The United Republic of Tanzania

Ministry of Infrastructure Development
Tanzania Airports Authority

Feasibility Study and Detailed Design for the Rehabilitation and Upgrading of Kigoma Airport

Preliminary Design Report
Environmental Impact Assessment

July 2008

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Issue and Revision Record

Rev	Date	Originator	Checker	Approver	Description
0	July 08	Belva	KC		Preliminary Submission

EXECUTIVE SUMMARY

1. Introduction

The Government of Tanzania through the Tanzania Airports Authority is undertaking a feasibility study and detailed engineering design for the rehabilitation and upgrading of the Kigoma airport, located in Kigoma-Ujiji Municipality, Kigoma region. The project is part of a larger project being undertaken by the Tanzania Airport Authority involving rehabilitation and upgrading of high priority commercial airports across the country. The Tanzania Airport Authority has commissioned two companies M/S Sir Frederick Snow & Partners Limited of UK in association with Belva Consult Limited of Tanzania to undertake a Feasibility Study, Detail Engineering Design, Preparation of Tender Documents and Environmental and Social Impact Assessments of seven airports namely Arusha, Bukoba, Kigoma, Tabora, Mafia Island, Shinyanga and Sumbawanga.

This report presents the Environmental Impact Assessment of the Rehabilitation and construction of Kigoma airport, to be implemented in Kigoma-Ujiji municipal in Kigoma region. The Objectives of the Environmental Impact Assessment are to identify and investigate in detail the most significant environmental impacts resulting from the rehabilitation and construction and use of Kigoma airport

2. Approach and Methodology

The EIA is to be undertaken following the Tanzania environmental assessment procedures. The Environmental Impact Assessment and Audit Regulations, 2005, First Schedule, categorize construction, expansion or rehabilitation of airports and airstrips and their ancillary facilities as projects for which a full Environmental Impact Assessment is mandatory. The study was carried from 21st to 26th May, 2008. Field visits were conducted and public consultations were held with representatives of communities around the project area.

3. Description of the Project

The airport is situated within Kigoma – Ujiji Municipality (4°53' South and 29°38' East), about 10 kilometers from Kigoma town centre at Katubuka area. The airport constitutes a single 1767m x 30m runway, a taxiway and a small apron all gravel surfaced and partially surfaced with aged bitumen. It is generally a domestic airport which also serves refugee

relief camps and some regional traffic to and from Rwanda, Burundi and Democratic Republic of Congo. The project site can be reached by way of a 1.5 km earth track that is a continuum of the Ujiji road via Majengo to Katubuka or by another earth track via Mwanga area. Kigoma can be reached from outside by three trunk roads traversing the region namely Mwandiga - Mwanyovu to Burundi border; Kanyani (Kasulu) - Rukwa region border; and Kigoma - Kasulu - Kibondo – Nyakanazi to Kahama. Other routes include Tabora – Urambo – Uvinza – Kigoma road; Tabora - Kigoma branch of the central railway line; over Lake Tanganyika from Rukwa, Mbeya, Burundi, Zambia, and Congo or by air. Kigoma airport is about 1250 km distance from Dar es Salaam by rail and 1080 km by air.

Currently Kigoma airport has a single gravel surface runway oriented at 15/34 elevated at 2700ft and overall runway length of 1767m x 30m, two taxiways and apron that are all graveled and partially surfaced with aged bitumen. The project will involve upgrading the airport (runway, taxiway and apron) to a bitumen surface designed to accommodate Boeing 737 aircraft.

4. Legal Framework

National policies and legislations relevant to the environment in relation to airport rehabilitation and construction have been considered.

5. Public Consultations

Communities around the project were involved in the preliminary studies through organised stakeholders meeting with community representatives. The representatives were very eager to know when the construction of the airport will start and among many issues raised, the following main concerns inclined on the negative side of impacts were presented;

- Effects of vibrations from heavy aircrafts to nearby buildings.
- Delay in compensation payments after valuation
- Alternative route to and from Buhanda- Businde to Majengo and Ujiji
- Disturbances during and after relocation.
- Official airport boundary
- Noise pollution
- Compensation Procedures of graves
- Employment to Kigoma People

6. Environmental Impacts and Recommended Mitigation Measures

The Rehabilitation and upgrading of Kigoma airport is viewed as a positive aspect in regional development. However is likely to impact on the community located around the airport. However this assessment identifies that many of the negative impacts can be avoided or minimised to acceptable levels.

Positive impacts as well as the negative impacts likely to emanate from the rehabilitation and upgrading of airport have also been identified. Impacts include those which affect the biological and socio-economic characteristics and the physical environment.

Positive impacts of the airport include improved regional transport, more tourism and improvements to the socio-economy of the project area.

Negative impacts of the project includes, depletion of natural resources, contamination and impaired quality of receiving body (land and water), damage to rehabilitated structures due to ineffective storm water drainage and overflows, Visual impacts / Public health hazards, health hazards / disturbances and nuisance to offsite receptors, destruction of vegetation cover / loss of local biodiversity from vegetation clearance and loss of jobs as among many others.

Many of the negative impacts can be avoided or minimised to acceptable levels whilst the positive impacts or benefits derived from the project can be enhanced by adopting good engineering practices and appropriate mitigation measures during design, construction and use of the airport. Therefore mitigation measures have been presented in this report.

7. Environmental Management Plan

The objectives of the Environmental Management Plan (EMP) are to describe the legislative and administrative frameworks in the country on Environmental Impact Assessment Management, implementation arrangements for the EMP, environmental monitoring programme and reporting arrangements. The executing agency of the airport project is Tanzania Airport Authority to be assisted by the Consultant in the implementation of the project. To minimize the potential environmental impacts, the project will require the support of various institutions as outlined in the actions of the EMP.

An Environmental Management Plan (EMP) has been developed to implement the proposed environmental protection measures during construction, operation and decommissioning of the project.

An Environmental Monitoring System (EMS) has been developed to monitor the efficacy of the environmental protection measures and socio-economic initiatives specified in the EMP. It supports the EMP by maintaining a record of environmental performance and enabling adjustments to be made to mitigate environmental and socio-economic impacts during the lifetime of the project.

8. Conclusions and Recommendations

Reconstruction of Kigoma is essential for the development of the economy of Kigoma-Ujiji municipal and Kigoma region in general. It is the consultant (Belva Consult Limited and Sir Frederick Snow & Partners Limited) opinion that the environmental impacts identified may be mitigated. The proposed environmental management plan and environmental monitoring plan if implemented will safeguard the integrity of the environment.

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ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
AMSL	Average Mean Seal Level
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
HIV	Human Immunodeficiency Virus
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
SIDO	Small Industry Development Organization
STD	Sexual Transmission Diseases
TAA	Tanzania Airport Authority
TANESCO	Tanzania Electric Supply Company
TTCL	Tanzania Telecommunication Company Limited
WHO	Word Health Organizations

INTRODUCTION

The Government of Tanzania through the Tanzania Airports Authority is undertaking a feasibility study and detailed engineering design for the rehabilitation and upgrading of the Kigoma airport, located in Kigoma - Ujiji Municipality, Kigoma region. The project is part of a larger project being undertaken by the TAA involving rehabilitation and upgrading of high priority commercial airports across the country. As part of the feasibility study, the TAA has commissioned Sir Fredrick Snow & Partners Limited of UK in association with Belva Consult Limited of Tanzania to undertake Environmental Impact Assessment of seven airports namely including Arusha, Bukoba, Kigoma, Tabora, Mafia Island, Shinyanga and Sumbawanga.

Kigoma airport has a single 1767m x 30m gravel surfaced runway, two taxiways and a small apron all graveled and partially surfaced with aged bitumen. The project will involve upgrading the airport (runway, taxiway and apron) to bitumen surface designed to accommodate Boeing 737 and construction of anew Terminal Building and Control Tower.

The EIA is to be undertaken following the Tanzania environmental assessment procedures. EIA and Audit Regulations, 2005, First Schedule, categorize construction, expansion or rehabilitation of airports and airstrips and their ancillary facilities as projects for which a full EIA is mandatory. This report presents the scooping activities undertaken from 21st to 26th April, 2008.

1.1 SCOPING OBJECTIVES

- To ascertain key issues that are likely to be important during EIA;
- To identify and involve all stakeholders in the EIA process by expressing their views and concerns;
- Specifically:
    1. Identification of project alternatives;
    2. Identification of EIA study boundaries;
    3. Identification of information requirements;
    4. Development of effective methods of approaching the EIA study; and
    5. Defining the terms of reference for the EIA study.

1.2 METHODOLOGY

1.2.1. Review Documents

- Project documents: 1996, M/S M-Konsult (T) Ltd & M/S Scott Wilson of United Kingdom, 20 Airports Study; and Terms of reference provided by Tanzania Airport Authority.
- Tanzania policies, laws and regulation (chapter 3 of this report)
- ICAO regulations & other safeguarding documents: Minimum distance requirements, etc.
- Environmental characteristics Kigoma District and Kigoma Region environmental and socio-economic profiles, demographics (population data and household survey data) from the Bureau of Statistics, Planning Commission etc.
- Climate and meteorological data from Met stations,
- Maps: land use, topographical maps, etc

1.2.2. Stakeholders Consultations

- Mainly one-to-one discussions
- Stakeholders consultation meeting
- Public meeting
- Notices posted at strategic points, mainly at Tanzania Airport Authority offices, Regional Secretariat offices, DC, DED etc.

1.2.3. Field Works

- Visiting the airport area and make physical observations.
- Take measurement of the existing structures and determine their functions in relation to the airport.

2. PROJECT BACKGROUND AND DESCRIPTION

2.1 PROJECT BACKGROUND

2.1.1 Location and Size

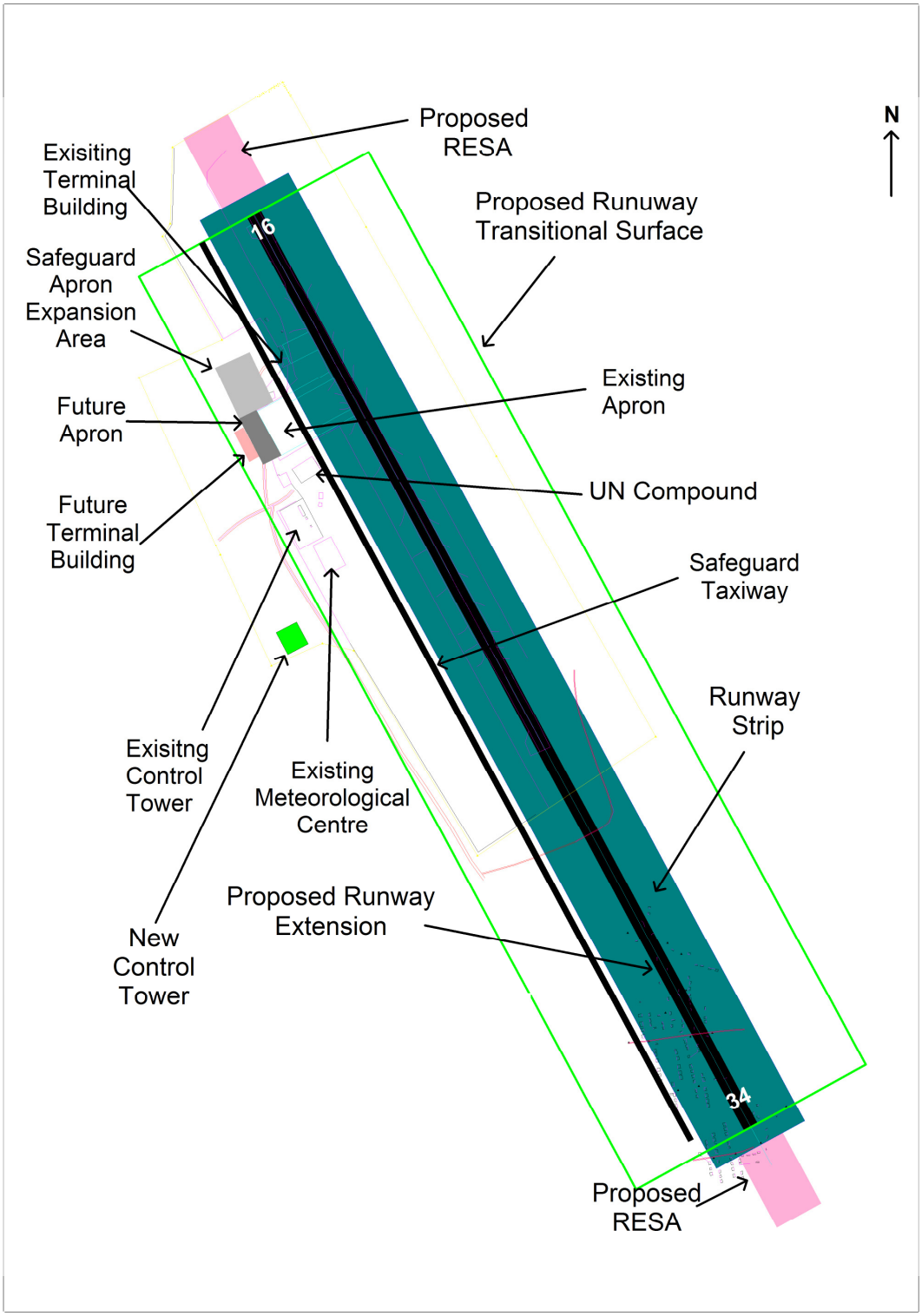
The airport is situated within Kigoma – Ujiji Municipality (4°53' South and 29°38' East), about 10 kilometers from Kigoma town centre at Katubuka area. The airport constitutes a single 1767m x 30m runway, a taxiway and a small apron all gravelled and partially surfaced with aged bitumen. It is generally a domestic airport which serves refugee relief camps and some regional traffic to and from Rwanda, Burundi and Democratic Republic of Congo.

