

5. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK GOVERNING ENVIRONMENTAL MANAGEMENT IN KENYA

5.1 Introduction

Development can have major impacts on the environment by degrading soils and waterways, altering landscape and destroying biodiversity and habitat. Other problems associated with development and human activity include land use conflicts, human and animal conflicts, water management and environmental pollution. In addition to harming the environment, these impacts can and do have significant economic costs and negatively affect human health. Environmental Impact Assessment (EIA) is a tool that assists in the anticipation and minimization of the adverse effects of development. Undertaken in the early stages of project planning and design, EIA seeks to help shape development in a manner that best suits the local environment and is most responsive to human needs. The concept of EIA arose from the pollution and degradation of natural resources caused by rapid population growth, industrialization, agricultural development and technical progress. EIA recognizes that natural resources are finite and incapable of absorbing the unchecked demands of modern society.

There is a growing concern in Kenya and at global level that many forms of development activities cause damage to the environment. This has been aggravated by lack of awareness and inadequate information amongst the public on the consequences of their interaction with the environment. In addition there is limited local communities' involvement in participatory planning and management of the environment and natural resources. Recognizing the importance of natural resources and the environment in general, the Kenyan Government has put in place wide range of policy, institutional and legislative framework to address the major causes of environmental degradation and negative impacts on ecosystems emanating from industrial and economic development programmes.

It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. It is a condition of the Kenya Government to conduct Environmental Impact Assessment on development Projects. EIA assesses the impacts of a proposed project before commencement of implementation. In addition to helping formulate proper development policy, EIA provides for public participation in the decision making process in respect of a given proposed project. EIA serves the following purposes:

- i) Integration of environmental issues into planning and decision making processes;
- ii) Anticipation, minimization and mitigation of environmental damage and recommendation of alternatives;
- iii) Public participation in decision making and environmental conservation.

The steps included in and EIA are contained in the Environmental of the Environmental Management and Coordination Act No. 8 of 1999 (EMCA) at Sections 58 and 138 and the Environmental (Impact Assessment and Audit) Regulations 2003 (Legal No. 101 of 2003). All undertakings enumerated in the Second Schedule of EMCA require an Environmental Impact Assessment project/study report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual licensing before the development commences.

5.2 Environmental Policy, Legal and Institutional Framework governing Environmental Management in Kenya

Kenya's environmental policy and legislation are scattered in a multiplicity of resource and sector specific laws and policy papers. The institutions and departments that deal

with environmental issues are equally numerous. Sector specific laws are deficient in that they are characterized by fragmented and uncoordinated sectoral legal regimes that are developed to facilitate resource allocation and to deal with environmentally adverse effects of resource exploitation. The sectoral institutions under these laws often find themselves in regulatory competition.

Constitution of Kenya

The Constitution of Kenya in spite of being the supreme law of the land does not contain specific provisions regarding the environment. Section 70 however lists the right to life as one of the fundamental rights an individual is entitled to. The right life guaranteed by the Constitution can be interpreted to include the right to a clean and healthy environment.

Environmental Management and Coordination Act of 1999 (EMCA)

The Environmental Management and Coordination Act of 1999 (EMCA) was enacted to provide an appropriate legal and institutional framework for the management of the environmental and for matters connected therewith and incidental thereto. EMCA does not repeal the sectoral legislation but seeks to coordinate the activities of the various institutions tasked to regulate the various sectors. These institutions are referred to as Lead Agencies in EMCA. Lead Agencies are defined in Section 2 as any Government ministry, department, parastatal, and State Corporation or local authority in which any law vests functions of control or management of any element of the environment or natural resource.

5.3 Institutions under EMCA

National Environmental Council (NEC)

The National Environment Council (NEC) is established under Section 4 of EMCA. NEC which is chaired by the Minister in charge of the environment, is the highest policy making body under EMCA. NEC is responsible for policy formulation and directions for purposes of EMCA. NEC sets national goals and objectives and promotes cooperation among both public and private organisations engaged in environmental protection programmes.

The National Environmental Management Authority (NEMA)

The National Environmental Management Authority (NEMA) is established under Section 7 of EMCA. NEMA is the principal Government institution charged with the overall supervision and co-ordination over all matters relating to the environment as well as implementation of all policies relating to the environment. NEMA is responsible for dealing with EIA. NEMA has to date considerably developed its human and other resource capacity to enable it coordinate the environmental management activities of Lead Agencies.

Provincial and District Environment Committees

Under section 29 (1) of EMCA, the Minister shall by notice in the gazette appoint Provincial and District Environment Committees of NEMA in respect of every province and district respectively. These committees assist NEMA in effectively carrying out its function of proper management of the environment at these levels. It is instructive to note that the membership of these committees include *inter alia* representatives of farmers or pastoralists, business community, women and youth.

Public Complaints Committee PCC

The Public Complaints Committee is established under Section 31 of EMCA. The PCC is concerned with the investigation of complaints relating to environmental damage and degradation generally. The PCC has powers to investigate complaints against any person or even against NEMA or on its own motion investigate any suspected case of environmental degradation. The PCC is required by law to

submit reports of its findings and recommendations to NEC. The law however is weak in that it does not provide PCC with the mandate to see its recommendations carried through. Further, NEC is not specifically required to do anything with regard to the reports submitted by the PCC and will often note and adopt the same without any further follow up action. So far the PCC has experienced challenges such as failure to honour summons, hostility between parties, hostility directed at PCC investigators, lack of understanding of EMCA and abdication of duty by Lead Agencies.

Standards and Enforcement Review Committee

The Standards and Enforcement Review Committee (SERC) is a committee of NEMA and is established under Section 70 of EMCA. This is a technical Committee responsible for formulation of environmental standards, methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures. The Permanent Secretary under the Minister is the Chairman of the Standard and Enforcement Review Committee.

The members of the SERC are set out in the third schedule to EMCA. They consist of representatives of various relevant government ministries and parastatals that are Lead Agencies as well as those responsible for matters such as economic planning and national development, finance, labour, public works, law and law enforcement, etc. Other members are drawn from public universities, and other government institutions.

To operationalize the Act, NEMA through this committee has issued the following Regulations which have a bearing on the proposed project in regard to compliance with national requirement:

- i)* The Environmental (Impact Assessment and Audit) Regulations, 2003. Legal Notice No. 1
- ii)* The Environmental Management and Coordination (Water Quality) Regulations, 2006, Legal Notice No. 120
- iii)* The Environmental Management and Coordination (Waste Management) Regulations, 2006. Legal Notice No. 121

National Environmental Tribunal (NET)

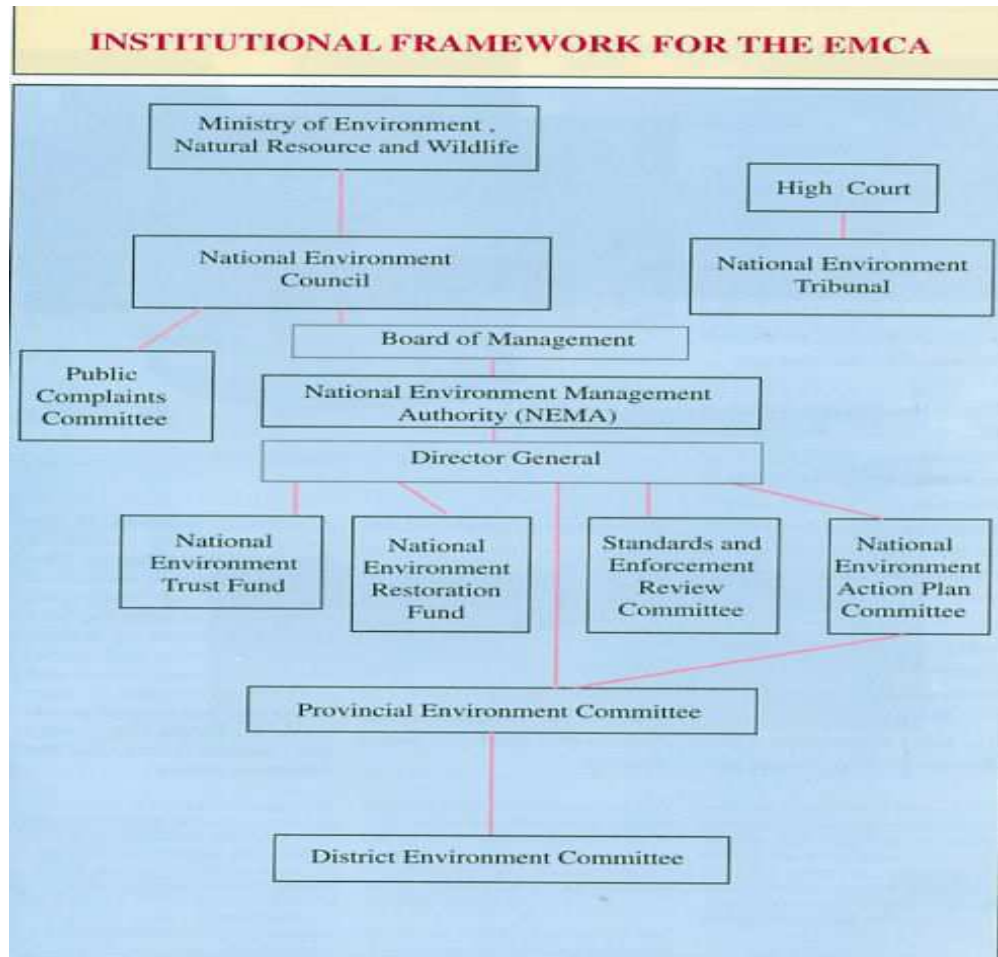
The NET is established under Section 125 of EMCA for the purpose of hearing appeals from administrative decisions by organs responsible for enforcement of environmental standards. An appeal may be lodged by a project proponent upon denial of an EIA licence or by a local community upon the grant of an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

National Environment Action Plan Committee (NEAP)

The National Environment Action Plan Committee (NEAP) is established under Section 37 of EMCA. This cross-sectoral committee is responsible *inter alia*, for the development of a five year national environment action plan. The national environment action plan shall contain among other aspects analysis of the natural resources of Kenya and their distribution, quantity and various uses. It shall also recommend legal and fiscal incentives for business that incorporate environmental requirements into their planning and operational processes as well set out

guidelines for the planning and management of the environment and natural resources. The national environment action plan shall upon adoption by Parliament be binding on all organs of government. Provincial and district environmental committees are also required to develop their own five year environmental action plans which are incorporated in the national environment action plan.

Figure 5.1: Environmental Management and Coordination Act Institutional Framework



5.4 The Legislative Framework

This section deals with other legislation and policy that are relevant to the proposed project.

