the project implementation in order to establish compliance to development conditions and also will conduct the auditing as per EIA and Audit Regulations of 2005.

5.2 National Environment Management Council

NEMC as mandated by law, has a responsibility to oversee the EIA process by undertaking screening, guiding developers on assessment procedures, conducting public hearings, reviewing EIA reports based on the Terms of Reference (ToR) and advise on approval of proposed projects. The council is also responsible for monitoring implementation of environmental protection measures recommended by EIA studies and

advising the Government through Minister of Environment on the quality of EIS.

5.3 Developers

The developer has direct responsibility for the project and should provide necessary information about the project at all stages of the EIA process. Developers hire experts to undertake EIA studies on their behalf and answer questions about potential impacts and proposed mitigation recommendations at public hearings. Developers have the responsibility to implement the environmental management plan including mitigation measures as proposed in the EIA report and carry out subsequent environmental monitoring and auditing.

5.4 Environment Impact Assessment Experts

EIA experts are professionals registered with NEMC to undertake impact studies. They help the developer to carry out EIA, design mitigation measures, prepare EIA report, and design environmental management and monitoring plans. These guidelines should be applied by any expert conducting EIA within agricultural sector. They will also be used during review process as reference point.

5.5 The Public

Public participation in the EIA process should be adequate in order to obtain local and traditional knowledge, which will be useful for improving transparency and accountability during decision-making process as well as ensuring that important impacts are not overlooked and, environmental and socio-economic benefits of proposed project are maximized. The main steps in which public participation is critical are scoping, impact assessment, EIS review and monitoring. In each of these stages the consultants or government authorities should use

different methods including advertisements in the newspapers, radio, television stations or conduct public meetings, public hearings and interviews in order to inform the public about the project and also to get required information from them. The EIS should include evidence of public involvement in the EIA process.

5.6 Local Government Authorities

The Environmental Management Officer under LGAs has the responsibilities to monitor the preparation, review and approval of EIA for local investments.