2.1.2. Accessibility

The project site can be reached by way of a 1.5 km earth track that is a continuum of the Ujiji road via Majengo to Katubuka or by another earth track via Mwanga area. Kigoma can be reached from outside by three trunk roads traversing the region namely Mwandiga - Mwanyovu to Burundi border; Kanyani (Kasulu) - Rukwa region border; and Kigoma - Kasulu - Kibondo – Nyakanazi to Kahama. Other routes include Tabora – Urambo – Uvinza – Kigoma road; Tabora - Kigoma branch of the central railway line; over Lake Tanganyika from Rukwa, Mbeya, Burundi, Zambia, and Congo or by air. Kigoma airport is about 1250 km distance from Dar es Salaam by rail and 1080 km by air.

2.2 MAJOR PROJECT COMPONENTS

Kigoma airport constitutes a single 1767m x 30m runway; a taxiway and apron all with gravel surfaces, a terminal building, control tower and meteorological station. The project will involve upgrading the airport (runway, taxiway and Apron) to bitumen surface designed to accommodate Boeing 737 aircraft. The project will involve rehabilitation of existing structures and expansion of some to meet requirements of the upgrading programme. According to current design plan, main structures under the upgrading program will include the terminal building, control tower, aircraft ground lighting and drainage systems.


Proposed RESA
N
Exisiting Terminal Building
Proposed Runuway Transitional Surface
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Safeguard Apron Expansion Area
Existing Apron
Future Apron
UN Compound
Future Terminal Building
Safeguard Taxiway
Runway Strip
Exisitng Control Tower
Existing Meteorological Centre
Proposed Runway Extension
New Control Tower
34
Proposed RESA

Fig 2.1: Proposed Upgraded Airport Location Plan

2.2.1 Runway

The runway is to be extended from 1,767m x 30m to 3,100m x 45m and the surface is to be of paved bitumen construction.

2.2.2 Taxiway

The runway will be linked to the new apron area through the provision of a new taxiway constructed to a similar design as that of the runway.

2.2.3 Apron

The new apron will be located and constructed on similar principles and procedures to the taxiway and runway.

2.2.4 Control Tower

A new control tower will be designed and constructed to suit the size of the design aircraft. Control tower will meet all ICAO standards in terms of orientation and visibility.

2.2.5 Terminal Building

A new Terminal Building will be designed and constructed to suit the forecast airport passenger flows. The terminal building facilities shall be sized in accordance IATA's guidelines

2.2.6 Other support facilities and services

The project will continue to use of existing airport facilities including outer buildings, car park, security, fire services and Metrological station. A new aircraft ground lighting system will be designed and constructed to suit the extended runway.

Table 2.1: Volumes of Kigoma Airport Air Traffic

Year	Aircraft movements			
	2003	2004	2005	2006
No. of aircraft	2,193	2,596	2,690	2,444

2.3. PROJECT ACTIVITIES

The rehabilitation and upgrading activities will be according to conventional engineering scheduling, procedures and practices.

2.3.1 SITE SELECTION PHASE

2.3.1.1 Rehabilitation of Existing Structures

Activities will be generally confined only to the extended runway, apron and taxiway and adjacent new terminal building and control tower locations. Other structures within the airport will be retained in their current state.

The airport will remain open throughout the duration of the rehabilitation works which are estimated to take thirty-six months. To achieve this, construction will be phased in a manner to make available sufficient runway length for the current design plane to operate. Some planned closures of the airport may be required to enable critical tie in works to be performed

2.3.1.2 Land Takes for New Extensions

If the project is implemented as per current designs, the runway will be lengthened by 1,233 m. But according to the design aircraft, more clearance is required which is of 150m from the centre line of the runway on both sides. This means the airport will be extended to include land beyond the ownership of the TAA. The affected people were notified of the impending land take in year 2006. The government (Tanzania Airport Authority and Kigoma local government) have undertaken valuation of the affected properties and compensation procedures are pending.

2.3.2 MOBILIZATION PHASE

1. Site Preparation

Site preparation at existing structures will involve:

- Clearance of vegetation and removal of top soil by using motor grader machine.
- Disposal of overburden (cleared vegetation and topsoil) and rubble at Buhanda and/or Businde area.

2. New Extensions

At the extension portions, the following activities will take place:

- Removal of existing natural obstacles and demolition of built structures including removal of the rocky outcrop to the west and other structures on the site described above (section 2.3.1).
- Clearance of vegetation and removal of top soil by using motor grader machine.
- Disposal of overburden (cleared vegetation and topsoil) and rubble at Buhanda and/or Businde area

3. Mobilization of construction materials and equipments

1.Sources of Materials

The project will require various standard construction materials including gravel, aggregates, sand, bitumen and water. Estimated 63,550 m^3 of course aggregate will be required up to completion of the project. They will be obtained from Ilunde quarry site, located at Uvinza, Kibondo District, Kigoma region, about 132 km from Kigoma Municipality center. Gravel, about 127,100 m^3 will be obtained from the government-owned Mungonya burrow pit about 10kms from the Kigoma- Ujiji Municipality center. Sand 25,420 m^3 will be obtained from Mungonya river area, located within Kigoma-Ujiji Municipality.

Bitumen about 1200 tons will be purchased in Dar es Salaam, Mwanza or Abroad. Water about 4,000,000 litres will be obtained from the nearby Lake Tanganyika or Supply fro Kigoma Urban Water Supply & Sewerage Authority. The exact point of extraction will be identified in the course of the feasibility study. At the quarry site and borrow pits, the materials will be excavated by excavator machine and loaded into trucks.

NOTE: The above stated quantities of materials are a provisional assessment for indicative purposes only and will be subject to confirmation at final Detailed Design stage

2. Equipment and Machinery

The project will employ various standard construction equipments

Table 2.2: Major Equipment to be Used for Implementation of Project

S/N	Type	Function	Duration (Month)	Source (Hire, Contractor etc.)
1	Excavator	Mobilization	6	Contractor
2	Wheel loader	Mobilization	6	Contractor
3	Trucks	Mobilization	6	Contractor
4	Motor grader	Mobilization	6	Contactor
5	Excavator	Construction	30	Contractor
6	Wheel loader	Construction	30	Contractor
7	Trucks	Construction	30	Contractor
8	Motor grader	Construction	30	Contractor
9	Compactor	Construction	30	Contractor
10	Asphalt plant	Construction	30	Contractor
11	Crasher	Construction	30	Contractor
12	Asphalt paver	Construction	30	Contractor

3.Transportation

The materials from the local borrow pits will be transported by trucks. Most construction equipments are available locally and some will be shipped from further afield or abroad.

4. Storage

In most instances materials will be used immediately after delivery. An on-site workshop and compound will be provided within the airport area to undertake service, repair and maintenance activities together with facilities for the storage of other non-perishable materials and goods to be used for construction.

5. Construction Crew

This will include a total of 30 skilled and semi-skilled personnel and about 140 labourers who will be hired locally. There shall be temporary construction camp adjacent to the airport. Accommodation for the senior staff and most of junior staff will be in appropriate accommodation addresses within Kigoma, with few on-duty staff and security staff based on camp site. Local labourers and other unskilled staff will be accommodated within their normal residences in Kigoma.

6. Local Supplies and Services (food, medicals, fuel, water etc.)

Food and other domestic essentials will be provided by local suppliers. Medical facilities will be provided from local registered medical practitioner. Fuel will be supplied from local Kigoma fuel station and water will be from Lake Tanganyika for construction purpose and for human use will be from Kigoma Urban water Supply and Sewerage Authority.

2.3.2 CONSTRUCTION PHASE

1. Construction of sub-base

The works will be phased in a manner to allow the existing runway to remain in use. Initially the sub base will be constructed to the new extended part of the runway. When the extension is completed then phased working will be applied to the existing runway in a manner to ensure that sufficient operating length of runway is available for aircraft at all times. During this process some temporary turning heads and planned extended closure periods of 36 to 48 hours maybe required to complete critical sections of the works. The sub base for the new rehabilitated runway will be constructed by utilising the existing runway materials and/or imported materials as required. These materials will be further stabilized and strengthened through the introduction and mixing of cement to achieve

2. Construction of Base

The same procedure used for sub-base construction shall also be applied to the construction of the base. The base layer installation shall be carefully coordinated and scheduled with other runway construction activities. The initial base shall comprise an optimum thickness layer of bituminous material which will be laid, spread and compacted over the surface of the sub-base using normal construction practices.

3. Construction of Basecourse and Wearing Course

The final paved surfacing shall comprise a two layers bitumen pavement construction of specified thickness that achieves the required design characteristics. The bitumen mixing process shall be accomplished using asphalt mixing plant which mixes a defined ratio of aggregates and bitumen together into a cohesive material. The asphalt mixing plant may be placed on the quarry site or at the construction site.

4. Associated works and finishing

Other works such as new markings shall be carried out at night whilst the runway is not in operation. Fencing and some other works can which do not inhibit airport operations can proceed during hours of normal airport operation and undertaken in parallel with other construction activities to suit the contractor's programme of activities.

5. Terminal Building and Control Tower

The new terminal building and control tower shall be constructed during normal hours and working. Whilst construction works on these new buildings proceeds the existing facilities shall continue to accommodate the normal day to day airport operations.

2.3.3 Operation Phase

Upon completion of the works normal airport operations will continue without interruption as the main activities related to the upgraded areas will only involve monitoring and periodic maintenance activities. The Tanzania Airport Authority has an airport Maintenance Unit which is under Directorate of Technical services, lead by a Director and assisted by engineers.

2.3.4 Decommissioning phase

Two scenarios that can happen in the future:

1. Major rehabilitation and/or upgrading which could involve dismantling and erection of new runaway and/or outer buildings.
2. Development of a completely new airport at a new site.

3. POLICIES, LEGAL AND INSITUTIONAL FRAMEWORK FOR ENVIRONMENTAL AND SOCIAL MANAGEMENT OF THE PROJECT

Location, deign, mobilization, construction/installation, operation and decommissioning of the proposed project components and its associated support services will have both positive and negative impact on the ecological and social environment. On one hand, Tanzania Airport Authority needs to ensure that during the entire life cycle of the project it complies with relevant national polices, legislations and standards in Tanzania. On the other hand, there are international agreements and/or conventions to which Tanzania is a Party. These also need to be considered during project construction and operation.

3.1 NEED FOR ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Impact Assessment is one of the planning tools which are used to facilitate and promote sustainable development by integrating environmental consideration in the decision making process and ensuring that unnecessary damage to the environment is avoided and optimises resources use and management opportunities. Due to the importance of Environment Impact Assessment, most sector policies and legislation have incorporated the requirement of undertaking Environmental Impact Assessment prior to the implementation of development projects.

The following sections will discuss relevant sector policies and legislation to the proposed project:

3.2 POLICIES

The following are relevant sectoral and cross–sectoral policies which provide directives on how projects should be implemented in relation to concerned environmental and socio-economic settings. The project proponent will consult these policies in the course of designing and implementing the proposed project activities.

3.2.1 National Environmental Policy (1997)

National Environmental policy highlights sustainable development as its core concept. National Environmental policy states that Tanzania is committed to sustainable development in the short-, medium- and long-term. Chapter 4, Paragraph 64 of the NEP states that "*It is in the context of an EIA regime that policy guidance on choices to maximise long-term benefits of development and environmental objectives can be revealed and decided upon.* Environment Impact Assessment *as a planning tool shall be*

used to integrate environmental considerations in the decision making process in order to ensure unnecessary damage to the environment is avoided". The policy also advocates public consultation in carrying out Environment Impact Assessment. Specifically paragraph 66 states that "One of the cornerstones of the Environment Impact Assessment process will be the institution of public consultations and public hearing in the Environment Impact Assessment procedures". The policy recognises the importance of promoting use of environmentally sound technologies that protect environment based on careful assessment of the carrying capacity of the environment. By carrying out this Environmental Impact Assessment, Tanzania Airport Authority has complied with the policy.

3.2.2 National Investment Promotion Policy (1996)

The National Investment Promotion Policy encourages protection of environment in line with the countries socio-economic policies. Under the policy, investors are required to undertake activities in a manner that best contributes to consumer and environmental protection. The investors are also encouraged to use local raw materials/components where possible. This Environment Impact Assessment is undertaken to ensure that Tanzania Airport Authority will abide to the relevant provisions of the policy to ensure compliance with the development.

3.2.3 The Tanzania Development Vision (2025)

The National Vision 2025 foresees the alleviation of widespread poverty through improved socio-economic opportunities, good governance, transparency and improved public sector performance. These objectives not only deal with economic issues, but also include social challenges such as education, health, the environment and increasing involvement of the people in working for their own development. The thrust of these objectives is to attain a sustainable development of the people. Rehabilitation of Kigoma Airport will contribute towards realisation of the Vision's objectives.

3.2.4 National Policy on HIV/AIDS (2001)

National HIV/AIDS policy provides the general frame work for collective and individual response to HIV/AIDS pandemic. It clear outlines the pertinent issues in struggle. These include among others, roles of various sectors, roles in the preventions, care and supports in HIV/AIDS.

3.2.5 National Transport Policy (2003)

National transport policy, aims at enhancing transport safety and environmental protection, through taking steps to review and update national legislation in transport operations and safety requirements.

3.2.6 National Land Policy (1996)

The National Land Policy advocates the protection of land resources from degradation for sustainable development. Among other things the policy requires that project development should take due consideration the land capability, ensures proper management of the land to prevent erosion, contamination and other forms of degradation. Environmental Impact Assessment for this project is intended to identify if there is potential for the adverse impact and to propose means for mitigating them.

3.2.7 The National Poverty Eradication Strategy (2000)

The strategy is viewed as an instrument for channelling national efforts towards broadly agreed objectives and specific inputs and outputs. The poverty reduction strategy is to large extent, an integral part of ongoing macro-economic and structural reforms. Achieving the target of accelerated growth will require significant efforts by different stakeholders to enhance productivity and increase investment in both human and physical capital.

3.3 LEGISLATIONS AND REGULATIONS

The following are relevant legislations and regulations which provide directives on how projects should be implemented in relation to concerned environmental and socio-economic settings. The project proponent will consult these legislations and regulations in the course of designing and implementing the proposed project activities.