Land Tenure and Land Use Legislation

Land tenure refers to the terms and conditions under which rights to land and land based resources are acquired, held transferred or transmitted. Land tenure systems fall into three basic categories: private modern communal or customary and public or state. Under private tenure, property rights are assigned to the individual while under the communal tenure system, these rights are assigned to a group of individuals. Public tenure obtains in the former Crown lands and includes national parks, forest land, alienated and unalienated land. Land use on the other hand refers to the utilization of land for agriculture, tourism, grazing, wildlife management, forestry, water conservation, etc. These are all valid and nationally productive uses of land. They are however competing and often give rise to land-use conflicts. The following are some of the main statutes that regulate land ownership and land use in Kenya:

The Government Lands Act, Chapter 280 of the Laws of Kenya

Under this act government lands are vested in the President who has powers to *inter alia* make grants or dispositions of any estates, interests or rights in or over unalienated government land. Unalienated government land is land which is not presently leased to any person and in respect of which the Commissioner of Lands has not issued a letter of allotment. Some of these powers have been delegated and are exercised by the Commissioner of Lands. The President through the commissioner of lands may allocate any unalienated land to any person he so wishes on private tenure basis. Once allocated, such land is held as a grant from the government on payment of such rents or conditions as the government may determine. Such allocations have often disregarded social and environmental imperatives, leading to degradation, inequity and other undesirable impacts. TARDA is a beneficiary of 28,680 hectares of land in Garsen which have been granted by the Government under this Act and the utilization of this land will be governed by the Act.

The Government Lands Act is key to the discourse on communal tenure rights in that in some pastoral areas, land used pursuant to communal tenure systems is in fact Government land usually what is known as unalienated government land. The communities in the project area hold the land on which they live and derive their livelihood on communal tenure basis. These communities may under this Act enter into leases or licenses with the Government for the land they use. However, given the nature of communal tenure regimes, it is unlikely that pastoral communities will wish to formalize relationships with the government. They may not see the rationale in entering into a formal relationship that are subject to rents and other conditions in situations where they may in fact be using such land in remote areas unimpeded. Any grant of title to any land that is occupied by the communities will be done under this Act.

Registration of Titles Act Chapter 281 of the Laws of Kenya

The Registration of Titles Act is an act of Parliament that provides for the transfer of land by registration of titles. When the Commissioner of land issues a letter of allotment to any person in respect of any land, one of the laws under which the title to that land is issued is the Registration of Titles Act. A freehold title issued under this act confers absolute control upon individuals or other legal entities upon a given parcel of land. It also confers upon them power to determine the use to which such land can be put. A leasehold title contains conditions such as the term of the lease, commencement date thereof, the user of the land etc. Private ownership of land is embodied in this Act. TARDA has been issued with a Letter of Allotment by the Commissioner of Lands in respect of 28,680 hectares which encompass the concession land. The tenure is leasehold for a term of 45 years from 1st January 1995. The user of the land is agricultural and there other condition contained in the Letter of Allotment. Under Section 23 the title that shall be issued to TARDA shall be conclusive evidence that TARDA is the absolute and indefeasible proprietor of the land subject to the matters contained in the title. This title cannot not be challenged except on grounds of fraud or misrepresentation.

There are two land registries in the country for the registration of land under this act. There is the Coastal Registry which covers land registration in the coastal area and the Inland Registry in Nairobi which covers land in the rest of the country. The title to this land will be registered at the Coastal Registry in Mombasa.

The Trust Land Act, Chapter 288 of the Laws of Kenya

The constitution vests all land which is not registered under any act of parliament under the ownership of local authorities as trust land. Section 117 of the Constitution of Kenya provides that the Trust Lands Act may empower a county council to set apart an area of trust land vested in that county council for use and occupation by a public body or authority for public purposes, or by any person for a purpose likely to benefit the persons

within the jurisdiction of the county council or for the purpose of prospecting or extraction of minerals or oil.

Trust land consists of areas that were occupied by natives during the colonial period and which have not been consolidated, adjudicated and registered in individual's or group names. It also includes native land not taken over by the Government. Trust land is governed by the Trust Lands Act and is vested in local authorities designated as councils. The councils manage all resources within trust land and regulate land use such and conservation within their jurisdictions. The land in the project area has not been adjudicated and largely falls under this Act. This includes the land comprising the factory site.

The Tana and Athi River Development Authority Act Chapter 443 of the Laws of Kenya

This Act of Parliament provides for the establishment of an authority to advise on the institution and co-ordination of development projects in the area of the Tana River and Athi River Basins and related matters. The authority established under Section 3 of this Act is the body corporate by the name of the Tana and Athi Rivers Development Authority. The Authority is empowered by Section 3 of the Act to inter alia taking, purchasing or otherwise acquiring, holding, charging and disposing of moveable or immovable property. The authority also has borrowing powers. These powers are crucial for the proposed project in that they grant the Authority the capacity to have the property registered in its Authority's corporate name. In the implementation of the project, the Authority must ensure that it operates within the ambit of this Act.

The Forest Act (Act Number 7 of 2005)

This is law was enacted by Parliament in 2005 to provide for the establishment, development and sustainable management including conservation and rational utilization of forest resources for the socio-economic development of the country. Parts of the project area consist of indigenous forests. Section 8 of the Act requires all indigenous forests and woodlands to be managed on a sustainable basis for the purposes *inter alia* of conservation of water, soil and biodiversity, riverline and shoreline protection, sustainable production of wood and non-wood products.

Community participation as provided for under Section 46 of the Act should be encouraged. The most appropriate would be initiation of participatory forest management in these forest reserves so that the local community and organization such as TARDA can have a significant input with Kenya Forest Service (KFS) office playing a coordination and guidance role.

The Agriculture Act (Cap 318)

This is an Act of Parliament for the promotion and maintenance of a stable agriculture, to provide for the conservation of soil and its fertility and to stimulate the development of agricultural land in accordance with accepted practices of good land management and good husbandry. Under Section 184 of the Act the Minister may make general rules for the preservation utilization and development of agricultural land. The concession land and TARDA land in general is agricultural and is therefore subject to this Act.

The Sugar Act 2001

The 2001 act provides for the development, regulation and promotion of the sugar industry through the establishment of powers and functions of the Kenya Sugar Board and for associated purposes. The Kenya Sugar Board which was established on the 1st of April 2002 succeeded the Kenya Sugar Authority. Its charged with the responsibilities of

regulating, developing and promoting the Kenya Sugar Industry. Some of its specific roles relevant to the EIA process include:-,

- Formulating and implementing overall policies and plans for the development of the industry;
- Facilitating the arbitration of disputes among interested parties;
- Promoting and encouraging the use of environment friendly technologies in the industry

Other functions of the board include facilitating equitable access to the benefits and resources of the industry by all affected parties, acting as an intermediary between the government and the industry, facilitating export of local sugar, collecting, collating and analyzing industry statistics and maintaining a database for the industry and promoting the efficiency and development of the industry through the establishment of appropriate institutional linkages amongst other functions.

Another institution within the industry includes the Kenya Sugar Research Foundation which aims at carrying out effective research in all aspects of sugar and sugar cane production and consumption. KESREFs functions relevant to the EIA process are to:-

- Breeding sugarcane varieties suited for various agro-ecological zones of Kenya;
- Appraising technologies on land preparation, damage and water management for economical cane production;
- Studying and monitoring of pests and diseases that affect sugarcane and recommending appropriate control strategies;
- Fostering research on sustainable productivity, environmental issues, human safety at field and factory levels amongst others.

The sugarcane 'millers' which comprise of the six operational Sugar Factories has a basic responsibility of efficiently milling supplied cane from farmers and the nucleus estates, so as to realize maximum returns for both farmers and millers. Its specific role relevant to the EIA process is to:-

- Maintain and develop adequate milling capacity for sugarcane planted on the basis of agreed planting plans with the growers and grower institutions.

Public Health Act (Cap. 242)

This is an Act of Parliament that makes provision for securing and maintaining health. Part IX, contains provision regarding sanitation and housing. Section 115 of the Act states that no person shall cause nuisance or cause to exist on any land or premises any condition liable to be injurious or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health.

Such nuisance or conditions are defined under section 118 as waste pipes, sewers, drainers or refuse pits in such state, situated or constructed as in the opinion of the medical officer of health to be offensive or injurious to health. Any noxious matter or waste water flowing or discharged from any premises into the public street or into the gutter or side channel or watercourse, irrigation channel, or bed not approved for discharge is also deemed as nuisance. Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

The Act also contains provisions on discharges of pollutants into water sources. On responsibility of the Local Authorities Part XI, section 129, of the Act states in part "It shall be the duty of every local authority to take all lawful, necessary and reasonably

practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes

Part XII, Section 136, states that all collections of water, sewage, rubbish, refuse and other fluids which permit or facilitate the breeding or multiplication of pests shall be deemed nuisances under this Act. This part seeks to guard against the breeding of mosquito which is key as they cause malaria which is one of the major causes of death in this country.

Local Authority Act Chapter 265 of the Laws of Kenya

Section 160 helps local authorities ensure effective utilization of the sewages systems. It states in part that municipal authorities have powers to establish and maintain sanitary services for the removal and destruction of, or otherwise deal with kinds of refuse and effluent and where such service is established, compel its use by persons to whom the services is available. However, to protect against illegal connections, section 173 states that any person who, without prior consent in writing from the council, erects a building on; excavate or opens-up; or injures or destroys a sewers, drains or pipes shall be guilty of an offence. Any demolitions and repairs thereof shall be carried out at the expense of the offender.

Section 170, allows the right to access to private property at all times by local authorities its officers and servants for purposes of inspection, maintenance and alteration or repairs of sewers. To ensure sustainability in this regard, the local authority is empowered to make by laws in respect of all such matters as are necessary or desirable for maintenance of health, safety, and well being of the inhabitants of its area as provided for under Section 201 of the Act.

The Act under section 176 gives powers to local authority to regulate sewage and drainage, fix charges for use of sewers and drains and require connecting premises to meet the related costs. According to section 174, any charges so collected shall be deemed to be charges for sanitary services and will be recoverable from the premise owner connected to the facility. Section 264 also requires that all charges due for sewage sanitary and refuse removal shall be recovered jointly and severally from the owner and occupier of the premises in respect of which the services were rendered. This in part allows for application of the “polluter-pays-principle”.

Physical Planning Act, 1999

This Act makes provision for development control. The Local Authorities are empowered under section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section, therefore allows for the prohibition or control of the use and development of land and buildings in the interest of proper and orderly development of an area.

In the development of any land, approval must be obtained from the relevant local authority. Section 30 states that any person who carries out development without development permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development permission granted by the respective local authority.