3.3.1 Environment Management Act, No. 20 of 2004

The Environmental Management Act (2004) introduces a concept of right of Tanzanians to clean, safe and health environment and right of Tanzanians to access various segment of environment for recreational, educational, health, spiritual, cultural and economic purposes (Article 4 (1) and (2)). The Act imposes an obligation on developers to conduct an Environmental Impact Assessment prior to the commencement of the project to determine whether the project may/or is likely to have, or will have a significant impact on the environment. Article 81 makes EIA mandatory to all projects that fall under the EIA mandatory list (Schedule 3) into which this project falls. The Act also requires that project developers undertake regular environmental audits of their facility.

3.3.2 EIA and Audit regulations, 2005.

First schedule of this regulation, lists rehabilitation of an airport among types of projects requiring a mandatory Environmental Impact Assessment. Since such project is likely to have significant adverse environmental impacts, an in-depth study is required to determine the scale, extent and significance of the impacts and to identify appropriate mitigation measures. Furthermore, the regulation specifically provide for procedures and guidelines for carrying out Environmental Impact Assessment in Tanzania. This EIA review has been carried out in accordance with these regulations.

3.3.3 The National Land Act (1999) and its Amendment (2004)

The Land Act of 1999 provides for the basic law in relation to land other than the village land, the management of land, settlement of disputes and related matters. Act lays down key fundamental principles for occupying and using the land. Among them, is the principle that any land user shall ensure that land is used productively and that any such use complies with the principles of sustainable development. This principle applies to categories of land.

3.3.4 The Village Land Act (1999)

The Village Land Act of 1999 confers the management and administration of village lands to Village Councils, under the approval of the Village Assemblies, although the Minister of Lands is entitled to decide on the amount of land which can be owned by a single person or commercial entity. Any person who wrongfully obstructs or encroaches on the public right of way and who does not within the time specified in any notice

served on him remove that obstruction or cease that encroachment commits an offence and upon conviction is liable to a fine.

3.3.5 Land Acquisition Act (1967)

The Act gives the power to the President to acquire any land for any estate or term where such land is acquired for any public purpose. The Act goes on to define the circumstances in which public interest could be invoked, e.g. for exclusive government use, public use, for or in connection with sanitary improvement of any kind; for or in connection with laying out any new city, municipality, township or minor settlement or extension or improvement of any existing city.

Other purposes are in connection with development of any airfield, port or harbour; mining for minerals or oils; for use by the community or corporation within community; for use by any person or group of persons as the President may decide to grant them such land. The acquisition of the land for the right of way as well as for the resettlement sites is within the provision of this Act. Further the Act specifies other requirements prior to the acquisition of the land such as investigation for the land to be taken, issuing notice of intention to take land and mode in which notices will be served. It further defines the requirements for and restrictions on compensation.

3.3.6 The Mining Act No. 5 (1998)

This act provides for prospecting of minerals, mining and dealing in minerals. It also provides for building materials including all forms of rock, stones, gravel, sand, clay, volcanic ash or cinder or other minerals being used for the construction of buildings, roads, dams, and aerodromes or similar works. The Legislation makes Environmental Impact Assessment mandatory as a precondition for granting various categories of mining licences.

Rehabilitation of Kigoma airport will require materials from borrows pits and quarries. Acquisition of these construction materials are all covered by this Environmental Impact Assessment study and respective licences will be acquired by the Contractors on behalf of Tanzania Airport Authority.

3.3.7 The Land Disputes Court Act. No.2 (2002)

Every dispute or complainant concerning land shall be instituted in the Court having jurisdiction to determine land dispute in the given area (Section 3). The Courts of jurisdiction include:-

(i) The Village Land Council
(ii) The ward Tribunal
(iii) District Land and Housing Tribunal
(iv) The High Court (Land Division)
(v) The Court of Appeal of Tanzania.

The Act gives the ward tribunals powers to resolve land disputes involving lands. If the ward tribunal fails to resolve the dispute, the mater can be referred to the District land and housing tribunal as established by the Land Act (1999). If any dispute will arise as a result of this project, the provision of this Act shall be observed.

3.3.8 Occupation Health and Safety Act No. 5 of 2003

This Act makes provisions for the safety; health and welfare of persons at work in factories and all other places of work. Also provides for the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with activities of persons at work. Relevant sections of the ordinance to the project activities include Part IV Section 43 (1) - Safe means of access and safe working place; Prevention of fire; and Part V on health and welfare provisions, which includes provision of supply of clean and safe to workers, sanitary convenience, washing facilities and first aid facility. Section 50, deals with fire prevention issues.

Section 15 gives powers to the Registrar of factories and workplace to enter any factory or workplace to perform his duties as provided by the Act. Section 16 requires that factories and workplace should register with Registrar of factories and workplaces before commencing operations. Part VI is dealing with special safety provisions for working places involving handling hazardous chemicals, hazardous processes or hazardous equipment.

3.3.9 The Water Utilisation (Control and Regulation) Act No. 42 of 1974

The main Legislation to control the extraction of water for different use is that of Water Utilisation and Regulation Act No. 42 of 1974, which is a principle Act, repealing cap 410 of 1959. The Act has been amended by Act No 10 of 1981, written laws (miscellaneous amendment) Act No 17 of 1989 and the Water Utilisation (miscellaneous amendment) Act No 8 of 1997. Both the principle Act and its amendments are for the protection of the water resources and the user so that there is a balance between different uses.

Relevant provision of this act is that the water "*Shall not be polluted with any matter derived form such use to such extent as to be likely to cause injury either directly or indirectly to public health to livestock, or fish, to crops, orchards or garden, which are irrigated by such water or to any product in the processing of which such water is used*".

Section 11 of the Act provides right to owner of a plot to sink or enlarge any well or borehole thereon and abstract water there from, not exceeding 22,700 litres in any one day. However, this section provides distances to be observed before construction of borehole is made.

3.4 INSTITUTIONAL ASPECTS

The Environment management Act, no. 20 of 2004, sets out the institutional arrangement for management of environmental issues in Tanzania. The EIA for the Kigoma airport will be undertaken following procedures laid down in the EIA and Audit regulations, 2005.

Table 3.1: Institutional aspect frame Work

S/N	Level	Institution	Role and Responsibility
1	**Central Government**	Vice President's office (Division of Environment)	▪ Coordinate the implementation of the National Environmental Policy ▪ Approval of EIS and issuing of certificates ▪ Coordinate environmental management activities within the country
		National Environment Management Council(NEMC)	▪ Registration of project, screening and assigning the level of impact assessment ▪ Review of scoping report and approval of terms of reference, • Review of EIS and recommendation to the government. • Monitoring the proposed measures • Carry out environmental auditing
		Ministry of Infrastructure Development (Environmental Management Unit)	▪ Issuing policy guidance ▪ Providing legal frame works ▪ Carry out project environmental monitoring ▪ Carry out project environmental auditing
		Tanzania Airport Authority (Environmental Management Unit)	▪ EIA Study ▪ Oversee overall project Implementation ▪ Environmental project Monitoring ▪ Environmental project auditing

2	**Regional**	Kigoma Regional Secretariat Office	▪ Oversee enforcement of laws and regulations ▪ Advice on implementation of development project activities ▪ Oversee and advice on implementation of relevant national policies
3	**Kigoma Municipal Council**	District Commissioner's office	▪ Oversee enforcement of laws and regulations ▪ Advice on implementation of development project activities ▪ Oversee and advice on implementation of relevant national policies
		District Executive Director's Office	▪ Incharge of all development within the Kigoma municipal ▪ Coordinator of all departments within the municipal.
		District Environmental, Natural Resources, Community Development and Related offices	▪ Baseline data on social and economic ▪ Enforcement of laws and regulations
		District Environmental Committee	▪ Coordinate the environmental matters within the District

4. ENVIRONMETAL AND SOCIO-ECONOMIC BASELINE

4.1 INTRODUCTION

This chapter provides a description of relevant environmental, economic and social characteristics of the project core area (site specific), and areas in the immediate vicinity of the airport (Buhanda – Businde, Machinjioni, Majengo, and Mwanga Kaskazini Wards) as well as broad description of the area of influence i.e. Kigoma - Ujiji Municipality and Kigoma Region. The level of details in the various sections depends on the interactions between the project activities and the particular environmental or socio-economic aspect. Information provided in this chapter will be superimposed on to the project concept and components for impact identification, evaluation and development of mitigation measures.

4.2 SITE DESCRIPTION (Project Core Area)

The topography of the airport environs and developments within the airport and outside its boundary, especially under the aircraft landing and take-off paths may have considerable influence on the effective utilization of an aerodrome.

4.2.1 Location and Accessibility

The airport is situated within Kigoma – Ujiji Municipality (4°53' South and 29°38' East), about 10 kilometers from Kigoma town centre at Katubuka area. The project site can be reached by way of a 1.5 km earth track that is a continuum of the Ujiji road via Majengo to Katubuka or by another earth track via Mwanga area. Kigoma can be reached from outside by three trunk roads traversing the region namely Mwandiga - Mwanyovu to Burundi border; Kanyani (Kasulu) - Rukwa region border; and Kigoma - Kasulu - Kibondo – Nyakanazi to Kahama. Other routes include Tabora – Urambo – Uvinza – Kigoma road; Tabora - Kigoma branch of the central railway line; over Lake Tanganyika from Rukwa, Mbeya, Burundi, Zambia, and Congo or by air. Kigoma airport is about 1,250 km distance from Dar es Salaam by rail and 1,080 km by air.

4.2.2 Biophysical features

1. Climate

Kigoma airport, experience climatic condition which is typical of Kigoma Region. The climate is characteristically tropical with a distinct long wet rainy season beginning from late October to May with short dry spell of 2-3 weeks in January or February, followed by a prolonged dry season June to October. Annual rainfall is variable ranging from 600 mm-1500 mm being the heaviest in highlands, intermediate in the lower slopes and low in the valley bottom and lake-offshore areas (location of the airport). Mean daily temperatures range between 25°C in December, January to 28°C in September. Temperature varies inversely with altitude.

2. Topography

Kigoma region is a gently inclined plateau with steep hills rising very sharply from 800 metres at the level of Lake Tanganyika to altitudes of 1,750 meters to the East descending from the North and East into gently rolling hills. Typically, the general airport area has an even topography. The absolute mark of the Kigoma airport checkpoint (AMSL) is 2700ft. Human-induced features on airport land that significantly interrupt the even terrain e.g. include an artificial high rise (3m high) a result of haphazardly disposed soil overburden from previous rehabilitation works of the runway; storm water drains/trenches. The airport area has numerous termite moulds of various heights and sizes. On the north-west of the airport there is a marked north to south gradient; the opposite is on the south-west where gradient is north to south. Drainage runs into the valleys found on both ends of the airport. Surrounding hilly terrain is to the north-west constituting the Masanga hills. Further to the north, is a range of hills (at 570 m) including Kalalangabo, Mtanga, Kagongo and Kasegera hills. With exception of palma and mango tree (3 – 6 m high), the south approach is free of hill obstacles.

3. Geology and Soils

The soils are typical of the Lake Tanganyika shore areas. Soils are predominantly deep and well drained comprising the dark reddish brown fine sandy loams, and sandy loams partly stony and severely eroded. Dark reddish clay loams tend to form on termite hills. Black clayey soils which have a high proportion of sand are found in lowland areas Bwawani to the north-east and the Kirugu lowland to the south-east subject to seasonal water logging. These are highly fertile areas because of high proportion of sand and silt.

4. Hydrology

There is no permanent or temporary water course that crosses the airport grounds. The main hydrological features close to the site are the Bwawani lowland to the north-east and the Kirugu lowland to the south-east (both become wetlands during heavy rains). The natural slope to the south and north and various storm water channels prevents storm water from stagnating on the airport field during heavy rains. Lake Tanganyika is just 4 km from the airport. The lowland /valley areas interconnect with the major perennial river Luiche which drains into the lake.

5. Air Quality and Noise Levels

No data are available with respect to ambient air quality in Kigoma region. However, is generally believed to be good, since there are no major sources of pollution and that the area is not likely to be affected by long range transport of pollutants.

6. Biological Characteristics

Main vegetation cover on the site, (and immediate landing and takeoff paths) is characterized by grass and secondary vegetation that has been evened out by constant mowing. Shinyanga airport land is huge with various vegetation characteristics (remnants of cleared bushy grassland): portions to the north west contain palm trees; north east constitute tall elephant grass with scattered palm and mango trees, and bushes of indigenous and planted trees; some areas to the east close to settlements are completely bare due to trampling by people: several bare footpaths crisscross the airport and there are bare patches used as playground/driving lessons.

Main fauna reported by airport staff include hare, snakes, lizards, frogs, burrowing rodents and various insects including butterflies, grasshoppers and ants. There are many termite hills on the airport grounds and associated seasonal swarms. Termites are a menace to vegetation growth and development and hinder flower gardening and re-vegetation efforts. Domesticated animals – cattle, goats illegally graze on airport land. The presences of nearby human settlements that generate bird feeds (garbage, cultivated crops: sunflower, sorghum/millet/rye); vegetations - trees, bushes and tall grass, livestock and nearby Lake Tanganyika that are resting/breeding/nesting sites, and habitats for small animals and insects; have attracted good numbers of birds including partridges, and birds that are a menace to aircrafts. Records of bird strikes at the Airport Managers

Office from 2005 indicated four main types of birds were noted (including black Indian house crows, white cattle egrets, "kwalala" and hawks.

Fig 4.1: Typical Grass Cover at the Airport Area

4.2.3 Land Uses

The airport area is strictly designated for its particular purposes. Section 2.1 describes the sizes and conditions of the various facilities found on the airport field. TAA is responsible for planning for land use, management and enforcement of laws pertaining to land within the airport area. Site assessments and information from stakeholders reveal several activities which are carried out on the airport grounds albeit illegally. These include farming, livestock grazing, footpaths and car tracks, digging for soils for making burnt bricks, play ground, driving lessons.

Fig 4.2: Tomato farm within the Airport Boundary

4.2.4 PLANNED FUTURE DEVELOPMENTS

In Kigoma there are a number of planned future developments as follows:

- Rehabilitation and Expansion of Water supply scheme in Kigoma-Ujiji municipal
- Construction of Mwandiga- Manyovu road
- Construction of Kigoma - Kasulu - Kibondo – Nyakanazi road

4.3 SOCIO-ECONOMIC CHARACTERISTICS OF IMMEDIATE VICINITY OF AIRPORT

4.3.1 Land Ownership and Major Land Uses

- **East**

To the east, the airport is neighbored by the Businde settlement without a separating outer fence. Farms and houses a bit further on higher grounds. Palm and mango trees (max. 3 - 6m high) are predominant. The area further south and including the Kirugu lowland is cultivated with various crops including tomatoes, sweet potatoes, banana,

maize, cassava, legumes, etc. A telecommunication mast (60 m) is prominent feature in the east.

- **West**

To the west, the airport is neighbored by the Katubuka settlement with farms and houses very closely abutting the airport area without a separating outer fence. North-east the airport is wall-fenced; the Mwanga – Katubuka – Buhanda road separates it from the Mwasenga settlement.

- **South**

Immediately after the Runway End Safety Area (RESA), part of the airport is wall-fenced and the rest is open grassland. The Lusimbi to Businde road forms the current southern boarder of the airport. A local burial site abuts the road. Beyond the road are the Machinjioni and Majengo settlements. Part of these settlements (about 381 households and the whole burial site) will need to be demolished to allow the extension of the airport. The future boundary (after extension) will be at Msingeni area just before the lowland area and primary school. Kasingiri, then Rubinga settlements are found further on higher grounds.

- **North**

To the north, the airport is neighbored by the Mwasenga settlement with farms and houses very closely abutting the airport area without a separating outer fence. The area immediate after the RESA is cultivated with various crops including tomatoes, sweet potatoes, banana, maize, cassava, legumes, etc. North east is the Bwawani valley cultivated with rice. Palm trees (max. 6m high) are predominant and considered obstacles when found on the approach of aircrafts.

4.3.2 Administrative Aspects

The area found in the immediate vicinity of the airport constitutes several sub-wards ("mitaa") within 4 wards of Buhanda – Businde, Machinjioni, Majengo, and Mwanga Kaskazini.

4.3.3. Demographics

1. Population

The population of Buhanda – Businde, Machinjioni, Majengo, and Mwanga Kaskazini wards is shown in table 4.1 Population on these wards showing a slightly skewed 1:1 ratio. About 20,478 people (44%) are regarded as able bodied and estimated 56% people do not contribute to the local economy (data from Machinjioni, Majengo, Buhanda-Businde, Mwanga Kaskazini Wards Offices, 2008). Members eligible to special attention / vulnerable groups in 4 wards include orphans, elderly, widows, and youths (table 4.2). Special needs of these vulnerable groups include food, cloth, and medicine which are mainly obtained from different institutions and their own households.

Table 4.1: Population of the Wards to be affected in the Airport Upgrading Program

No.	Ward	Population			Households	
		Male	Female	Total	Number	Average size
1.	Machinjioni	1035	1156	2191	376	6
2.	Majengo	1725	2094	3829	524	7
3.	Buhanda-Businde	2359	2546	4905	835	6
4.	Mwanga Kaskazini	17486	17793	35279	6945	5

Source: Census 2002 and Data collected by Wards Local Leaders (2008).

Table 4.2: Vulnerable Groups Need Special Attention

Ward	Widows	Disabled	Elderly	Orphans
Machinjioni	64	27	151	-
Majengo	86	18	94	-
Buhanda-Businde	118	41	68	-
Mwanga Kaskazini	-	7	-	-

Source: Machinjioni, Majengo, Buhanda-Businde and Mwanga Kaskazini Wards Offices, 2008

2. Household's characteristics

Number of households and average number of people per household in each ward is as shown in table 4.1 above. Most of houses in the four settlements are built of earth. Most of the houses in Mwanga Kaskazini, Majengo and Buhanda-Businde are constructed with corrugated Aluminium roofing while in Machinjioni 60% is thatched with grass. All of the four wards has both planned and unplanned areas. Space between houses is 3m. There are few roads through in bad conditions and several footpaths crisscrossing the settlement distinguish the streets in the area.

3. Occupation and job opportunity

In the four settlements the average income of a person per day is as the standard for Tanzania which is $1.00. Job opportunities are available in the various economic sectors and social services (see section 4.4.2). Employment is mainly from informal sectors although formal sector is also contributing. Women have been active in both formal and informal activities. Main occupations of the people are farming, livestock keeping, small scale business/enterprises and formal employment-offices.

4. Ethnicity

The indigenous people of Kigoma Region are of Bantu origin. Various tribes including the Goma, Rundi, Bwari, Manyema, Bemba and Jiji people, also Holoholo, Vinza, Nyakaramba, Hangaza, Tongwena and Waha are found in Kigoma region.

4.3.4 Land Use and Land Tenure

1. Land use

The prominent land uses in the four wards are settlement and farming. Small scale industry occupy small portion. Residential areas constitute both planned and unplanned areas with associated institutions e.g. schools etc.

2. Land ownership, Rights and Tenure

At the project area and area of influence, land ownership, rights and tenure are governed under the national land laws. Land in Tanzania is owned by the state and can be allocated by the state to users under specified tenure regimes. At the project area the four Wards as an urban area, land is administered and managed by the Kigoma/Ujiji Municipal Council (Lands Office). Most individuals and institutions especially in the

planned areas at Buhanda-Businde, Majengo (92%), Machinjioni () and Mwanga Kaskazini (95%) have been surveyed. Much of the unplanned areas land is held under customary right by individual households.

4.3.5 Social Services Infrastructure

1. Water Supply

Sources currently utilised by settlements at the project site for domestic use include pipe water, shallow wells, rivers, streams and boreholes. Water resources are chemicals well suited for use in water supplies. Water is within the reach / in house. The water is considered safe. The Kigoma airport is connected with water.

2. Health condition and facilities

The general health condition, food security and nutritional status of the fours wards population are fairly good. Diseases of public concern and cause of higher morbidity and mortality rates are Malaria, Anemia, Cholera, Tuberculosis, Diarrhea, Clinical Aids, Card Disorder, Meningitis, Intestinal Worms and Burn. People from Buhanda-Businde, Majengo, Machinjioni and Mwanga Kaskazini are served with hospital and dispensaries that are about 1-3km away. The environmental condition is fairly maintained. In these four wards most of the houses have no sewage system and mainly use traditional toilets pit latrine. Drainage systems are only available for 5% of the area. Solid waste disposal by backyard pits is the practice throughout the area.

3. Education and Training

Educational facilities in the four wards include ten primary schools (Majengo 1, Buahada-Businde 2, Machinjioni 2 and Mwanga Kaskazini 5) and three secondary schools (Machinjioni and Mwanga Kaskazini 2). In the primary schools (except for Mwanga Kaskazini ward) total number of pupils is 4,314; average number of pupils per class is 80, with a high deficit of teachers in schools.

4. Police, Security, and Fire Services

The four wards are serviced with police station, local militia, and community policing. There are wards security committee and local levels. Kigoma airport security, fire fighting equipment and emergence/rescue services are detailed in chapter 2.

4.3.5 Planned Future Developments

Changes anticipated before and after the project commences include:

- Access road to the airport rehabilitated to tarmac level. Tender has already been issued to Contractor, works expected to commence by 2009 under TANROADS.
- Rehabilitation of roads

4.4 SOCIO-ECONOMIC CHARACTERISTICS OF THE AREA OF INFLUENCE (KIGOMA - UJIJI MUNICIPALITY AND KIGOMA REGION).

4.4.1 Demographic Profile

The distribution of the population in the project area of influence (Kigoma-Ujiji Municipal and Kigoma Region) from the 2002 Population and Housing Census is as shown in table 4.3. The demographic profile of the region indicates the potential social economic significance of the project.

Table 4.3: Kigoma Region Census Counts, 2002 and Intercensal Growth Rates

District/Region	Population (Number) Total	Population (by Gender)		Household		Population Density 2002	Intercensal Growth Rate (1988 – 2002)
		Male	Female	Number	Average Size		
Kigoma Region	1,679,109	807,859	871,250	242,533	6.9	45	4.8
Kigoma - Ujiji Urban	144,852	70,630	74,222	26,066	5.6		
Kigoma Rural	490,816	237,342	253,474	72,085	6.8		
Kasulu	628,677	299,506	329,171	85,810	7.3		
Kibondo	414,764	200,381	214,383	58,572	7.1		

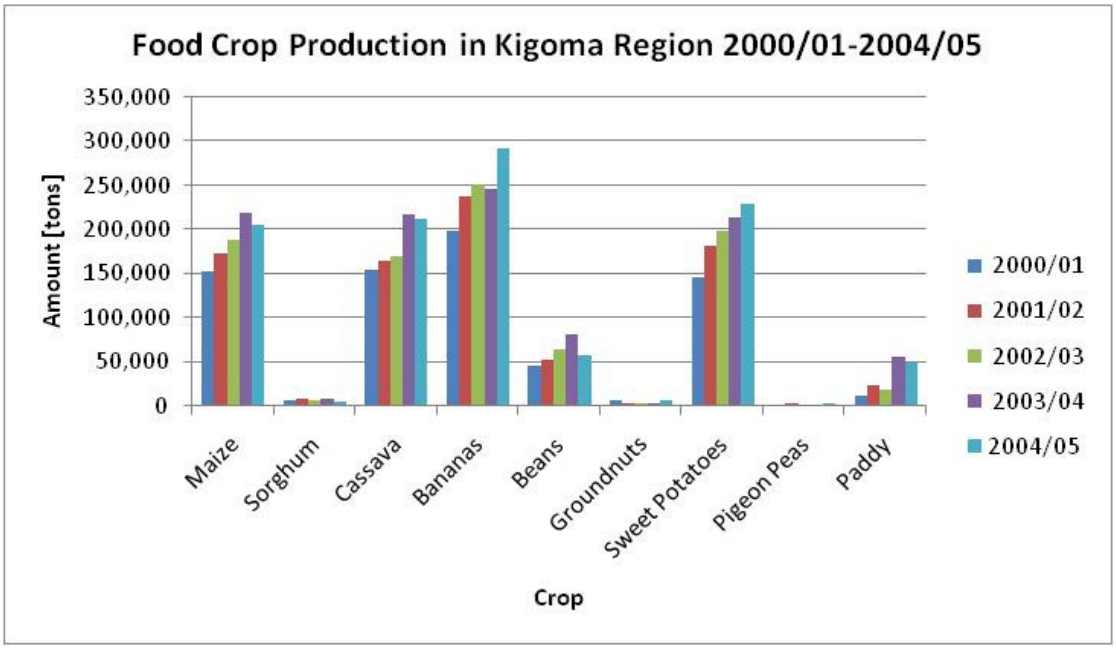
Source: The 2002 Population and Housing Census, Government of Tanzania, 2004

4.4.2 Economic Activities

Economic activities in the project area of influence that could have a direct bearing to the upgraded airport are briefly described below:

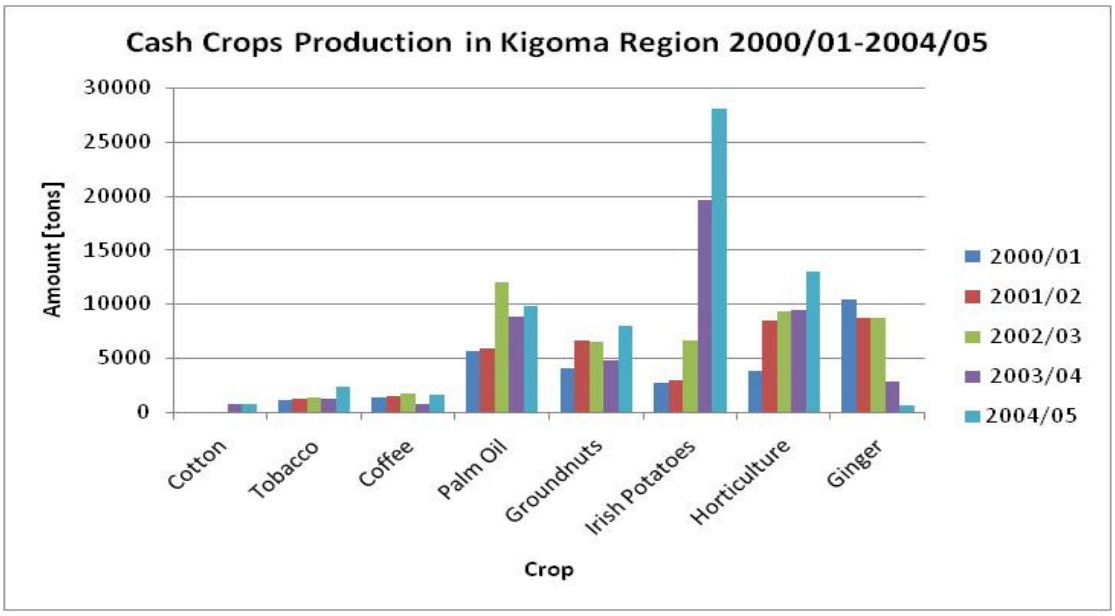
4.4.2.1 Agriculture

Agriculture is the predominant economic sector in Kigoma regions. Over 85% of the Kigoma population depends on agriculture for food as well as source of income. The type of agriculture practiced in the region is peasant agriculture whereby smallholders who employ very limited capital in their production process are the most involved. Food crops grown include cassava, maize, legumes, sweet potatoes and banana. Cash crops include coffee, palm oil, cotton, groundnuts and tobacco. Transport infrastructure and marketing is the one of the obstacles facing the agriculture sector in Kigoma, thus the upgrading of the airport may facilitate the accessing of markets and hence the growth of this sector in the region.