Finally, section 36 states that if in connection with a development application, local authority is of the opinion that the proposed development activity will have injurious impact on the environment, the application shall be required to submit together with the application an environment impact assessment EIA report. EMCA echoes the same by requiring that such an EIA is approved by the NEMA and should be followed by annual environmental audits.

Land Planning Act Chapter 303 of the Laws of Kenya

Regulation 9 of the subsidiary legislation (The Development and Use of Land Regulations, 1961) under this Act requires that before the local authorities submit any plans to the Minister for approval, steps should be taken as may be necessary to acquaint the owners of any land affected by such plans. Particulars of comments and objections made by the landowners should be submitted. This is intended to reduce potential conflicts between the interest of the authorities and those of land owners in respect of settlement social and economic activities.

Water Act, 2002

Part II, section 18, of the Water Act 2002 provides for national monitoring and information system on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority (WRMA) to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to the authority.

The Water Act vests the rights of all water to the state, and the power for the control of all body of water with the Minister, the powers is exercised through the Minister and the Director of water resources in consultation with the water catchments boards, it aims at among others:

- i) Provision of conservation of water and**
- ii) Appointment and use of water resources.**

Water apportionment board is a National Authority whose duty is to advise the Minister on issues with respect to water use. Permission to extract underground water for large-scale use lies with the board and the pollution of such water source is an offence. Failure to comply with such directives is an offence. The Minister is given the power to appoint undertakers of water supply and in most cases are Town, Municipal and City Councils.

Further in order to provide security and supply of water the Minister can declare a catchment's area of particular source of water as protected area and restrict activities in those areas. Such orders must be publicized in Kenya gazette.

Pollution of any water course is an offence and the Act also prohibits whoever throws, conveys, cause or permits throwing of rubbish, dirt, refuse, effluent, trade waste to any water. It enhances the Ministry's capacity to enforce the Act by reviewing the water user fees.

Section 73 of the Act allows a person with a licence (licensee) to supply water to make regulations for the purpose of protecting against degradation of water resources. Section 75 and sub-section 1 allows the licensee to construct and maintain drains serves and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water sources within his/her jurisdiction.

Section 76 states that no person shall discharge any trade effluent from trade premises into sewers of a licensee without the consent of the licensee upon application indicating the nature and composition of effluent, maximum quality anticipated, flow rate of the effluent and any other information deemed necessary. The consent shall be issued on conditions including payment of rates for discharge as may be provided under section 77 of the same Act.

Way leaves Act Chapter 292 of the Laws of Kenya

Section 3 of the Act empowers the Government to carry any sewer, drain or pipeline into, through, over or under any lands whatsoever, but may not in so doing interfere with any existing building. Section 8 further states that any person who, without the consent of the Permanent Secretary to the Ministry responsible for works (which consent shall not be unreasonably withheld), causes any building to be newly erected over any sewer, drain or pipeline the property of the Government shall be guilty of an offence and liable to a fine of one hundred and fifty shillings, and a further fine of sixty shillings for every day during which the offence is continued after written notice in that behalf from the Permanent Secretary; and the Permanent Secretary may cause any building erected in contravention of this section to be altered, demolished or otherwise dealt with as he may think fit, and may recover any expense incurred by the Government in so doing from the offender.

Electricity Power Act No. 11 of 1997

The Electric Power Act No. 11 enacted in 1997 deals with generation, transmission, distribution, supply and use of electrical energy as well as the legal basis for establishing the systems associated with these purposes. According to the Act, the Minister through the Electricity Regulatory Board is conferred with the legislative power to grant licences and authorise works for generation or transmission of electrical energy. However, the provisions of section 4 of the Act require such authorisation only for generating plants with a rating capacity exceeding 1000kw. Section 9 (3) of the Act addresses environmental integrity of the power generating systems which, must be considered by the board in recommending the grant of licences to the Minister

In this respect, the following environmental issues will be considered before approval is granted:

- i)* The need to protect and manage the environment, and conserve natural resources;**
- ii)* The ability to operate in a manner designated to protect the health and safety of the project employees; the local and other potentially affected communities.**

Under schedule 3 of the Electric Power (licensing) Regulations 2003, it is mandatory to comply with all safety, health and environmental laws. Moreover,

schedule 2 (regulation 9) of the Electric Power (licensing) Regulations 2003 stipulates that licensing and authorisation to generate and transmit electrical power must be supported by the following documents duly approved by NEMA.

- 1 Environmental Impact Assessment Report (EIA) or**
- 2 Initial Environmental Audit Report (IEA) and**
- 3 Environmental Management Plan (EMP)**

Building Code 1967

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and all the wastewater must be discharged into sewers. The code also prohibits construction of structures or buildings on sewer lines.

Penal Code Act Chapter 63 of the Laws of Kenya

Section 191 of the Penal Code provides that any person or institution that voluntarily corrupts or fouls water for public springs or reservoirs, rendering it less fit for its ordinary use shall be guilty of an offence. Section 192 also makes it an offence for a person to make or vitiate the atmosphere in any place to make it noxious to health of persons/institutions, dwelling or business premises in the neighbourhood or those passing along public way.

Factories Act Chapter 514 of the Laws of Kenya

This Act of Parliament was enacted to provide for the health, safety and welfare of persons employed in factories and other places of work and for matters incidental thereto and connected therewith. It also provides for the formation of Health and Safety Committees in the work place.

Health

Section 13 of the Act provides that a factory shall be kept in a clean state free from effluvia arising from any drain, sanitary convenience or nuisance. Section 14 prohibits overcrowding of factories and provides specific measurements for space required for each employee less than which shall constitute overcrowding.

The Act also requires that factories should have adequate ventilation, lighting, drainage of floors, and sanitary conveniences separate for each gender. Food and drinks should not be partaken in dangerous places or workrooms. Provision is made in the Act for suitable protective clothing and appliances including where necessary, suitable gloves, footwear, goggles, gas masks, and head covering, and maintained for the use of workers in any process involving expose to wet or to any injurious or offensive substances.

Safety

Part V of the Act contains general provisions regarding safety in factories and other places. The act makes it mandatory to fence dangerous parts of machinery. Section 37 requires steam boilers must be of good construction, sound material, adequate strength and free from defect and shall be properly maintained. The Act further provides for the training and supervision of inexperienced workers, protection of eyes with goggles or effective screens must be provided in certain specified processes. Floors, passages, gangways, stairs, and ladders must be soundly constructed and properly maintained and handrails must be provided for stairs.

Special precaution against gassing is laid down for work in confined spaces where persons are liable to overcome by dangerous fumes. Air receivers and fittings must be of sound construction and properly maintained. Adequate and suitable means for extinguishing fire must be provided in addition to adequate means of escape in case of fire must be provided.

Section 42 stipulates that in every factory there shall be provided and maintained readily accessible means for extinguishing fire and persons trained in the correct use of such means shall be present during all working periods.

Welfare

The general provisions regarding welfare are contained in Part VI of the Act. The welfare requirements include supply of both quantity and quality of wholesome drinking water must be provided. Maintenance of suitable washing facilities, accommodation for clothing not worn during working hours must be provided. Sitting facilities for all female workers whose work is done while standing should be provided to enable them take advantage of any opportunity for resting. Under Section 50 of the Act, a first aid box shall be provided, maintained and made readily accessible.

Legal Notice Number 31 of 2004 contains rules for the creation and management of Occupation Health and safety committees. Further, it is requirement under these rules to post an Abstract of the Factories Act in key sections of the factory.

Employment Act, Chapter 226 of the Laws of Kenya and The Regulation of Wages and Condition of Employment Act Chapter 229 of the Laws of Kenya

These Acts deal with employee rights. The Employment Act fixes minimum standards of employment, while regulation of wages and conditions of employment Act creates wages fixing institutions like the wages board and councils to continuously review the human standards of employment on a sector basis. These Acts effectively deal with issues such as prohibition of forced labour, child labour, and discrimination in employment as provided for in the respective International Labour Organisations conventions which Kenya has since ratified.

5.5 Relevant Government Sessional Papers

Sessional paper No. 6 of 1999

This Sessional Paper elucidates on the connection between environment and development, highlighting the key environmental challenges. It provides priorities for action, implementation strategies and capacity building. It states that the overall goal is to integrate environmental concerns into the national planning and management processes and provide guidance for environmentally, socially and economically sustainable development.

Sessional Paper Number 1 of 2002

This Sessional paper for sustainable development which is an update of Sessional Paper Number 4 of 1984 on population policy guidelines, addresses issues on environment, gender, poverty and problems faced by segments of the population including the youth, the elderly and persons with disabilities. Outlined in the paper are population and development goals and objectives including improvement on standards of living and quality of life of the people; full integration of population concerns into development process; motivating and encouraging Kenyans to adhere to responsible parenthood; and empowerment of women. The problem of HIV/AIDS is also addressed. The proposed project is therefore in line with this Sessional paper.

The National Poverty Eradication Plan

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

The Poverty Reduction Strategy Paper (1999) on Environment and Development

This strategy paper was published by the Government in 2001. The two key goals of the strategy is poverty reduction and economic growth. The document outlines the priorities and measure necessary for poverty reduction and economic growth. The objectives of economic growth and poverty reduction are borne out of realization that economic growth is not a sufficient condition to ensure poverty reduction. In this regard, measures geared towards improved economic performance and priority actions that must be implemented to reduce the incidence of poverty among Kenyans have been identified. With respect to the environment the paper proposes that adequate awareness be created among stakeholders regarding environmental costs and benefits. It further calls for community involvement and participation in environmental management and conservation.

Strategy for Revitalizing Agriculture 2004-2014

This document focuses on agriculture as a key sector for growth and employment. It discusses in detail the agricultural sector policy framework and the need for increased support to agro-processing industries in the rural areas and trade.

Private sector development strategy 2006-2010

The strategy focuses on improving Kenya's business environment, institutional transformation, trade expansion, improved productivity and support to entrepreneurship and indigenous enterprise development. One of the key factors for the improvement of productivity is the adoption of modern, appropriate technologies.

Vision 2030

Vision 2030 is a government development strategy that is aimed at steering Kenya to a middle income country by the year 2030. It is based on the 3 pillars of political, social and economic advancement and it aims to transform the economy and achieve sustainable growth. Environmental considerations of development are contained within the social and economic pillar. On poverty reduction, the vision aims at creating opportunities for the poor by making institutions stronger. The proposed introduction of cane growing and having the communities as out growers by the project proponent in Tana River is a clear step towards this vision. This is also in line with the *Economic Recovery Strategy for*

Wealth and Employment Creation (ERS) which addresses issues of promoting sustainable livelihoods in marginal areas.