Source: Kigoma Region Socio-economic Profile, April 2007

Figure 4.3: Food Crops Production in Kigoma region

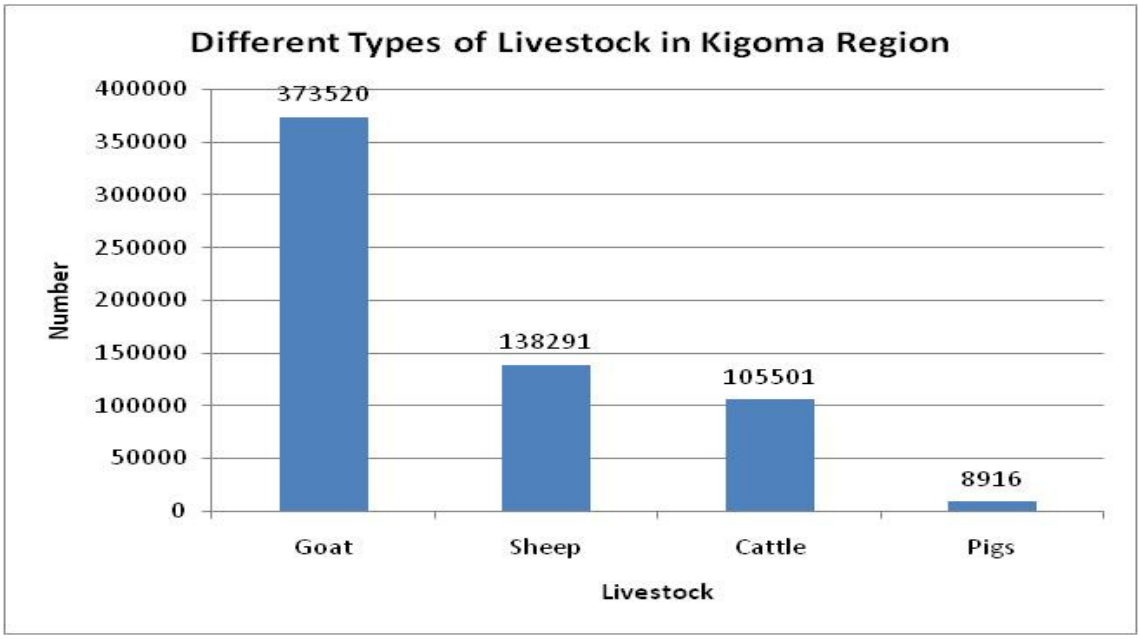


Source: Kigoma Region Socio-economic Profile, April 2007

Figure 4.4: Cash Crops Production in Kigoma region

4.4.2.2 Livestock Keeping

Livestock keeping practiced in Kigoma region is both traditional and commercial in nature. The most important types of livestock are cattle mainly indigenous breeds (long horned Ankole) and few short horned zebu, sheep and goats also pigs, chicken, ducks and pigeons. There are a few animals of improved breed. Livestock keeping is mainly concentrated in the highland zone of Kasulu district (mainly cattle) where conditions are more favourable, and Kibondo district (leads in goat's population). As far as poultry farming is concerned, it is practiced throughout the region; a larger proportion of the domesticated lot is found in the rural areas while the improved types are found in urban areas. Products from the livestock include milk, meat, hides and skins. The rehabilitation of the airport may facilitate the transportation of these products to the potential markets.

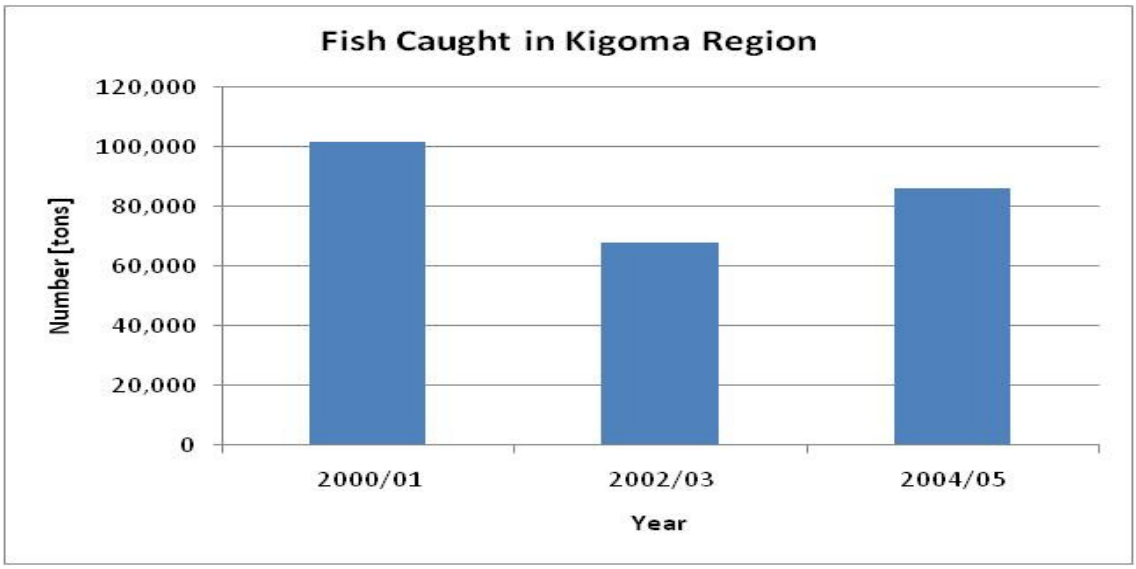


Source: Kigoma Region Socio-economic Profile, April 2007

Figure 4.5: Different type of livestock in Kigoma Region

4.4.4.3 Fishing

Kigoma region has potential for fishing in the Lake Tanganyika and River Malagarasi. Lake Tanganyika has many rare fish; 214 species (134 family cichlidae); The fish industry of the lake include artisanal and commercial fishery. The artisanal fishery accounts for more than 99% of the total catch providing protein food as well as generating employment and income. Commercial catch is contributed by six pelagic species namely *Stolothrissa tanganicae* (dagaa) and *Limnothrissa miodon* (lumbo) and four Lates species i.e. *L. steppersii* (migebuka), *L. mariae* (sangara), *L. microlepis* (nonzi) and *L. angustrifrons* (gomba). *Stolothrissa tanganicae* (Dagaa) makes up more than 80% of the catch in both traditional and modern fisheries. There are more than 3,370 fishermen in Kigoma region.

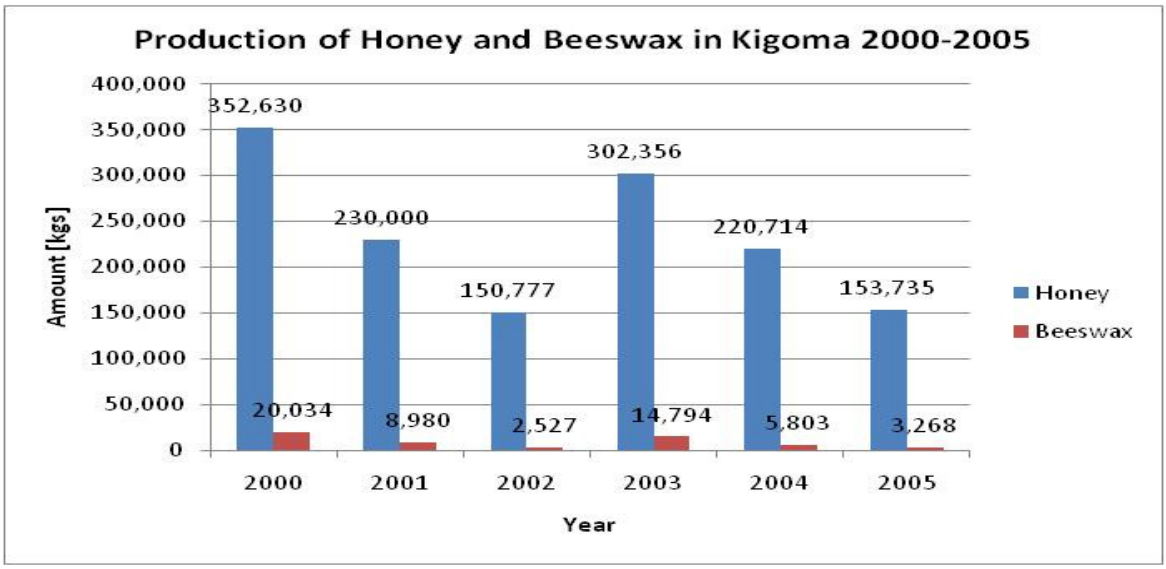


Source: Kigoma Region Socio-economic Profile, April 2007

Figure 4.6: Amount of Fish Caught in Kigoma Region

4.4.4.4 Beekeeping

Kigoma region has a high potential for beekeeping due to many nectar yielding tree species in the miombo woodlands. It is based on traditional beehives of low productivity and difficult for regular inspection. In 2005 Kigoma had about 84,249 traditional beehives and 2,096 modern beehives. Production of honey and beeswax in the region is indicated in figure 4.7 below.



Source: Kigoma Region Socio-economic Profile, April 2007

Figure 4.7: Honey and Beeswax in Kigoma Region

4.4.4.5 Wildlife

Kigoma is widely regarded as the world's foremost sanctuary for Chimpanzees. Other primates found in Kigoma not common elsewhere include red tailored monkeys, red Columbus and the Angolan black and white Columbus monkeys. In the eastern woodlands of the Mahale Park are found elephants, giraffes, zebras, antelopes, buffaloes and warthogs. Predators are also found in the park; they are lions, wolves and crocodiles and hyenas. The varieties of birds are also found in Kigoma Region.

4.4.4.6 Tourism

Kigoma Region is famous for historical events and antiquities such as Dr. David Livingstone memorial monuments at Ujiji Old town. Other tourist attraction in the region include the Gombe National Park, Mahale National Park, and Lake Tanganyika which is the deepest lake in Africa and second deepest in the world which is attracting tourists for fishing adventures. The realization of the tourist potential of Kigoma region has been hindered by poor infrastructure and difficulty in accessibility of the region. Therefore the upgrading of the airport may facilitate the accessibility by attracting air service providers and hence realization of tourist potential of the region.

4.4.4.7 Forestry

Kigoma region has great diversity of vegetation type namely montane forests, riverine forest and closed and open miombo woodlands. Other vegetation type includes montane grasslands, open grasslands, wooden grasslands, bush grasslands, bamboo thickets and swampy vegetation. Miombo woodlands are the major vegetation type occupying about 45.1% of the land area consisting mostly of braches taiga, jubernardia and isoberlimia species. Kigoma has an estimated cover of forest and woodland amounting to over 842,000 hectares. The swampy vegetation is dominated by mat forming species covering the area of Malagarasi and Muyowosi Ramser site. The forests and woodlands support wood-based industries as well as contribute more than 92% of natural energy requirement in the region. Furthermore, they support most communities by providing food, shelter, medicine, fruits and income to many people. Charcoal and firewood production depends much on this endowment.

4.4.4.8 Industrial Development

Apart from Uvinza Salt Mine, industry is limited to some small consumer-goods production due to geographical location and poor economic infrastructure. Small scale industrial activities include carpentry, auto-repair, boat building, soap making, saw milling, palm oil and palm kernel oil extraction, printing etc. Low level cottage industry includes a number of items like knives, spears, baskets and some ornamental materials.

4.5 ECONOMIC INFRASTRUCTURE

4.5.1 Roads

Kigoma Region has a road network with a total length of 2,803 Kilometers graded under trunk and regional roads. The region also has a number of district and feeder roads. (Road accesses to Kigoma region see section 4.2.1 above). Most of roads have earth surface and are in poor condition certain areas impassable during rain season. The road network in Kigoma region is of greater impact on the development of the region than the railway line as they link the region to the neighbouring regions of Rukwa (South), Kigoma, Shinyanga and Tabora as well as countries such as Burundi. The expansion of the airport will enhance the transportation to and from the region.

4.5.2 Air Transport

Kigoma region is served by one commercial airport located in Ujiji township. The airport has a gravel surface runaway, capable of handling Fokker aircrafts and other small planes. Kigoma Region is basically served by one commercial airline – Precision Air – that operates between Dar es Salaam and Kigoma. UNHCR and Red Cross international, who provide relief services to Burundian and DRC refugees, also operate frequent flights between Kigoma and Dar es Salaam, Mwanza, DRC and Burundi. Kigoma Hilltop Hotel also provides airlifts to tourists visiting Mahale National Park and safari camps at Muyowosi Game Reserve. In addition to the Kigoma airport, there are ten airstrips in the region: four are in Kigoma Rural District, one in Kibondo District and six in Kasulu District - used by light, non-commercial aircrafts at irregular intervals. The airstrips are generally maintained in good condition but may become waterlogged after exceptionally heavy rains. It is envisaged that the expansion of the airport will expand the flight services and reduce the relative isolation of the region from the centre (Dar es Salaam) and other regions in the country that will enhance development of the region.

4.5.3 Railway

Kigoma Town is one of the terminals of the railway line that starts from the port of Dar es Salaam. There are both; regular passenger trains and frequent cargo trains plying on what is generally referred to as the central line. The 1250 km railway branches off at Tabora 840 km (from Dar es Salaam) off northwards to Mwanza on the shores of Lake Victoria. There are three passenger trains and on average three cargo trains to and from Kigoma per week.The railways line traverses the region serving nine (9) stations namely: Luiche, Kandaga, Kalenge, Kazuramimba, Lugufu, Uvinza, Ilunde, Malagarasi and Nguruka. The central line also serves the landlocked countries of Burundi, Rwanda and Democratic Republic of Congo through Kigoma port.

4.5.4 Marine Services

A well established port is along Lake Tanganyika providing an important communications and strategically well placed link with neighbouring countries of Zambia, Burundi and Democratic Republic of Congo. Kigoma port serve as an outlet for cargo to and from these neighbouring countries. The major vessels in use are the M.V. Liemba and M.V. Mwongozo that sail weekly from Kigoma port to Bujumbura (Burundi), Kalemie (DRC) and south along the lake to Mpulungu (Zambia) calling at major villages in between both Kigoma and Rukwa regions. There is only one tanker ship known as Mt. Sangara with capacity of carrying 350,000 of fuel.

4.5.5 Communication Networks

TTCL and mobile operators - Vodacom, Celtel, TIGO provides telephone and fax services mostly in urban areas. Full postal service are provided in nine (9) urban and semi-urban areas of Kigoma, Ujiji, Kasulu, Kibondo, Uvinza, Mabamba, Manyovu, Mwandiga and Nguruka and twelve sub-post offices located in the minor towns or trading centres.

4.5.6 Energy

Electricity - mainly thermal and limited mainly to domestic purposes - is supplied by Tanzania Electric Supply Company (TANESCO) and some individuals. Electricity requirement for Kigoma /Ujiji is estimated at 4000 KW by seven diesel powered generators. The supply is equivalent to only 44% of the total demand. Kibondo, Kasulu and Uvinza also depend on diesel generators owned by individuals – supply does not meet demand. Fossil fuel is mainly for domestic purposes - kerosene is the number one source in both rural and urban areas.

4.6 PLANNED FUTURE DEVELOPMENTS

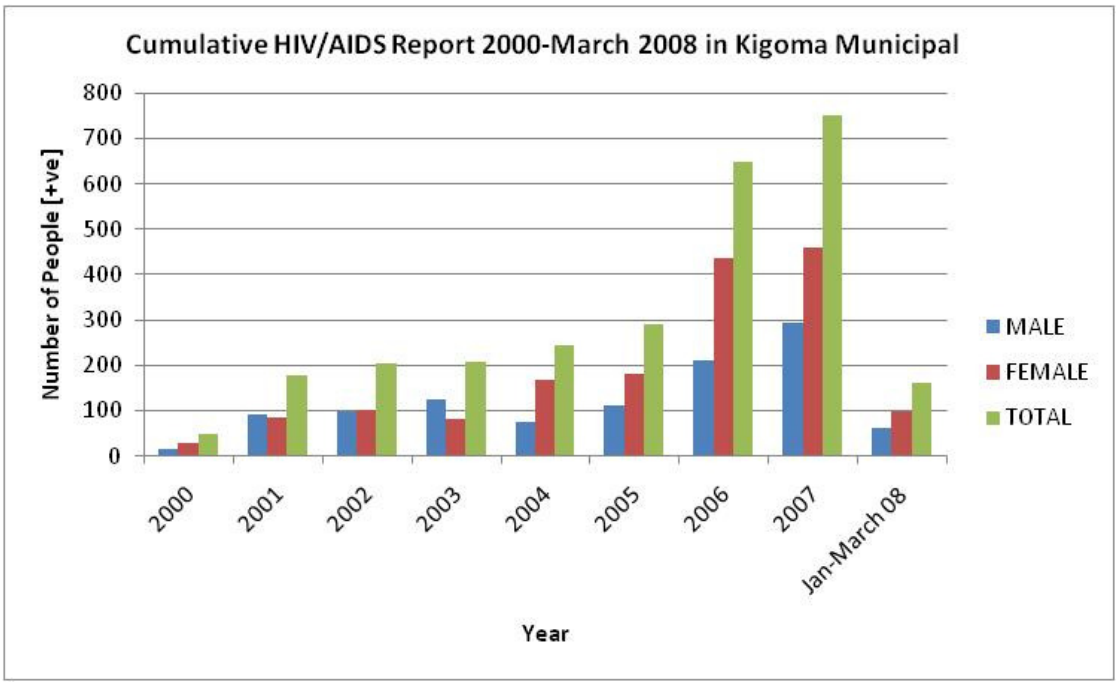
Changes anticipated before and after the project commence:

- Rehabilitation of the 65 km Mwandiga – Manyovu road;
- Rehabilitation of the 45 km Kigoma – Kidawe road;
- Construction of the Malagarasi bridge and 22 km road.

4.7 HIV/AIDS STATUS IN THE AREA OF INFLUENCE

Kigoma/Ujiji Municipal Council is engaging itself in the fighting against HIV and AIDS. Statistics shows that number of infected people increased by 95% from 2001 to December 2007. From 2007/2008 up to March 2008 number of people counseled and tested was 8,633 among them 4,412 were male and 4221 female with average prevalence rate of 2.6% of the tested people. In order to fight HIV/AIDS effectively participatory committees have been established in 13 wards of Kigoma/Ujiji Municipal Council. Other activities carried out are:-

- The sensitization of the people on the spread of the deadly disease.
- Counseling and voluntary testing that are carried out in government hospitals and other health centers
- Treatment and care for the infected (people living with HIV/AIDS) carried out through the provision of retroviral drugs at hospitals.



Source: Kigoma/Ujiji Municipal Council, 2008

Figure 4.8: HIV/AIDS Report in Kigoma Region

5. PUBLIC PARTICIPATION

One of the objectives of the scoping study for the proposed rehabilitation and expansion of Kigoma airport was to identify and involve key stakeholders in the Environmental Impact Assessment process. The process afforded opportunity to the stakeholders to express their views and concerns to be included in the Environmental Impact Assessment study.

The Consultants and Tanzania Airport Authority identified organizations, groups and individuals considered to be key stakeholders that might be impacted by the project components or have influence on the project. These stakeholders include government sectors, e.g. Ministries/Departments/Agencies; District, Ward and village governments; environment committees and experts.

The Consultants held consultations with different stakeholder listed in Annex IV In the meetings, the Environmental Impact Assessment team explained the scope of the project and solicited views from the stakeholders. In all cases Stakeholders' views were sought on their acceptance of the project.

The consultant advertised a public assembly in all project areas by placing posters at strategic public points inviting people to attend. The objectives were to explain the project and solicit opinions about the project's positive and negative effect.

5.1 THE STAKEHOLDERS

The assessment team held interviews and meetings with officials from government ministries, departments and agencies, district authorities, public and private organizations and NGOs. The consultants also organized public consultation meetings in Majengo area and publication of advertisements soliciting public opinions. The following emerged as the key stakeholders for the Kigoma Airport Rehabilitation Project:

- Central Government: Ministries, Departments and Agencies. These include Vice President's Office (Division of Environment, NEMC), Ministry of Lands, Housing and Human Settlements Development and, Ministry of Energy and Minerals.
- Project Proponent – Tanzania Airport Authority: Kigoma airport manager, Fire rescue team commander and design and planning manager.
- Kigoma Regional Secretariat and Kigoma District Commissioner's Office.

- Local Government Authorities: Kigoma-Ujiji Municipal Council: Municipal Director, and Municipal Management Team (Planning, Land, Community Development, Engineers, and Agriculture Departments).
- Kigoma Municipal Mayor, councillors and Regional Commissioner
- Local stakeholders included Buhanda, Businde, Machinjioni and Majengo sub-Wards (Ward Development Committee consisting of Ward Councillors, Ward Executive Officers.

5.2 ISSUES RAISED BY STAKEHOLDERS

5.2.1 SOCIO-ECONOMIC ISSUES

5.2.1.1 Land take

1. Areas of impact

A total number of 381 families/households found on the 1.2 km airport extension stretch in the Ujiji area will be involved. Most of them (almost 90%) are located in 5 sub-wards of Machinjioni Ward. The rest (about 10%) are located in 3 sub-wards of Majengo Ward. All roads within the earmarked area will be closed, but other infrastructure e.g. piped water systems or electricity transmission lines are none- existent in the extension area. No local institution e.g. school, health center, or church/mosque will be demolished. A local burial site will be relocated.

2. Alternative Sites/Routes

Stakeholders identified the following alternative resettlement areas among others which the Kigoma-Ujiji local government will continue to pursue: Kichangachui and Kigoma areas which very close to the extension area. Stakeholders identify three alternative roads including revival and rehabilitation of the old Kasulu road, construction of two new road from Businde - Buhanda to Gungu and Buhanda- Majengo-Ujiji. Areas for relocation of burial sites were yet to be identified.

3. Issues arising

- Fair valuation of land, houses, other immovable properties and improvements on the site; using current market prices.
- Timely compensation: valuation was done in 2007; improvements have been suspended since then, but no actions taken to-date.
- Compensations issues at alternative resettlement sites are still contentious.

- Procedure for compensation of burial sites needs to be elaborated.
- The exercise to be guided by the Land Acts and Land Acquisition Act (1999).
- Honoring promises made and the intent to rehabilitate and extend the airport, and not let the resettlement of people and involved costs and disturbances be in vain.
- Formation of a Committee constituting various stakeholders to deal specifically with resettlement and compensation issues was proposed.

5.2.1.2 Activities within the Airport Boundaries

The airport outer perimeter is only partially fenced about 2.5 km to the west, the rest about 6.5km to the east has no outer fence. Currently the airport grounds are used for various activities which are prohibited under the Aerodromes Law of Tanzania and other international regulations of ICAO.

- Farming of various crops (cassava, maize, sweet potatoes, vegetable) by about 30 – 40 families was inadvertently allowed on the land side (north and southwest) of the airport. This was with restrictions on crops like cereals (millet, sorghum, rice, rye) and sunflower that can attract birds and farming practices (terrace) that can restrict movement of fire vehicles.
- A playground and driving lessons on the airport access road west of the airport
- Footpaths and car tracks
- Burnt bricks making: about 6-10 pits dug for clay soil found at any given time; several furnaces erected on airport land;
- Clearance of trees and grass for thatching houses and animal fodder
- Livestock grazing – about 50-60 heads of cattle and goats; eroded cattle routes.

All activities constitute trespassing and are prohibited and stakeholders were informed that they will be stopped by airport management with immediate effect. Farmers will be allowed to first harvest their current crops; but there will be no compensations for halted activities on airport grounds.

5.2.1.3 Concerns about Benefits

Main concerns raised include:

- Employment of people outside Kigoma vs local /indigenous people
- Concerns about benefits that will accrue for the Kigoma-Ujiji council not being obvious e.g. percentage of revenue collected at the improved airport.
- Compliment to other planned development activities in Kigoma region e.g. Special Economic Zone to be developed south of the airport.

5.2.1.4 General Socio-Economic Benefits

A number of benefits of the upgraded airport were outlined as follows:

- Bigger planes – Boeing 737, UN Monlic - with big capacity for passengers and cargo will enhance increased commerce and trade with neighboring countries: DRC, Rwanda and Burundi and facilitated UN activities in the region
- Upgraded airport means more operators, more competitions and reduced air-travel prices.
- Income to local entrepreneurs and service providers at and close to the airport; shops for general goods and souvenirs, food and refreshment kiosks, restaurants, hotels/guest houses, transportation and delivery services
- Increased tourism to attractions e.g. Gombe (*chimpanzees*) National Park, Mahale (*gorillas*) National Park, Livingstone center, Lake Tanganyika
- Stimulate investment and opportunities (e.g. development of the proposed Special Economic Zone (EPZ), business and commerce and communications.
- Upgraded airport category.

5.2.2 Environmental issues

- Noise pollution: Impacts of increased numbers and frequency of aircrafts especially to schools in the direct path to the airport.
- Disposal of solid waste especially ruble fro demolished buildings.

5.2.3 Technical Issues

1. Rehabilitation and Upgrading Works

- Concerns about upgrading an airport which is located in the middle of an urban area instead of finding alternative more spacious sites with minimum or no compensation costs and related resettlement issues.
- Construction works that are up to standards and not shoddy jobs.

2. The MCC Funds

Highly publicized but never materialized.

3. Sources of Materials and Other Inputs

- Sources for aggregates are not well established in Kigoma region and there are no established stone crushing sites and equipments. A site needs to be explored at e.g. Ilunde, Ilagala (Uvinza area about 130 km from the airport.
- Source for gravel: Mungonya located about 10 km from the airport.

- Other developments anticipated before the project commences that demand construction materials include rehabilitation of the 65 km Mwandiga – Manyovu road; the 45 km Kigoma – Kidawe road; and construction of the Malagarasi bridge and 22 km road.
- Water is in ample supply. Piped supply by the Kigoma WASA is available at the airport. Alternatively water for construction can be sourced from Lake Tanganyika at Livingstone, Ujiji.
- Electricity supply by TANESCO is thermal power from diesel generators. Most institutions have own generators.

5.2.4 Institutional and Management Issues

- The District Commissioners office will take the lead in all matters concerning compensation and resettlements. The cutoff date and an official notice will be decided upon and issued within 2/weeks (from date of this community meeting 24th April, 2008)
- Responsibility for coordinating environmental issues has been delegated to Urban Planning Department – an acting Municipal Environmental Office among the staff.
- Committees on environment, HIV/AIDS, security are all in place. To follow and monitor degradation at points of sources, and pollution from waste.

5.2.5 Acceptance of the Project

The majority expressed support for the project – overwhelming majority at the regional stakeholders meeting; with a few at the community level. Main issues of trepidation related to unfair valuation and timely compensations.

6. ENVIRONMENTAL IMPACT ASSESSMENT

6.1 IMPACTS IDENTIFICATION AND SIGNIFICANCE

This section determines likely sources and quantification of both negative and positive environmental impacts.

6.1.1 SITE SELECTION PHASE

Site selection phase presents the overarching impacts of the presence of the project on the general natural settings at the project area. The impacts are further analysed in subsequent phases and sections. In upgrading projects such aspects as land-take that are normally considered for new projects do not apply. However, within the land required for extensions there are no natural features of ecological value that will be disturbed/cleared, thus main impacts sources relate to natural factors and processes.

6.1.1.1 Effects of Natural Factors and Processes

- Potential Impact: **Damage to Airport Buildings/Erected Structures and Disruption of Operations**

This relates to possibilities of natural factors e.g. climatic elements and earth movements etc. to have effects on the project components. Kigoma is known to sometimes experience extreme climatic conditions in the months of March - May (influenced greatly by its proximity to Lake Tanganyika) with heavy rains, accompanied by lightning and sometimes storms that damage buildings, farms and tall trees and built structures. There are no recorded earthquakes in Kigoma region. Impact associated considered as: **negative, long-term and moderate significant**

6.1.2 DESIGN PHASE

Main impact sources for the design phase relate to:

- Choice of Best Available Techniques (BAT), technologies, and practices (to meet both Tanzania and international Health, Safety and Environmental (HSE) standards);
- Setting management procedures for handling and disposal of wastes, health & safety procedure;
- Planning for availability of adequate resources

6.1.2.1 Storm Water Drainage and Overflows

- Potential Impact**: Ineffective Utilization of The Airport / Damage to Rehabilitated Structures.**

Due to airports flat terrain, storm water tends to remain stagnant on airport grounds especially during the heavy rains. Kigoma airport is within wide lowland that extends to encompass most of the Ujiji Township. However, the natural slope towards the Bwawani lowland to the north-east and the Kirugu lowland to the south-east and various storm water channels constructed on the airport prevents storm water from stagnating on the airport field during heavy rains. At the extension area also there good slope towards the Msingeni valley and various drainage channels in the Ujiji area. The lowlands /valley areas interconnect with the major perennial river Luiche which drains into Lake Tanganyika. Thus these existing natural and built drainage systems can be utilized to design and build efficient drainage channels. Impact associated considered as: **Negative but high significance.**

Fig 6.1: Drainage Channel inside the Airport Area

6.1.2.2 Exploitation of Borrow Pits/Quarries and Other Natural Resources

- **Degradation At Points of Source of Construction Materials**

Project construction main materials requirements are indicated in table 6.1 below

Table 6.1 Materials required for construction works.