5.6 International Conventions and Treaties

Conventions are legally binding bilateral, regional or international agreements that binding to the states that are parties thereto. Kenya has ratified some of the most important conventions on the environment and is bound by the same.

5.6.1 The Ramsar Convention on Wetlands of International Importance

Kenya ratified the Convention in June 1990. The Ramsar Convention on Wetlands is primarily concerned with the conservation and management of wetlands. Parties to the Convention are also required to promote wise use of wetlands in their territories and to take measures for the conservation by establishing nature reserves in wetlands, whether they are included in the Ramsar list or not. Wetlands are defined by the Ramsar Convention as “areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary with water that is static or flowing, fresh, brackish or salty, including areas of marine water the depth of which at low tide does not exceed six meters”.

The National Wetland Standing Committee of Kenya’s Inter-Ministerial Committee on Environment (IMCE) defines wetlands as “areas of land that are permanently, seasonally or occasionally water logged with fresh, saline, brackish or marine water, including both natural and man-made areas that support characteristic biota” while EMCA defines wetland as “an area permanently or seasonally flooded by water plants and animals have become adapted. The Lower Tana (the project area as well as the Tana Delta) is endowed with wetlands which improve water quality in nearby river channels. For this reason, the proposed project is expected to strictly observe the Ramsar Convention’s principles of wise use of the wetlands in the project area.

Convention on Biological Diversity (CBD)

The CBD is one of the outcomes of the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. The CBD establishes a global legally binding framework for the conservation of biodiversity, the sustainable use of its components and the fair and equitable sharing of benefits arising out of utilization of genetic resources. The provisions of this convention should be taken into account in the conservation of various species of plants, animals and the variety of ecosystems in the project area.

The Rio Declaration and Agenda 21

The Rio Declaration and Agenda 21, the action plan for the 21st century are two non legally binding instruments adopted by the 1992 United Nations Conference on the Environment and Development (UNCED). While the Rio Declaration contains general principles and objectives, Agenda 21 contains detailed guidance on their practical implementation. Principle 4 of the Rio Declaration provides that in order to achieve sustainable development environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it. Principle 25 accentuates this by stating that peace, development and environmental protection are interdependent and indivisible.

In an effort to control levels of air pollutants from industries sources, the Geneva Convention on long-range trans-boundary air pollution was signed. Other conventions include the convention on the law of the sea (1994). Conventions on nuclear accidents (Notification Assistance) 1986; the Montréal Protocol on substances that deplete the ozone layer, the Biological and toxin weapons etc

5.6.2 *The World Commission on Environment and Development (The Brundtland Commission of 1987)*

The Commission in its 1987 report dubbed "*Our Common Future*" focused on the environmental aspects of development, in particular the emphasis on sustainable development that produces no lasting damage to the biosphere and to particular ecosystems. In addition to environmental sustainability is economic and social sustainability. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resources. While social sustainable development is development that maintains the cohesion of a society and its ability to help its members work together to achieve common goals, while at the same time meeting individual needs for health and well being, adequate nutrition, and shelter, cultural expression and political involvement. The key aspect of sustainability is the interdependence of generations.

The concept of EIA is embodied in many multilateral environmental agreements. Principle 17 of the Rio Declaration provides that environmental impact assessment as a national instrument shall be undertaken for proposed activities that are likely to have a significant impact on the environment and are subject to a decision of a competent national authority.

6. CONSULTATION AND PUBLIC PARTICIPATION

6.1 Introduction

A detailed procedure/ methodology used in public consultations and participation have already been outlined in Chapter 2. This chapter outlines the key issues/ concerns on the proposed Tana Delta Integrated Sugar Project mainly in Tana River District and partly in Lamu District. The mitigation measures suggested by the public that the developer should incorporate to minimize environmental degradation and promote good working relationship with the community has been integrated in this chapter. The chapter ends by highlighting the general opinion of the key stakeholders on the proposed project.

6.2 Objectives of the consultation and public participation

The objective of the Consultation and Public Participation (CPP) as required in EMCA, (1999) was to:

1. Disseminate and inform the stakeholders about the project with special reference to its key components, location and expected impacts.
2. Create awareness among the public on the need for the EIA for the TSIP and its due process.
3. Gather comments, concerns and suggestions of the interested and affected parties.
4. Ensure that the concerns of the stakeholders were known to the decision-making bodies and the developer at an early phase of project development planning.
5. Establish a communication channel between the general public and the team of consultants, the MSC/TARDA and the Government.
6. Incorporate the information collected in the study by EIA specialists

The purpose for such a process was to identify the positive and negative impacts and subsequently promote and mitigate them respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned.

6.3 Interested and affected stakeholders consulted

The following is the summarized list of interested and affected parties consulted (see a comprehensive list of the people/ stakeholders consulted in Appendix 4).

1. Government Institutions and departments/ officials at national, provincial, district and divisional levels.
2. Local authority leaders.
3. Researchers at local universities and research institutions.
4. NGOs operating at National, regional and local levels.
5. Ordinary citizens (peasant farmers, pastoralists, traders, etc) at the grassroots level.
6. Members of parliament and local leaders from the project area.
7. Local Community Representatives (Village representatives).

This chapter covers the views or concerns of various stakeholders on the proposed integrated sugar project i.e. local crop and livestock farmers; youth groups; women groups; Community Based Organisations; local, national, regional and international NGOs; local leaders; surrounding institutions; and other interested persons or groups.

For the local residents to familiarise themselves on sugar cane farming and processing, several visits to their factory were arranged by the proponent, Mumias Sugar Company in Western Kenya. The participants selected from various villages based on occupation and gender aspects toured the factory, waste treatment facilities, nucleus estate and outgrowers' farms, workshop, and social amenities (schools, health centres, sport facilities, etc) supported by the Company.

6.4 Issues raised by the affected community

6.4.1 Loss of grazing land

There was a lot of concern and fear by livestock farmers (mainly the pastoralist community, i.e. Orma and Wardei) that implementation of project will replace their current grazing land for cane growing. The other fear is that the project will reduce livestock watering points along the river and interfere with livestock corridors. Though the land is currently leased to TARDA for development, the local people still feel that they own it. Most of the poor pastoralists were supportive of the project unlike the few rich pastoralists who opposed the project. The Tana River DC announced in the public meetings that the president/ government has approved a livestock grazing area of 200,000 acres hived off from the Galana ADC ranch in the Northern part of the proposed sugar project. This is a major boost to the project because it will act as a mitigation measure to loss of pasture land within the TDSIP. The ranch is also free from diseases and pests manifested in the most parts of the lower River Tana. Rehabilitation of water facilities (dams/ pans) in that ranch will be required by MSC in collaboration with the relevant government ministries

6.4.2 Relationship between TARDA and local communities

The relationship between TARDA and local communities appears tenuous due to a multiple of factors which included former company staff's unpaid salaries/ wages of about 3million to date, poor distribution of job-opportunities among the existing communities/ villages when the rice project was in operation, land ownership and boundary dispute cases in court since 1994 affecting Kulesa, Wema and Hewani Villages, mismanagement of the rice project activities/ corruption and final natural collapse of the Rice project due to El-Nino rains, lack of any successful project in the area, poor Public Relations with the locals, non-fulfilment of the promised Corporate Social Responsibility services/ facilities (e.g. schools, health centres, cattle dips, water supply, etc), etc. The local people perceived TARDA as their "first wife" married to the region that has ended up divorcing them and damaged their resources, livelihoods and future hopes. However, the members strongly recommended for TARDA's activities to be limited to the Rice Irrigation area which requires quick rehabilitation to help the local people. The local people recommended that MSC should spearhead the project directly in collaboration with local community leaders/ representatives and partly exclude TARDA management in their future negotiations. This study established that about 7 of court cases filed by TARDA against certain villages are pending in court in Mombasa. They need to be studied properly and if possible settled out of court before commencement of the project.

6.4.3 MAT International Ltd Sugar Project

There appears to be competition between the current proposal by TARDA/MS and MAT International Ltd sugar project that is proposed in the upstream of the current project. MAT International Ltd intends to extract water from Tana River for its planned expansive cane farms of approximately 30,000ha North of Garsen town in Tana River District, 30,000 in Ijara District and a further 60,000ha in Lamu District. The rivalry was caused by the cancelling of the planned partnership between TARDA and MAT International Ltd in

the current proposed project. Since that project had not yet undertaken any substantial feasibility and EIA studies, no public documents were available for review by the consultant by the date of this report. Hence, there exists no public detailed information on the magnitude of the project, exact location and its final designs. However, both projects should be harmonised in the long term to ensure local environmental sustainability and optimisation of benefits to the local communities.

6.4.4 Water and Land Rights/ Conflicts

The public meetings showed that disputes over the rights to water and land are at the heart of the complex development problems facing the Delta. While the area's potential for sugar case was recognised as early as 1969, there have been little developments towards this vision. Hence the site remains unprotected, badly utilised under the traditional grazing methods and degradation rates being very high due to increased human activities like charcoal burning, timber collection and palm wine harvesting. Further demand for water upstream of the proposed site will soon arise when the MAT International Ltd sugar project will be approved.

6.4.5 Preservation of Forest Resources

The stakeholder strongly expressed their concerns on the environmental implications of the project to the existing forest patches which partly form the basic livelihood assets of the local people. The riparian forests along the meandering course of the lower Tana River and other identified and mapped patches should not be cleared but be preserved for local sustainable use because they are a major source of fuelwood, building/ timber materials, fruits, honey, traditional medicinal herbs, palm wine, etc. Protection of mangrove ecosystem which is about 45Km downstream from the project negative impacts was also expressed. The study observed that high rates of population growth have increased pressure/ threat on these forest resources because large areas have been cleared for cultivation, pole-cutting, fire, felling of large trees for canoe-making and rampant charcoal burning activities.

6.4.6 Preservation of Water and Wetland Resources

Boreholes wells, permanent and seasoned ox-bow lakes and wetlands (including Tana River) were the main source of water for domestic animals, household use, wildlife, fish and local irrigation to rice and maize by the farmers. Lakes also act at important fresh fish breeding grounds. However, there were no ox-bow lakes and marshlands currently in existence or use within the proposed sugar cane project area. This is why the cane growing has to be under irrigation. However, in the project surrounding, we have very important lakes like Lake Shakababo near Ngao Village and Lake Kongolola in the Right Bank of the Tana River, and Lake Harakisa, Lake Moa, Lake Dida Warede, Lake Kitumbuni in the eastern part of the Left bank of the river. These are important lakes depending on water from Tana River. However, high sedimentation rates into these lakes are the major threat. Other smaller lakes have disappeared over time due to the same problem of sediment deposition.

6.4.7 Preservation of Important Birds Areas (IBAs) and other Wildlife

Several NGOs based in Nairobi and other countries like Canada and UK expressed concern on the negative impacts expected from the proposed project. First, the project is within the Tana River Delta which is one of the Important Bird Areas (IBAs) in Kenya. This is a stronghold of two of the near-threatened species, Malindi Pipit and Basra Reed Warbler. Internationally, important bird populations have been also recorded in the Tana Delta for about 20 species. The delta also houses one of the very few breeding sites for colonial waterbirds and other migratory birds in Kenya. This was identified to be near

Idsowe, south of Garsen town, on *Ziwa la Matomba*, seasonally-flooded lagoon where birds nest in the thicket.

The stakeholders also indicated the importance of the Tana delta for other wildlife apart from the birds. They indicated that the delta lies in the expanse, intactness, variety and productivity of its habitats. The floodplain supports a number of animals like the Topi, a few lions, elephants, Red Collobus, Crested Mangabey, etc. The river channels and lakes also support a large number of Hippopotamus and Nile Crocodiles, Dugong and marine turtles. If the project has to proceed, it is important that all forest patches and wetland pockets within and around the project area are exclusively protected for the birds and wildlife purposes.

6.4.8 *The Delta - A Gift from God*

Both pastoralists and farmers who presented their views during the public meetings believe that the Delta resources are a special gift from God to the local people. They believe that this is implied both in the Qur'an and the Bible. Hence, the locals greatly appreciated when the proponent gave them a chance to participate in the decision making process concerning the proposed project. With this background, they insisted that MSC must negotiate and formulate an MOU with the local community leaders to ensure the resources are well utilised for the benefit of everybody.

6.4.9 *Floods Control*

Most stakeholders that submitted their views indicated that the project will basically depend on the assurance that the Tana River floods can be tamed permanently to reduce disastrous impacts in case of the reoccurrence of the El-Nino rains in future. Most residents were also worried with the positing of the dykes to protect the floods. As much as the local people liked to be enclosed within the dyke for protection purposes, a policy should be put in place on ownership and management of the dykes to ensure that the people are not categorised as squatters. The existing conflicts on dyke positing in the Rice scheme need to be sorted out through community negotiations. To avoid risks, the stakeholders suggested that the river regimes should be monitored carefully and ensure that it is controlled for utilization to improve local standards of living. Damage from the cattle and other animals should also be monitored crossly and avoided where necessary.

6.4.10 Performance of Previous Projects in the Tana River Basin

Since its inception over 30 years ago, TARDA has planned and implemented many projects, including but not limited to the following: Masinga Multipurpose Reservoir, Kiambere Reservoir, Hola Irrigation Project, Masinga Irrigation Project, Tana Delta Irrigation Project and other small ones. The public observed that by change of Government policy in 1988 and subsequent power sector reforms, TARDA lost some of its core income-generating projects/ assets. For example, power distribution was assigned to Kenya Power and Lightening Cooperation (KPLC) and power generation assets to KenGen. The problem later was compounded by the enactment of the Water Act 2000, which did not make reference to TARDA in terms of water use within Tana and Athi River. The entry of El-Nino was a culmination of that background which washed away most of the projects' assets. This led to a collapse of many projects in the Basin. This is the root cause of the bad blood between TARDA and local community members.

6.4.11 Development of a Master Plan for the Tana River Delta

Both the government agencies and NGOs felt that development of a Master Plan for the utilization of the Delta resources was of dire need. The plan should outline how each of the available resources (forests, water, land/soil/ agricultural potential, birds and other wildlife, fish, etc) should be utilised in for the benefit of the local people. The goal of the plan will be harmonisation of various on-going and proposed enterprises in the Delta to reduce resource use conflicts. However, the EIA consultation process established that the Coast Provincial Physical Planning office was currently undertaking that but at a slow pace due to inadequate financial resource allocation from the central government annual budget.

6.4.12 Viability of the Sugar Project in Lower Tana

According to the Government official and Kenya Sugar research Foundation presentations during the EIA meetings, the country is currently faced with serious sugar deficit (250,000 tonnes per year) compared to current production of 400,000 tonnes per year. The COMESA tariffs arrangements in favour of Kenya will also end by 2008 and may lead to a collapse of the sugar industry due to outdated and inefficient production and processing technologies in the country. Furthermore, the continued importation of sugar has drained foreign exchange and exported jobs. This calls for intervention measures such as the Tana Delta Integrated Sugar Project. According to previous and recent studies, varietal trials and recommendations of the National Sugar Conference, Tana Delta has the potential of responding to challenges in the sugar industry due to the following findings:- (a) favourable climatic and agronomical conditions that favour fast maturity (10-11) months as compared to 18-24 months elsewhere in Kenya), (b) high yields (over 100 tonnes per Ha compared to 35 tonnes per Ha elsewhere in the country) and (c) availability of enough land and water for large scale irrigation the Tana Delta.

6.4.13 Political and Economic Pressure

When the Government approved the project proposal to open way for the feasibility and Environmental Impact Assessments, there has been fear that there is political pressure to start the sugar project. Furthermore, the COMESA regional plans to liberalize the sugar market in the year 2008 have also been perceived as the underlying economic pressure to start the project. However, during the public EIA meetings, the public were educated on the importance of integrating the environmental concerns in the project is found sustainable. They were also assured of a fair and rational decision based n professional facts.

6.4.14 Food Security

Due to the long-term dependence on food relief in Tana River and Lamu Districts, a strong food security component must be introduced alongside the proposed project. Quick identification of a development partner to revive and rehabilitate the stalled rice irrigation project destroyed by El-Nino floods in 1997 was called for urgently. Provision of free gravity irrigation water for the Lower Tana Village Irrigation Projects (LTVIP) for the villages inside the project area was requested by the residents. The farmers requested to be assisted in expansion of the former rice irrigated lands by providing technical and logistical support. Introduction of tenant farm management gradually on experimental basis with the aim of finally handing over the whole farm to the tenant farmers will be recommendable.

6.4.15 Procurement of goods and services

Priority in material and service procurement should be considerate to the local entrepreneurs to promote more local job opportunities. This runs from food products, building materials, office supplies, labour, etc. Award of tenders to local entrepreneurs was suggested so that it can promote local enterprises and create more indirect job opportunities for locals and increase living standards.

6.4.16 Corporate Social Responsibility (CSR) Strategy

The locals feel that TARDA short-changed them due to lack of an MOU based on a CSR based on community needs. Because of that experience, a comprehensive, focused, localised, negotiated and time-bound CSR plan much be put in place due to the existing suspicion associated with TARDA's poor performance in the past. The agreed CSR budget annually should be managed in partnership with the local people. Haphazard selection and implementation of projects decided by the company alone without consultation and participation of the local people will not be accepted in future.

6.4.17 Establishment of Tana River Sugar Company Ltd

A new company by the name "*Tana River Sugar Company Ltd*" was proposed by the local leaders for the new private venture planned between MSC, TARDA and local people. The local farmers and leaders should be allowed to own some shares of this private company envisaged. They locals should also be appointed/ nominated or elected to participate in the management board of the proposed company.

6.4.18 Employment opportunities

The unemployment in the project area is extremely high among school leavers. Most youths without any formal education are engaged mainly in cattle grazing. Illiteracy levels are also very high in the area. Because of this background, the community members raised fears that casual labourers may be imported from other places like Mumias in western Kenya and yet they have a large base of cheap labour/workforce amongst their unemployed youth. They felt that the employment criteria should be through their local village elders committee since they live with them and know virtually all the educated and responsible youth within their community who could provide the required labour. Furthermore, due to the poor education levels in the area, recruitment of local people for non-technical jobs (e.g. cane cutting, factory operations, etc) should not be based on similar competitive criteria with people from up-country. In brief, recruitment should be village-by-village based and the employment criteria adjusted as per the local educational qualifications for non-technical jobs.

6.4.19 Training of Youths for Sugar Cane Production and Processing

As part of the planning process, it was recommended that MSC should immediately recruit about 100 youths for short-internships/ pre-training at MSC factory in western Kenya. These will be used to impart or transfer skills on sugar production technologies to locals. The recruitment should strictly target all communities and villages using traditional lines of authority to avoid ethnic conflicts.

6.4.20 Gender issues in the project

Due to the existing culture among the Tana River and Lamu Districts, the women and youth leaders expressed concern that most projects in the region discriminate against them in the decision making process and yet they are the most affected in terms of high poverty and unemployment levels in the area. Hence, the proponent should incorporate them in manpower recruitment, management board, selection of CSR community-based projects and other relevant decisions that pertain to the project.

6.4.21 National Irrigation Board (NIB) special concerns

The NIB plans to revive and rehabilitate the Hola Irrigation Scheme in the upstream of the project, and the minor irrigation schemes at Hewani, Wema, Oda and Ngao. The TARDA Rice Project near Garsen is also in the process of being revived. This will lead to further demands on the existing Tana River water. These demands need to be calculated and harmonized to avoid serious environmental problems in the downstream of the river.

6.4.22 Indirect employment

The locals appreciated the fact that the development would offer much indirect employment opportunities to majority of the local people and most would sell their produce to workers hence benefiting them economically. The farmers envisaging benefits include those producing milk, mangoes, indigenous vegetables, coconuts, palm wine, honey, etc. Other enterprises that expect benefits are those dealing with the supply of building materials.

6.4.23 Regional Rural Poverty

Most people in the project area live in rural villages. Their sources of income are very limited with over 70% of the rural populations in the area surviving on less than 1 USD per day. They survive on very little income that comes from engaging in cattle trade, selling mangoes, crocodile eggs, milk, fish, basketry and some agricultural products.

6.4.24 Waste disposal

Waste disposal is an alarming case that they felt the project should address in order not to contaminate their shared resources like water. In conjunction to this they felt that seepage of untreated waste water into the underground water table may contaminate the existing boreholes, shallow wells and the River Tana within the vicinity, a main source of their water.

6.4.25 Provision of social amenities and services

The area has very limited schooling and health facilities. Most of the community members, especially the pastoralists hardly send their children to school. Educational levels are therefore very low. It was a request that social amenities that may arise due to the project be extended in to the interior to open up the region at large.

The amenities suggested by the locals include:

- Provision of clean and safe water to every village around the project area.
- Establishment of health facilities as per community priorities
- Educational facilities through establishment of primary and secondary schools in key areas to be identified by the Village elders' committees. Establishment of tertiary training institutions relevant to the project, e.g. village polytechnics focusing on motor mechanics, production engineering, agricultural extension, etc. From the many youth who dropped out of school at the very early stages, they suggested to the proponent to possibly offer educational scholarships to their youths to see them through with

tertiary education and enable them take up skilled jobs in the sugar factory and raise the living standards in the area in general.

- The proponent should establish an education scholarships programme managed in partnership with the local community members.
- It was also a suggestion for the project proponent to sink a few boreholes at the area to provide the water and let the borehole management to be run by the locals.

6.4.26 Infrastructural development

The road network in the area is generally very poor and in most areas non-existent. There are three major roads, i.e. Malindi-Hola, Malindi-Lamu road and Garissa- Hola Road. Locals felt that the proponent should assist in upgrading the existing infrastructure (especially roads and bridges) and assist in developing new ones where and when needed in collaboration with the relevant Authorities and other companies operating in the region. Other facilities that the local people wanted to be developed include water supply system by providing economical water points at village level, electricity and communication networks. Provision of electricity, a task performed by Kenya Power and Lightning Company, was requested through help by the project proponent's intervention to light up the villages too. The provision of electricity will improve security in the area and reduce the dependence on local forests as a source of firewood energy in the long term.

6.4.27 Increased security

Tana River District is an area characterised by insecurity from wild animals, banditry attacks and cattle rustling, and tribal animosities. Since the proposed company will and other emerging enterprises within the neighbourhood will hire security firms to man their premises who work in collaboration with the police, the local community members felt that the local security will improve drastically. This usually beefs up security in the area hence beneficial to locals. However, the community members indicated that such security firms should strictly hire and train local youths to work in the project premises and farm sections.

6.4.28 Increased crime rate

Security matters came in to the limelight whereby locals expressed fear that if the developer does not engage the locals in his activities especially the youth and develop a good relationship; chances are that their discontent may take other forms such as crime thus increasing the rate of the vice within the area.

6.4.29 Influx of People

As a result of the project taking place, population increase due to in-migration will be experienced in the area. This will be as a result of people coming from different places to look for job at the site and also to look for houses to stay in. Businessmen will also move to the area to set up new enterprises related to sugar production. The local community members recommended for establishment of a moratorium over the host area as soon as possible, to avoid people hoping to acquire land tenure from moving into the area.

6.4.30 Project sensitisation programme by MSC

Though the local people welcomed the sensitisation programme that has been going on through public and in-door meetings and field trips to Mumias in western Kenya, the majority of the people are still not properly informed on cane production to make contributions to the proposed project. It was the wish of the local people that EIA meetings could have been held in all over 40 villages. However, central places that were selected attracted thousands of residents to participate.

Due to the poor education levels in the area, the local people demanded a lot of sensitisation on the benefits and environmental of sugar cane production using a **village-to-village** contact approach especially among the non-crop farmers. They proposed that the proponent needs to move with a portable generator, laptop, LCD projector, sugar cane products, maps, posters, etc from village-to-village for the project to be fully understood. The local leaders also expressed concern that they have not been sensitised properly on the project. It was also recommended that training on food security interventions relevant for the region can be integrated in such meetings in the future. This will be like phase two of the sensitisation programme which has been on-going. Phase 3 of the sensitisation will be during the implementation and operation stages if the project is approved by the Government. In brief, the public sensitisation program should be a continuous process at all the project cycle stages.

6.4.31 Land ownership and adjudication

Currently, almost all the people in Tana River do not own land titles. The local people emphasised that for the project to ensure the local participation, Mumias Sugar Company should assess the progress of the on-going land adjudication programme in Tana River and Lamu Districts, in order to consider the possibility of facilitating the government officers to accomplish the work which has been dragging for a long time due to limited financial resource allocations every year of the Government budget. The local people seriously expressed the dire need for permanent settlements and land ownership even in blocks in order to ensure success of the outgrowers systems. This should be implemented stretching from Sailoni Village in the north to Handarako and Arithi villages in the south tip of the project site. If this is undertaken, community participation in the project is expected to be high.

6.4.32 Human Resettlement

Emphasis of the public members was concerned on where and how the affected people within the TARDA land will be affected during the project implementation and operation stages. However, the proponent has indicated that almost all villages around the project site will not be affected. However, a good **Human Resettlement Plan** for the existing **legal** and **illegal** villages within the envisaged project area (Nucleus estate, factory sites and canals) will require a **detailed study/ assessment, mapping, negotiation, compensation, formulation and implementation** before commencement of the project in order to avoid unnecessary conflicts.

Research on rain-fed Sugar cane

The locals requested MSC to seriously explore the possibility of growing rain-fed cane in the Witu and Kipini areas depending on the reliability of rain. Farmers had a lot interest in those areas to participate as outgrowers.

6.4.33 Formulation of an Environmental Management Plan

They recommended that a well-thought and comprehensive environmental management and monitoring plans must be put in place before the project commences. In particular, the disposal of wastewater into the Tana River should be monitored due to the **massive dependence on it downstream** by local people for their livestock, domestic use and fish.

6.4.34 Formulation of an MOU for partnership

Due to the poor past performance of TARDA, the National Irrigation Board, KENGEN, Kenya Power and Lighting Company, the local community member demanded for an MOU to be negotiated, developed and signed with the local community touching on most of the concerns raised in this chapter. In brief, the people demanded for an MOU that

addresses the following issues: Direct/ indirect compensation for loss of grazing land, future relationship between TARDA and local communities, water and land rights, preservation of forest resources, water, wetlands, birds and other wildlife, floods control, management/ administrative systems of the project, food security, local procurement of goods and services, Corporate Social Responsibility (CSR), employment and training opportunities, gender considerations, waste disposal, provision of social amenities and services, security, human resettlement, active participation in the implementation of the NEMA approved Environmental Management Plan (EMP). The main MOU for partnership will have to be signed with the local people or in their presence depending on the final negotiation of the project.

7. ENVIRONMENTAL AND SOCIAL IMPACTS

7.1 Introduction

This Section identifies both positive and negative impacts associated with the proposed project. These impacts are hereby identified in two distinct phases of the project i.e. Construction Phase and Operation Phase. Another study is expected to be carried out during the projects decommissioning phase. Scoring or weighing of the magnitude of the impacts using the Leopold Matrix is currently being undertaken and results will be reflected in the final report.

7.2 Construction phase

7.2.1 Negative Impacts

7.2.1.1 Loss of vegetation cover and biodiversity

Before the construction of the scheme and associated facilities begins, clearing of part of the existing vegetation cover at the project site has to occur, especially within the areas where buildings and roads are to be constructed. Direct impact from such disturbances may cause changes in temperature, light, moisture and nutrient levels; changes in natural community processes or invasion of non-native plant species. Loss of plant communities also results in decreased water quality, increased erosion as a result of unstable soil, nutrient imbalances in the soil, and/or compaction of soil. It is recommended that the developer should replace these with the planting of indigenous trees or other fast growing trees and grass in strategic areas as part of the landscaping activities.

7.2.1.2 Alteration or destruction of wildlife and wildlife habitat

Like plant communities, wildlife habitat may be impacted on negatively both from direct and indirect activities associated with the development. Human-wildlife conflicts will thus be exacerbated while the movement of livestock and humans may also be impeded. Alteration, fragmentation, or destruction of wildlife habitat can result in the direct loss or displacement of species and the ability of the ecosystem to support other biological resources such as the plant communities upon which the wildlife rely on for survival. In the event that there are rare or endangered animal species they may be rendered extinct.

7.2.1.3 Dislocation of populations and communities

To implement the project the proposed land has to be vacated so that the plants and the irrigation scheme may be established, this means that the communities living illegally within the project site have to be vacated through compensation or resettlement of the affected peoples through appropriate administrative protocol. This will lead to the dislocation of the resident community thus directly affect the population by changing their lifestyles considerably. However, the villages well marked within the project area will not be affected. At the proposed factory site, about 14 families with an average household size 6-10 people will have to be compensated and re-settled elsewhere. The Gamba Village is one of the illegal villages to be either formalized or the people to be settled elsewhere. A resettlement plan will have to be developed and negotiated among affected parties.

7.2.1.4 Disposal of excavated soil

During excavation some of the soils will be rendered un-useable. All this material needs to be collected, transported and disposed off appropriately in designated areas or other alternative uses such as it being used for dyke construction should be sought.

7.2.1.5 Increased soil erosion

Possibilities of soil erosion occurring especially in areas with steep slope gradients during construction are high specifically during rainy and windy seasons. This environmental problem becomes serious when the topsoil is left bare and agents of erosion become active. Soil erosion is serious problem both at its source and downstream of the development site. Lost soil is deposited elsewhere, and the location of the deposition could alter downstream hydrology and increase flooding. It may also interfere with water quality directly through increasing turbidity levels, siltation and indirectly from contaminants carried with or attached to eroded soil particles.

7.2.1.6 Surface and ground water hydrology and water quality degradation

Changes in surface hydrology alter the flow of water through the landscape. Construction of impervious surfaces such as parking lots, roads and buildings increase the volume and rate of runoff, resulting in habitat destruction, increased pollutant loads, and flooding. Built or paved areas and changes in the shape of the land also influence groundwater hydrology (i.e. recharge rates, flow, conditions). Changes in surface hydrology and water quality can have adverse impacts on aquatic species such as fish, plants, and microbes. Increased turbidity, temperature, velocity of flow, and pollutant loads can have direct impacts on the species and their habitat.

Project related excavation could also lead to surface and ground water quality degradation. Contaminated soil or ground water in the path of the project could be disturbed by excavation resulting in a potential transfer of the contamination to surface waters. The excavated area, if linear could act as a conduit to extend groundwater contamination to new areas. Spills of hazardous materials in excavated areas during construction could introduce contaminants to ground water. Development activities such as irrigation development as well as the spill over effects of development such as increased demand water and increased fertilizers and pesticide use can impact water quality by contributing sediment, nutrients, and other pollutants to limit water supplies, increasing the temperature of the water, and increasing the rate and volume of runoff.

7.2.1.7 Ecological imbalances

Without appropriate management measures preparing land for irrigated agriculture has the potential to create serious ecological imbalances both at the project site and in adjacent areas. Excessive clearance of natural vegetation cover in the command area, for example, can affect the microclimate and expose the soil to erosion, leading to a loss of top soil and nutrient leaching. The removal of roots and vegetation disrupts the water cycle, increasing the rate at which water enters rivers and streams, thereby changing flow regimes and increasing siltation in the downstream zone. This is often to the detriment of fisheries and aquaculture activities.

The destruction of natural habitats in this manner and the creation of agricultural monocultures also impacts on the local flora and fauna reducing biodiversity. The introduction of exotic species of plant or animal may oust indigenous species or introduce disease agents which may affect plants, animals and/or man. Fertilizers and pesticides are widely applied to correct imbalances. These can percolate through the soil and/or be carried away in the drainage water polluting both groundwater and surface waters especially in the downstream zone. The nutrients in fertilizers may give rise to eutrophication of surface water bodies and promote the growth of aquatic weeds. Pesticide residues are hazardous to the health of both man and animals.

7.2.1.8 Solid waste generation

Large amounts of solid waste will be generated during construction of the project. These will include metal cuttings, rejected materials, surplus materials, surplus soil, excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others.

Solid wastes if not well managed have a potential of causing disease outbreaks due to their presence providing suitable breeding conditions for vectors of certain diseases such as cholera and typhoid. Outbreak of diseases such as Malaria could also be exacerbated by the presence of open water ditches for breeding of anopheles mosquitoes. The major vulnerable groups are children who could be exposed to these conditions.

The workers on site will also generate faecal waste during their day-to-day operations. The generated waste needs proper handling to prevent disease, such as cholera, typhoid and diarrhoea outbreak on the site. Unless this is addressed, it can prove to be an environmental/health hazard.

7.2.1.9 Risk of oil spills

The machines on site during construction may contain moving parts, which may require continuous oiling to minimize the usual corrosion or wear and tear. Likewise, moving vehicles on site may require oil and other lubricants change. Possibilities of such oils spilling and contaminating the soil and water within the project site are real. Maintaining the machinery in specific designated areas designed for this purpose can substantially contain these dangers.

Noise 7.2.1.10 *Pollution*

The construction works will most likely be a noisy operation due to the moving machines (mixers, tippers, communicating workers) and incoming vehicles to deliver construction materials and workers to site. To some degree site workers and neighbours are likely to be affected since noise beyond some level is itself a nuisance and thus should be controlled within acceptable limits.

7.2.1.11 *Dust emissions*

Particulate matter pollution is likely to occur during the site clearance, excavation and spreading of the topsoil, building of dykes and canals, loading and transportation of the construction waste. There is a possibility of PM₁₀ suspended and settle-able particles affecting the site workers and even surrounding neighbours' health.

7.2.1.12 *Generation of exhaust emissions*

Exhaust emissions are likely to be generated during the construction period by the various construction machinery and equipment. Motor vehicles used to mobilise the work force and materials for construction would cause a potentially significant air quality impact by emitting pollutants through gaseous exhaust emissions.

7.2.1.13 *Increased water demand*

Both the workers and the construction works will create additional demand for water in addition to the existing demand. Water will mostly be used in the creation of concrete for construction works and for wetting surfaces or cleaning completed structures.

7.2.1.14 *Increased energy consumption*

The project will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environmental implications on its availability, price and sustainability. The projects construction phase will also use electricity or diesel to run generators. Electricity in Kenya is generated mainly through natural resources, namely, water and geothermal resources. In this regard, there will be need to use electricity sparingly since high consumption of electricity negatively impacts on these natural resources and their sustainability.

7.2.1.15 *Building materials and energy used*

Building materials such as hard core, ballast, cement, rough stone and sand required for construction of the project will be obtained from quarries, hardware shops and sand harvesters who extract such materials from natural resource banks such as rivers and land. Since substantial quantities of these materials will be required for construction of the buildings and ancillary facilities, the availability and sustainability of such resources at the extraction sites will be negatively affected as they are not renewable in the short term. In addition, the sites from which the materials will be extracted may be significantly affected in several ways including landscape changes, displacement of animals and vegetation, poor visual quality and opening of depressions on the surface leading to several human and animal health impacts.

7.2.1.16 *Workers accidents and hazards during construction*

During construction of the proposed project, it is expected that construction workers are likely to encounter occupational health hazards as a result of coming into contact and

handling hazardous waste. Because of the intensive engineering and construction activities including erection and fastening of roofing materials, metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries. Such injuries can result from accidental falls from high elevations, injuries from hand tools and construction equipment, cuts from sharp edges of metal sheets and collapse of building sections among others.

7.2.1.17 *Creation of informal settlement*

The proposed project may lead to the formation of informal settlements within the surrounding area owing to workers preference to stay near their places of work. A long-term negative impact will be the mushrooming of informal settlements within the neighbourhood owing to the job opportunities that would be available in the construction sector. Workers may be attracted to settle in the neighbourhood for that purpose of securing jobs. For example, during the construction period there may be specific health and other social risks due to an influx of migrant workers living in temporary and unsanitary accommodation.

7.2.2 *Positive Impacts*

7.2.2.1 *Employment opportunities*

One of the main positive impacts during projects construction phase will be the availability of employment opportunities especially to casual workers and several other specialized workers. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled labour will be used in construction hence economic production. Several workers including casual labourers, masons, carpenters, joiners, electricians and plumbers are expected to work on the site for the period from the start of the project to the end. Apart from casual labour, semi skilled and unskilled labour, formal employees are also expected to obtain gainful employment during the period of construction.

7.2.2.2 Improving growth of the economy

Through the use of locally available materials during the construction phase of the project including cement, structural steel, concrete and ceramic tiles, timber, sand, ballast electrical cables etc, the project will contribute towards growth of the economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers.

7.2.1.3 Improved living standards

There are usually several opportunities which come up during the construction and implementation periods of such projects. The increase in revenues for locals and influx of immigrants into the project surroundings improves money circulation within the project area. This in turn leads to the initiation of several businesses by entrepreneurs within/around the project site. Businesses such as shops, hotels and entertainment spots where businessmen benefit directly from the construction staff member. This will promote the informal sector in securing some temporary revenue and hence livelihood.

7.2.1.4 Provision of market for supply of building materials

The project will require supply of large quantities of building materials many of which will be sourced locally and regionally. This provides ready market for building material suppliers such as quarrying companies, hardware shops and individuals with such materials.

7.3 Operation phase Impacts

7.3.1 Negative Impacts

7.3.1.3 Increased water use and reduced downstream flow

The irrigation and industrial activities which will occur during the operation phase of the project will involve the use of large quantities of water. Within the factory activities such as steam generation, equipment cooling using water and others operations such as cleaning and sanitary uses will also require substantial amounts of water. The water used for irrigation will form the bulk of the water used from the Tana River and will inevitably lead to the reduced return flow downstream which are often utilized by other farmers or wildlife habitats. Changes to the flow regime may have significant negative impacts on downstream users, whether they abstract water (irrigation schemes, drinking supplies) or use the river for transportation etc.

7.3.1.4 Reduced water quality

Increased quantities of agricultural chemicals are usually required in irrigation lands to keep production levels up; fertilizer must be used to compensate for high growth rate and loss of nutrients through leaching, and pesticides to control the greater number of crop pests and diseases. Chemical fertilizers and pesticides used within the sugar plantations will increase the pollution of surface and ground water thus leading to the deterioration of water quality essentially downstream.

Pesticides are a more common source of poisons associated with irrigation schemes. They are poisonous to plants, fish, birds and mammals including humans. Persistent

chemicals are a threat to aquatic systems even when not soluble, as many bond chemically to soil particles and may be transported by erosion. Persistent organochlorine insecticides (eg DDT, dieldrin and endosulfan) are particularly hazardous to aquatic systems and become rapidly concentrated in the food chain. Non-specific herbicides can rapidly affect the supply of food. Pesticide risks are likely to increase if a monoculture is practiced, so that weeds and pests are not controlled by rotation, or if the method of agricultural management requires high applications, such as low tillage methods.

Water pollution can also occur through the discharge of liquid effluents and process cooling water from the projects industrial plants directly into water bodies or from surface runoff flowing through waste piles or landfills. The deterioration of water quality below an irrigation project can render the water unfit for other users, harm aquatic species, and because of high nutrient content, result in aquatic weed growth that clogs waterways and has health, navigation and ecological consequences.

7.3.1.5 Increased incidence of water borne diseases

Ecological and demographic changes resulting from the introduction of irrigation may create new or more favourable habitats for disease vectors. Due to the presence of irrigation water through most of the year the introduction and increase in incidence of water borne or water related diseases is expected. Diseases such as Schistosomiasis (Bilharzia), Malaria, Onchocerciasis (River Blindness), Lymphatic filariasis (Elephantiasis) etc will thus be more prevalent within the project surroundings.

7.3.1.6 Increased soil erosion

During the operation of the irrigation scheme it is expected that soil erosion will occur from the tilled land (agriculturally induced erosion), the canals, dykes, drains etc. The method of irrigation profoundly affects the vulnerability of the land to erosion. Because irrigated land is wetter, it is less able to absorb rainfall and runoff will therefore be higher. Field size, stream size (drop size), slope and field layout are all difficult to change and all significantly affect erosion rates. Careful design can avoid the occurrence of erosion problems. Agricultural practices affect soil structure and therefore the soil's erosivity, or the ease with which particles are dislodged.

This will interfere with water quality directly through increasing turbidity levels, sedimentation of the river and the canals resulting in canal clogging. Over time cleaning of the canals and depositing the sediments on cropland, or simply irrigating with water of high sediment content can raise the land level to such a height that irrigation is impaired.

7.3.1.7 Salinization and contamination of soils

There main reasons for an increase in soil salinity on an irrigation scheme include:

- Salts carried in the irrigation water are liable to build up in the soil profile, as water is removed by plants and the atmosphere at a much faster rate than salts. The salt concentration of incoming flows may increase in time with development activities upstream and if rising demand leads to drain water reuse;
- Solutes applied to the soil in the form of artificial and natural fertilizers as well as some pesticides will not all be utilized by the crop;
- Salts which occur naturally in soil may move into solution or may already be in solution in the form of saline groundwater. This problem is often severe in deserts or arid areas where natural flushing of salts (leaching) does not occur. Where the groundwater level is both high and saline, water will rise by capillary action and then evaporate, leaving salts on the surface and in the upper layers of the soil

Careful soil monitoring is highly recommended whenever the irrigated regime is intensified, even though the saline layers might be far below the soil surface and the irrigation water applied is of high quality. Soil may be contaminated through leachates from poorly engineered dumping sites or through deliberate deposition of contaminated industrial wastes

7.3.1.8 Waterlogging and salinization of soils

In the long-term, one of the most frequent problems of irrigation schemes is the rise in the local water-table (waterlogging). Low irrigation efficiencies in some areas are one of the main causes of rise of water table. Poor water distribution systems, poor main system management and archaic in-field irrigation practices are the main reasons. Drainage is a critical element of irrigation projects which if poorly planned and managed can have serious consequences. Water logging results mainly from inadequate drainage systems and over-irrigation, and to a lesser extent from seepage from canals and ditches. Waterlogging exacerbates salinization by concentrating salts, drawn up from lower in the soil profile, in the plants rooting zone all of which are as a result of irrigation.

7.3.1.9 Algal blooms, weed proliferation and eutrophication

Increased nutrient levels in the irrigation and drainage water due to the increased use of chemical fertilizers rich in nitrogen and phosphorous may result in the flourishing of algal bloom, proliferation of aquatic weeds and eutrophication. The main problems of aquatic weeds are that they reduce the storage and conveyance capacity of reservoirs, canals and drains and increase water loss through evapotranspiration. Other problems of aquatic weeds are that they can provide a favourable and protected habitat for disease vectors such as snails and mosquitoes.

7.3.1.10 Hinterland effect

The development of irrigation schemes in is often associated with an increase in intensity of human activity in areas surrounding the scheme. This may be due to people moving into the area as a result of the increased economic activity or may be carried out by farmers and their families who are directly engaged in irrigation activities. In either case typical activities are: more intensive rain fed agriculture; an increase in the number of livestock; and, greater use of forests, particularly for fuel wood. All these activities are liable to increase erosion in the area by decreasing vegetative cover which will have a

detrimental effect on the local fertility and ecology as well as contribute to sediment related problems. Clearing higher non-irrigated parts of the catchment can result in a rising downstream water table. In areas where the groundwater is saline the higher recharge may cause higher salinity levels in the rivers and cause pressure levels in the lower irrigated areas to rise thus impeding leaching.

7.3.1.11 Ecological change

The nature of irrigation, i.e. providing water to water-short land, will radically change both the agricultural and natural ecology in the project area. The creation of reservoirs and channels provides the possibility of enhanced aquatic habitats. In particular, reservoirs and channels may also offer favourable habitats for disease transmitting insects and snails.

The consumption of water for irrigated agriculture and the reduced quality of return flows is likely to adversely impact on downstream ecosystems. Reduced flows, increased salt concentrations, lower oxygen levels, higher water temperatures and increased pollution and silt loads all tend to favour vigorous, tolerant species (aquatic weeds). Marked changes to the water environment, both in quantity and quality, are liable to have negative impacts on downstream aquatic biota which may be adversely affected by changes to the hydrology or morphology of a river system.

Reductions in low flows and flood flows may significantly reduce the capacity to transport sediment and thereby causing a build up of sediments in slower moving reaches and possibly a shrinking of the main channel. Increasing flows will have the reverse effect. Where the sediment balance changes over a short distance, perhaps due to a reservoir or the flushing of a sediment control structure, major changes to the local river morphology are likely to occur. The release of clear water from reservoirs may result in scour and a general lowering of the bed level immediately downstream, the reverse of the effect that might be expected with a general reduction in flows.

Changes to the morphology of river estuaries can result from increased erosion or sedimentation. Areas of mangrove may be threatened by changes to the estuary morphology. Mangroves need both significant fresh water recharges and sediment rich flows in order to thrive. A reduction in flow leads to an increase in the soil salinity which favours more salt-tolerant species. Mangroves trap silt, transported by flood flows, and obtain their inorganic nutrients from it. These flushing flows also serve to keep the deltaic channels open. Irrigation can have a direct impact on wetlands by either changing the hydrological conditions or by reducing water quality in downstream areas.

7.3.1.12 Increased runoff from new impervious areas

Construction of buildings and paved roads could result in additional runoff through creation of impervious areas and compaction of soils. Impervious areas and compacted soils generally have higher runoff coefficients than natural area, leading to increased flood peaks which are a common occurrence in developed areas.

7.3.1.13 Solid waste generation

The project is expected to generate substantial amounts of solid waste during its operation phase. Various components of solid waste will be generated during the operation of the project. Poor management of waste can be a public nuisance by clogging sewers and open drains, encroaching on roadways, diminishing aesthetics, cause unpleasant odours, breeding of populations of disease vectors (e.g. flies, rats, cockroaches) etc. These wastes can be injurious to the environment and negative impacts on human and animal health.

Environmental damage from poor solid waste disposal typically can include contamination of soil, groundwater, surface water and air quality. Solid waste can also contain pathogenic micro-organisms and toxic chemicals. Some of these waste materials especially the plastic/polythene are not biodegradable may cause long-term injurious effects to the environment. Some of the biodegradable wastes can still be injurious to the environment because as they decompose, they produce methane gas which is a greenhouse gas hence accentuates to global warming.

7.3.1.14 Increase in air pollution

The stack house emissions from the various plants within the scheme will act as a major contributor of air pollutants in the form of sulphur oxides, carbon dioxide, nitrogen oxides, methane, CFCs, particulate matter amongst others. Volatile organic compounds are also expected from sources such as the treatment plant. Increase in these air pollutants may lead to other secondary effects such as the creation of acid rain, photochemical smog, depletion of stratospheric ozone and contribute to global warming. Foul odours are also expected to be generated from various point sources within the project site these include the wastewater treatment plant, landfills and dumpsites, the sugar mill etc

7.3.1.15 Occupational health effects

During operation of the proposed project and its components, it is expected that workers are likely to encounter occupational health hazards as a result due to materials handling, noise or other process operations. Workers will be exposed to risks of accidents and injuries.

7.3.2 Positive Impacts

7.3.2.1 Employment generation

Employment opportunities are one of the long-term major impacts of the project that will be realized during the operation and maintenance of the project. It is estimated that this direct employment would create numerous jobs. Other indirect sources of employment will also arise.

7.3.2.2 Increased in sugar and other sugar related products

Once the plant is operational local sugar supply is expected to increase. Sugar is a major food item and a source of highly needed calories while cane tops and molasses are important dietary supplements for livestock. Sugar and molasses are also raw materials for the manufacture of confectioneries, pharmaceuticals, alcohol and other beverages. Refined sugar is an essential raw material in food processing, beverage manufacture and soft drinks amongst others.

7.3.2.3 Electricity generation

The proposed project shall generate a substantial amount of electricity through its co-generation plant which it will use for its own consumption with the surplus being supplied to the national grid. Since electric energy in Kenya is generated mainly through natural resources, namely water and geothermal resources, alternative generation of electricity will augment the already existing supply which is claimed to be below the current demand.

7.3.2.4 Alternative use of by products

By products which will emanate from the Sugarcane mills such as Bagasse and Molasses will be reused to manufacture other products hence being put to good use. Bagasse which has proved to be a nuisance to other existing sugar plants in terms of disposal will be combusted to produce electricity thus providing an alternative method of disposal for the cane milling plant. By using the bagasse to manufacture electricity the plant will be self sufficient in electricity requirements and will also inject the surplus to the national grid hence providing an alternative electricity generation source and reduce bagasse waste stockpiles significantly. On the other hand molasses will also be used in the production of animal feeds.

7.3.2.5 Increase in revenue

There will be positive gain for the revenue system arising from the operations of the proposed plants. This will come from the various forms of taxes which include income taxes, Value Added taxes (VAT), city/municipal council rates, etc. The sugar industry is the countries second largest contributor to agricultural Gross Domestic Product after tea. The sugar industry is also a major foreign exchange saver through import substitution.

7.3.2.6 Optimal use of land

By putting up the proposed irrigation scheme and various plants within the project site, the design will incorporate an optimal use of the available land by providing the proposed facilities. The concentration and intensification of agricultural production on a smaller area can protect forests or wild lands from being converted to agriculture. Resources are a scarce in Kenya and thus the implementation of the proposed project will ensure its optimal use.

7.3.2.7 Increased rural development

The project will act as a conduit for rural development through deliberate action and also through spill over effects. Apart from having an improvement in local infrastructure, health centres, schools, trade centres and other social amenities are expected to come up as a result of the projects implementation hence opening up of marginal areas and eventually an increase in rural development. The project will also act as a check to rural urban migration from the area and hence promote rural development through direct participation of the rural families in sugar processing areas.

7.3.2.8 Moderation of flooding downstream

Irrigation projects are known to help in the reduction of inundation downstream. By controlling and retaining water upstream and releasing it at a moderate rate incidences of flooding of lands downstream are greatly reduced.

7.3.2.9 Improved security

The proposed project is expected to boost security within and around the neighbourhood. The proposed project will improve the lighting in the surrounding areas in addition there will be several security guards on duty per shift hence enhancing security.

7.4 Decommissioning Phase Impacts

7.4.1 Negative Impacts

7.4.1.1 Loss of livelihood and economic ruin

The establishment and operation of the project will bring about a lot of positive change to the lives of the people around it and also to the surrounding economy. Decommissioning of the project will thus mean a reverse of these gains whereby many will lose their source of livelihood from jobs to business ventures hence directly leading to a decline of the areas economic stature and a drawback to the economy at large.

7.4.1.2 Solid waste generation

Demolition of the project buildings and related infrastructure will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality.

7.4.1.3 Noise pollution

The decommissioning related activities such as demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. This will be as a result of the noise and vibration that will be experienced as a result of demolishing the proposed project buildings and related components.

7.4.1.4 Dust and exhaust emissions

Large quantities of dust will be generated during demolition works. Particulate matter pollution is likely to occur during demolition and transportation of the construction waste. There is a possibility of suspended and settle-able particles affecting the site workers and the surrounding neighbours' health. Exhaust emissions are likely to be generated during the demolition period by the various machinery and equipment to be used as well as motor vehicles used for the exercise.

7.4.1.5 Occupational hazards

Demolition works will inevitably expose workers and the public to occupational health and public safety risks: in particular, working with heavy equipment, handling and use of tools engender certain risks. The construction workers are also likely to be exposed to risk of accidents and injuries resulting from accidental falls, falling objects, injuries from hand tools and other equipment.

7.4.2 Positive Impacts

7.4.2.1 Rehabilitation

Upon decommissioning of the proposed project, rehabilitation of the project site will be carried out to restore the site to its original status or to a better state than it was originally. This will include replacement of topsoil and re-vegetation which will lead to improved visual quality of the area. This will also mean that alternative options can be utilized within the project site.

7.4.2.2 Employment opportunities

For decommissioning to take place properly and in good time, several people will be involved. As a result several employment opportunities will be created for the demolition staff during the demolition phase of the proposed project.

7.5 Environmental hazard and risk assessment of TISP

Risk assessment in the context of the Tana Irrigated Sugar Project focuses on potential major industrial hazards, occupational health risks associated with the use of hazardous materials, environmental pollution and floods. The design of the project is based on the 100-year flood (4,200 m³) in which 20% of flood water would flow to the eastern part of the project area while 80% would flow through the western parts where the Tana River is. The main risk here will be the potential breach of the flood protection works which would cause major impacts on humans and the environment. There is also the risk that the project could be negatively affected if water from the upstream reaches of the river is not enough due to inadequate rainfall in the upper catchment or if the upstream reservoirs do not release enough water during such periods as required. This would also have major impacts on humans, livestock, fisheries and other aquatic animals and the ecosystems in the project area and downstream.