Materials	Quantity	Potential Source
Gravel	127,100 m^3	Mungonya Borrow Pit
Aggregates	63,550 m^3	Ilunda Quarry, Uvinza area
Sand	25,420 m^3	Ujiji area
Water	4,000,000 m^3	Lake Tanganyika, Mungonya River or Luiche River
Bitumen	1080 Tones	Dar es salaam or Abroad

NOTE: The above stated quantities of materials are a provisional assessment for indicative purposes only and will be subject to confirmation at final Detailed Design stage

Sources for aggregates are not well established in Kigoma region and there are no established stone crushing sites and equipments. Potential sites at e.g. Ilunde, Ilagala (Uvinza area) are about 132 km from the airport. Extractions of gravel from both authorized borrow pits and quarries on government land, communal land and on private-owned land e.g. the main active borrow pit at Mungonya and other minor quarries e.g. Masanga hills are associated with rampant degradation with no efforts of restoration/re-vegetation. Most exploited borrow pits are found on land with natural or planted vegetation and sometimes crops which have been cleared/disturbed. Mungonya quarry located on Kasulu road, about 10 km from the airport have pits excavated on both sided of the road: about 10 acres of shallow (1-3m depth) to the west and about 3 acres of relatively deep pits (over 5m) to the east. The pits are close (less than 20m) to the sensitive ecosystem of Mungonya River which is a tributary of Luiche river which empties into Lake Tanganyika. Pollution risks include sediment overload into the river system during rains and contamination by oils from excavators/loaders.

There is no likelihood of over-exploitation of local water resources as Kigoma has ample supply. Piped supply by the Kigoma Water Supply & Sewerage Authority is available at the

airport. Alternatively, water for construction can be sourced from Lake Tanganyika at Livingstone, Ujiji. Electricity supply is a challenge for the region. Supply by TANESCO is thermal power from diesel generators. Most institutions have own generators. Fuel wood – charcoal and firewood are the main energy sources for domestic purposes and most accessible areas of the region have already been depleted of wood resources.

Resources extraction is open to all Contractors / users. There are other developments anticipated before the airport expansion project commences that demand construction materials including rehabilitation of the 65 km Mwandiga – Manyovu road; the 45 km Kigoma – Kidawe road; and construction of the Malagarasi bridge and 22 km road.
The project will be adding on to existing/future problems (cumulative impacts).
Thus impacts associated with resource extraction from off-site locations are considered as:
Secondary or indirect negative impacts, cumulative, short to medium -term but of high significance.

Fig 6.2: Mungonya Borrow Pit

6.1.2.3 Haphazard Disposal of Wastes

- Potential Impact: **Contamination and /Impaired Quality of Receiving Body – Land and Water.**

Main sources of construction waste are cleared vegetation and top soil (overburden), rubble from demolished runway and facilities, and domestic waste from construction crew. During operation of the upgraded airport, various type of wastes will be generated including solid and liquid wastes from food and refreshment centers, offices and business centers; fuel and oils from maintenance workshops/hangar and aircraft fueling points. Designs should take due consideration for prevention of haphazard waste disposal. The wastes may contaminate land or be washed into local surface and ground water resources and impair the quality of these receiving bodies. Other impacts include increased bird population (attracted by food waste). The airport is very close to Lake Tanganyika – a water body of ecological and socio-economic significance for the Great Lakes countries. There is possibility for waste from the various construction and airport operation activities to be dumped/washed into the lake. Impacts associated are considered as: **Negative, cumulative, short-term but of high significance**

The project also expected to employ 60 skilled and semi-skilled personnel and about 300 labourers who will be hired locally. There shall be temporary construction camp site adjacent to the airport which will accommodate junior and semi skilled staffs. Accommodation of senior staff will be in Kigoma town and for labourers will be from their homes, since will be residence of Kigoma municipal. An average 0.5Kg waste will be produced per person per day. It expected that about 197 tons of domestic solid waste will be produced for the 3 years duration of the project construction. Impacts associated are considered as: **Negative, cumulative, short-term but of high significance.**

6.1.2.4 Atmospheric Emissions Generating Equipments

- Potential impact: **Deteriorated / Impairment of local air quality**

During construction and operation phases of the airport, air pollution by gaseous emissions from various sources is an issue for consideration during design stage. Sources of air pollution will be gaseous emissions from fuel powered equipments and vehicles. Main impact is impairment of local air quality, the extent of which will depend on quantities emitted, duration and prevailing atmospheric conditions. Table 6.2 shows the various construction emissions generating equipments.

Table 6.2 Emissions Generating Construction Equipments.

S/N	Type	Function	Number
1	Excavator	Excavation of land	3
2	Wheel loader	Loading truck	4
3	Trucks	Haul	40
4	Motor grader	Clearing and Grading	6
5	Compactor	Compaction	6
6	Asphalt plant	Asphalt producer	1
7	Crusher	Aggregate crusher	1

Due to the number of the equipments involved, the emissions may affect local air quality but will have no significant impact on global air quality issues. Therefore impacts associated are considered as: **negative, short-term, low significance.**

6.1.2.5 Base Camp

Site(s) will be required, though temporarily at both the airport site and at borrow pits for storage of equipments and materials and for an office for construction crew. At the airport area there will be temporary buildings with all facilities like water, electricity and sanitation system, whilst at the borrow pit there will be camp for supporting staffs like security guard and drivers.

Impact sources for consideration during design phase:

- Land requirements: impacts similar to section 6.1.1.1 above
- Waste disposal: impacts similar to section 6.1.2.3 above

6.1.3 MOBILIZATION PHASE / CONSTRUCTION PHASE

Main impact sources under this phase include:

- Clearance of extension portions and if necessary access routes and sites for support facilities (storage, crew).
- Transportation of construction equipments, materials and labour.
- Setting up and operation of base camp
- Construction works

6.1.3.1 Vegetation Clearance

- **Impact: Damage Local Vegetation Cover and Potentially Loss of Local Biodiversity.**

Clearance of vegetation – especially bulldozing to ground level - has tendency to damage local vegetation cover and potentially damage/ loss of habitats and local biodiversity and increase risks to erosion. Permanent clearance will be confined only to the existing graveled runway, apron and taxiway which constitute a small portion of the grassed airport. Vegetation on the extension portions mainly heavily mowed grass, crops, a few planted trees and other secondary vegetation important in the stabilization of soil will be replaced by grass capable of the same functions. Thus, the overall vegetation clearance will constitute no significant ecological loss. Impacts associated are considered as**: Low significant**

6.1.3.2 Air Pollution

- Potential impact: **Impairment Of Local Air Quality**

Equipments capable of generating air emissions are elaborated above (section 6.1.2.4.) where technologies and practices for reduction / elimination of emissions are considered. However, even with the best available technologies, most of the equipments and vehicles emit gases such as CO_2, NOx, SOx, particulate matters and hydrocarbons - regarded as residual air pollution. Congruent to these are pollutions from fugitive dusts emitted during clearing / excavation works and from vehicles running on loose-surface roadways.

Construction equipments, aggregates, cement etc. will be transported by using various means including cargo train wagons or trucks from as far as Mwanza/Dar es Salaam about 387 km and 1,580 km away respectively. Gravel will be obtained from Mungonya borrow pit and other materials e.g. sand will be procured locally in Kigoma and transported by trucks to the airport site.

Table 6.3 is the number of truck journeys required to mobilize construction materials from off-site locations to the airport construction site.

Table 6.3 Number of Truck Journeys to Mobilize Construction Materials

Type of material	Quantity (m3/Tonnes)	Distance from Source (km)	Truck Journeys (Number)
Gravel	127,100	10	15,888
Aggregates	63,550	132	7,,943
Sand	25,420	10	3,105
Bitumen	1,080	1580	31
Water	4,000,000	10	4,000

NOTE: The above stated quantities of materials are a provisional assessment for indicative purposes only and will be subject to confirmation at final Detailed Design stage

6.1.3.3 Fuel, Oils, Lubricants Spillages/Leakages

- Potential impact: **Contamination / Impairment Of Quality Of Receiving Bodies**

Incidental spillage of fuels and oils may occur during refueling and minor equipment repairs or leak from equipments that are not well maintained. These may contaminate land or be washed into local surface and ground water resources and impair the quality of these receiving bodies as elaborated under section 6.1.2.3.

6.1.3.4 Excavation

Potential impact: **Damage/Disturbance to Sub-Surface Organisms.**

Trenching (for drainage channel, new fence etc.) and construction of sub-base especially on the extension portion of the runway may cause damage/disturbance to any sub-surface organisms found in the project area. Kigoma airport vegetated areas, contain ants and burrowing rodents that may be affected as well as the usual subsoil microorganisms, arthropods and earthworms etc. However, these are not unique or rare organisms and found in the general project area. Impacts associated considered as: **negative, localized, short term and moderate significance.**

6.1.3.5 Inadequacies in Compaction and Resurfacing

- Potential impact: **Damage /Erosion Of Exposed Surfaces**

Inadequate compaction and resurfacing compounded by rain, trampling etc. may cause damage to rehabilitated structures and soil erosion and consequent sediment load in runoffs (section 6.1.2.3 above). This is mostly likely to happen if construction is undertaken during the months of March - May when Kigoma experience heavy rains.

Impacts associated considered as: **Negative, localized, short term and moderate significance.**

6.1.3 OPERATION PHASE

During operation phase, impact source is due to operation of upgraded airport. Once the airport will be upgraded there is anticipate increase in passengers, aircraft, cargo, etc. Impact sources for this phase are increased aircrafts, traffic and inadequacies in maintenance and monitoring

6.1.3.1 Air Emissions from Increased Aircrafts

- Potential impact: **Impaired Air Quality**

A consequence of expanded capacity of the airport will be increased air emissions from increased numbers of aircrafts including gases such as CO2, NOx, SOx, particulate matters and hydrocarbons. However initially frequency of aircraft anticipated will be low, thus the emissions will have no significant impacts on local or global air qualities. Impacts associated are considered as: **Negative, long term and Low significance**.

6.1.3.2 Inadequacies in Operation and Maintenance

- Potential impacts: **Contamination and /Impaired Quality of Receiving Body – Land and Water.**

Lack of periodic maintenance of the runway and inadequate resources to maintain the airport facilities e.g. lack of sustained water supply, storm water drainage, haphazard disposal of wastes etc. may in future result in storm water overflows and waste disposal hazards expounded under section 6.1.2 above. Flooded airport is the main cause of frequent closure of airports, disrupted airport operations and boycott by some of the operators. Impacts associated are considered as: **Negative, long term and high significance.**

DECOMMISSIONING

6.1.4.1 Disposal of Waste from Demolished Structures

Potential impact: **Contamination/Impaired Quality of Receiving Body**

In the event of future rehabilitations and upgrading, the runway and associated facilities may need to be demolished necessitating disposal of demolished waste. Haphazard disposal may cause contamination/impaired quality of receiving body – especially land, and water resources.

6.2 IMPACTS MITIGATION

Section 6.1 above has identified potential environmental impacts and their significance. This section provides a summary of mitigation measures of those impacts which are considered to be of moderate to high significance.

6.2.1 SITE SELECTION PHASE

(I) Damage to Airport Building/Erected Structures and Disruption of Operations Due to Nature Factors and Process

To mitigate this impact, the buildings and other structures within the airport area will be designed to the appropriate structural and civil engineering codes and practices. Building foundations, columns and frames shall be reinforced with high tensile strength steel bars to achieve the structural ability to withstand climatic elements anticipated in this locality.

6.2.2 DESIGN PHASE

(I) Damage to Rehabilitated Structures Due to Ineffective Storm Water drainage and Overflows

Normally during the design of airport storm water impact is given a high priority, with the limitation of gradient (slope) required for the runway, taxiway and apron. Storm water effect have been mitigate successfully in almost all airport design. Therefore to mitigate this impact a proper hydrology analysis will be carried out, considering the airport topographical features, amount of rainfall and catchments area as the major factors of design of storm water channel. Also storm water drainage design will take into consideration the existing channel along the airport area, if the amount of storm

water produced is higher than the existing channel can accommodate further additional and supplementary drainage provisions will be designed and installed as part of the rehabilitation and upgrading works.

(II) Exploitation of Borrow Pits/Quarries and Other Natural Resources

Effects of exploitation of borrow pits/quarries and other natural resources will be mitigated as follows:

- Exploitation of construction materials will be from the authorized source only as indicated in table 6.1
- Restoration of the borrow pits/quarries after use constituting leveling the area and seeding or planting of trees and/or grasses will done in association with local government (natural resources department) and local environmental NGOs. If appropriate the leveled area will be left for natural re-vegetation.
- Maintain construction equipments in good running condition and refuel restriction at the workshop/base camp.

(III) Contamination and Impaired Quality of Receiving Body- Land and Water

To mitigate the impacts of wastes an efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport.

- To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials where leveling of runway, taxiway and apron is required.
- Cleared vegetation, top soil and rubble from demolished buildings at the airport area will be used to cover haphazardly disposed municipal waste at Masanga damp site. Alternatively in consultation with municipal council, the waste will be used to fill up any other infrastructures (roads, pits etc) that needs filling.
- Introduction of waste disposal bins, warning notices, "DO's & DON'TS" etc posted at strategic points, through the airport area.
- No, on site burial or open burning of solid waste shall be permitted at the airport. Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system.
- Wastes not suitable for incinerations and general municipal waste damping (e.g. Batteries, plastics, rubbers, tyres, etc) shall be removed from the airport for recycling, treatment, and/or disposal by licensed contractor as appropriate.

- Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non combustible waste during bidding process.
- Waste management training for all personnel, operators and services providers at the airport.
- Liquid waste will be collected using a cesspit tanks system at the airport area. When full Tanzania Airport Authority will make use of the existing municipal council/urban water supply and sewerage authority cesspit empting services.

(IV) Deteriorated / Impairment of Local Air Quality due to Emission Generated from Construction Equipments

To mitigate this impact measure of control of exhaust emissions shall take place during project implementation which includes:

- Maintain equipment in good running condition, no equipment to be used that generates excessive black smoke.
- Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switch off engines when not in use.
- Routine Inspection of equipments

6.2.3 MOBILIZATION /CONSTRUCTION PHASE

(I) Destruction of Vegetation cover / Loss Local Biodiversity from Vegetation Clearance

To mitigate the impact the contractor and Tanzania Airport Authority during construction shall ensure that:

- Indigenous vegetation in areas that will not be impacted by the project shall not be disturbed.
- Rehabilitation by seeding or planting grasses to all areas that will not be occupied by runway, taxiway, apron, buildings and other airport facilities on the project site.
- Avoid planting non-native and exotic species on the site as well as those that constitute obstacles according to the airport regulations.

(II) Deteriorated / Impairment of Local Air Quality due to Emission Generated from Construction Equipments

Mitigation measures similar as in section 6.2.2 (IV)

(III) Contamination/Impairment of Quality of Receiving Bodies from Fuel, Oils, Lubricates Spillages/Leakages

To mitigate the impacts the contractor and Tanzania Airport Authority during construction shall ensured the following:

- Routine maintenance and checks of contractor's equipments and trucks.
- Training of site personnel in proper handling, storage and cleanup of contaminating material into the environment.
- Storage and routine handling of fuels, lubricants, oils and other potentially contaminating materials to occur in weather protected areas equipped with secondary containment systems for spills as appropriate.

(IV) Damage/Disturbance to Sub-surface Organisms Due to Excavation

To mitigate the impact the contractor and Tanzania Airport authority during construction shall ensure that only those areas needed to be excavated are excavated and subsequently backfilled after construction.

(V) Damage/Erosion of Exposed Surfaces

To mitigate the impact the contractor and Tanzania Airport Authority during construction shall ensure the following:

- That construction will be as per engineering design and procedure of which a minimum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant.
- Divert runway water away from structures
- Maintain gravel fill and/or re-vegetate around the structures

(VI) Impairment of Air quality Due to Dust

In order to mitigate dust impacts it is recommended that the contractor shall do the following:

- Protect stockpiles of friable material subject to wind through wetting.
- Cover loads with of friable material during transportation.
- Restrict speed on loose surface roads to 30Km/hr during dry or dusty conditions.
- Douse with water of roadways and work sites to reduce dust when necessary.

6.2.4 OPERATION PHASE

(I) Disrupted Airport Operations and Contamination and/Impaired Quality of Receiving Body (land and water) due to Inadequacies in Operation and Maintenances.

In order to mitigate the above impact the Tanzania Airport Authority shall ensure the following:

- Water reserve tank of not less than 100 m^3 shall be constructed at the airport
- Monitoring and reporting for routine maintenance, repairs, replacements, of all environmental sensitive areas e.g. storm water channels, waste collections and storage.
- Enforcements of all regulations instituted by the airport e.g. Warning notice

6.2.5 DECOMMISSIONING PHASE

(I) Contamination/Impaired Quality of Receiving Body

Mitigation measure similar as explained in section 6.2.3 (II) above.

7. SOCIAL IMPACTS ASSESSMENT

7.1 IMPACTS IDENTIFICATION AND SIGNIFICANCE

7.1.1 SITE SELECTION

Site selection phase determines the overarching impacts of the presence of the project on the general socio-economic settings at the project area. The impacts are further analysed in subsequent phases and sections. In upgrading projects, aspects that are normally considered for new projects do not apply, thus main impacts sources relate to land take at extension portions and effects of neighbouring activities and developments.

7.1.1.1 Land Take for Extension of Existing Runway

- **Cost Of Compensation and Relocation Disturbances**

The design plane for the upgrading programme, Boeing 737 requires land space of about 150 m either side from the center line of the runaway and 3.1 km length of the runway. About 1.2 km of land of within Ujiji Township, located within this range will need to be taken in order to meet the required dimensions (ICAO). The main socio-economic effects of the project to the owners/users will be permanent loss of land taken and disturbances associated with relocation; loss of income and food from cleared crops; divided communities and general disruption of economic/social activities and services and nuisance related to closure of roads and blocked access.

Main developments on the extensions of socio-economic value that will need to be relocated /closed / cleared /restricted include:

- **About 381 Families/Households.**

Most of the houses (almost 90%) are located in 5 sub-wards of Machinjioni Ward; and the rest (about 10%) are located in 3 sub-wards of Majengo Ward. Infrastructures such as piped water systems or electricity transmission lines are none- existent in the extension area. No local institution e.g. school, health center, or church/mosque will be demolished.

- **Roads and Footpaths Leading From and to Two main Wards***;*

Extension of the runway will cause blockage of the road from Rusimbi settlement (west of the airport) to the Buhanda – Businde settlements (east of the airport). The main business and administrative center – market, health services and piped water

supply are found in Kigoma-Ujiji to the west. Thus people residing on the east side will be denied of traditional access routes to these services. Likewise, along the Rusimbi to Businde road there is a vibrant trade and exchanges of various goods – mainly farm produce and charcoal – brought from rural Kigoma: Kwaga, Msesa, Manyange, Ikwage, Kandaga, Kidahwe, Mlela and other villages as far as Kasulu (90 km away). The majority of the buyers are women; catching the goods at a cheaper price before they get into the main markets in Kigoma-Ujiji.

- **A local Burial Site**

The site caters for all religions and wards surrounding the airport area. Relocation of old graves will involve compensations, costs of relocation as well as psychological apprehension to concerned families. Relocation site and new burial site are yet to be identified by the Municipal; Council.

Though not happy about the issue, the affected people and their leaders understand and accept the inevitability of moving – as directed by the Land and Airports Acts - to give way to the airport expansion plan. Main constraints drawn from experience from other projects in the region include compensations that are not timely or transparent: valuation was done in 2006, improvements have been suspended since then, but no actions taken to-date; unfair valuation of land, houses, other immovable properties and improvements on the site not using current market prices; lack of experience about procedure for compensation and relocation of burial sites. On the part of the project proponent On the part of the project proponent - TAA, main impacts are costs of compensation of land and developments. Impact associated considered as: **Negative, cumulative, short/medium term and of high significance**

7.1.1.2 Abolition of Activities Prohibited within Airport Boundary

- Potential impact: **Disruption of Economic and Social Activities and Services**

Lack of outer boundary fence allows trespassing and a multitude of activities on airport land. From the user's point of view, the advent of a well fenced airport result in disruption of economic and social activities and services including blocked access, loss of income etc. Kigoma airport outer perimeter is only partially fenced about 2.5 km to the west; the rest about 6.5km to the east has no outer fence. Thus, the landsides of the airport are used for various activities listed under section 5.2 (stakeholders issues) including farming of various crops by about 30 – 40 families; a playground and driving lessons livestock grazing; footpaths and car tracks; burnt bricks making.

The activities are illegal, constituting trespassing and against both the Tanzania law and international laws and airport practices: Aerodromes Law of Tanzania and other international regulations of ICAO. Their abolishment will increase airport effectiveness and security. Furthermore, when the airport is fully operational, omission of a fence as part of the upgrading programme could cause fatal accidents especially to children/people tres-passing the airport grounds. Crops like cereals (millet, sorghum, rice, rye) and sunflower attract birds and farming practices (terraces) can restrict movement of fire vehicles. Impacts associated considered as: **Positive from airport operational perspective but negative to the trespassers. Impact is of medium term and of moderate significance.**

7.1.2 DESIGN PHASE

Main impact sources for the design phase relate to:

- Choice of Best Available Techniques (BAT), technologies, and practices (to meet both Tanzania and international Health, Safety and Environmental (HSE) standards);
- Setting management procedures for handling and disposal of wastes, health & safety procedure;
- Planning for availability of adequate resources

7.1.2.1 Exploitation of Borrow Pits/Quarries and Other Natural Resource

- Potential Impact: **Depletion Of Resources/Public Health Risks**

There are no apparent signs of over exploitation of the commonly used construction materials from areas within economic distance from the Kigoma Municipal center. There are several sites for sourcing gravel materials – open to all contractors and other small scale users. The gravel borrow pit at Mungonya village (10 km on Kasulu road) caters for many users and materials are abundant. It is sandwiched between the Mungonya settlement and the Mungonya River. The river is a multipurpose wide wetland grown with mix of sugarcane, palm trees, banana and reeds. It water is used by locals to irrigate nearby small farms of maize, tomato, legumes, vegetables etc.; for domestic use (drinking, washing, cooking); and portable water for brick making and construction works. Pollution by sediment overload and contamination by oils from excavators/loaders pose heath risks to users. The pits abut the Kasulu road and

pose high risks of damaging it. The airport project will be adding on to this already perilous situation. Impact associated considered as**: Negative, secondary (indirect), cumulative, and of high significance.**

7.1.2.2 Haphazard Disposal of Construction and Operations Wastes

- Potential impact: **Visual Impacts / Public Health Hazards**

Main sources of construction and operations wastes are shown in table 7.1.

Table 7.1: Types and Sources of Construction and Operations Waste.

Type of waste	Sources
Vegetation and top soil (overburden)	Clearance
Rubble	Demolition of runway and airport facilities
Domestic waste: food, paper, metal parts, glass, batteries etc.)	• Construction crew • Food and refreshment centers, offices and business centers
Fuel, oils and lubricants	• Construction equipments • Maintenance workshops /hangar • Aircraft fueling points.

Overburden, rubble, domestic waste produced by construction activities and during airport operations if dumped haphazardly becomes an eyesore, cause bad smells and reduces the aesthetic value of an area. Food waste attracts insects (houseflies, ants) and scavengers (rodents, birds, dogs, cats) some of which are potential vectors of diseases including cholera, diarrhea etc and may create nuisance to airport users. Bird strikes cause damage to aircrafts. Some waste are non-biodegradable and/or poisonous (plastic, batteries, oils etc.) and may seep into under ground/surface water resources. Groundwater depth throughout the core study area typically ranges from

45 m to 100 m below the ground surface. Rivers/streams and Lake Tanganyika are the main source of potable water for most of the inhabitants of the airport general area.

Current measures to manage waste (collection and disposal of solid, liquid and excreta waste) and maintain the sanitation and hygiene at the airport are barely sufficient for current traffic and staffs. The area around the project site lack management of solid waste. Approximately 360 workers will be needed to carry out the upgrading programme. Assuming that the per capita waste generation is about 0.5 kg per day. About 197 tonnes of solid waste will be generated during construction. Also sewage will be generated from the occupants of the camp. Assuming that each person will use 20 litres of water and 80% of this amount is discharged as waste the amount of domestic wastewater that will be generated is about 6,300,00 litres. Impact considered as: **Negative, short term high significance**

7.1.2.3 Hazards to Workers

- Potential impact: **Occupation Health And Safety**

Inadequacies in provisions for working conditions - safe working environment is normally assured when code of practices in the working place are instituted. Failure during the design to provide for and integrate health and safety (e.g. proper personal protective gear) and ensure there is a distribution of responsibility and accountability for health and safety to all employees at all levels may lead to accidents, injuries to workers, loss of lives and/or of property. Mobilization and construction activities are rife with activities that may cause risk of serious injuries, fatalities to workers these include motored / sharp edged equipments, etc.

Construction works use various noise-emitting heavy power equipments and tools and engines including compressors, generator and mixing machinery. Noise is expected to be generated from vehicles and trucks transporting construction equipment and from crew and if applicable from blasting. Noise levels from hand portable drilling equipment range between 90-96 dB, and from vehicles about 65 dB.[1] Also fire risk at base camps made of tents or thatch-roofed. Occupational health hazards may also be promoted by lack of procedures that mitigate negligence at work, fatigue due to understaffing and long working hours, employing wrong people on particular jobs (e.g. employing an unskilled person to handle dynamite explosives), lack of

[1] http://www.cdc.gov/elcosh/docs/d0500/d000573/d000573.html

protective gear, low morale, etc. Impact considered as: **Negative, short term, low high significance**

7.1.2.4. Public Health and Safety

- Potential impact: **Health Hazards / Disturbances and Nuisance to Offsite Receptors**

Transportation and construction hazards to public could emanate from vehicles causing accidents, congested traffic, material spillage etc; air pollution from emissions of exhausts of trucks, equipments and dust from loose earth roads; and noise generated from vehicles and trucks transporting construction equipment and from crew. Construction works use various noise-emitting heavy power equipments and tools and engines including, compressors, generator and mixing machinery. Noise levels from hand portable drilling equipment range between 90-96 dB and from vehicles about 65 dB[2]. Impacts associated considered as: **Negative, short term, low high significance**

7.1.2.5 Social Interactions

- Potential impact: **Public Health Hazards/Safety**

Construction works and increased business opportunities at the airport will be associated with availability of employment opportunities and hasty generation of income. Therefore people with different social background will immigrate in the project area to access opportunities created. This influx of people in the project area and resultant social interactions among workers and locals is inevitable especially on the construction areas, transportation routes etc. The obvious relative wealth of the project workers may lead to exploitative behaviour on the hosts' side. Consequence of these interactions could be increased incidences of health impacts such as spread of STDs, HIV/AIDS, breaches of security as well as attitudes and behaviour change to indigenous people. HIV infection rate in Kigoma Municipality is at 2%. However, airport upgrading is one among several construction works and other investments taking place in the Municipality/region. Impact associated considered as: **negative, cumulative, short-term, and of moderate significance.**

[2] http://www.cdc.gov/elcosh/docs/d0500/d000573/d000573.html

- Potential impact: **Compromised Security**

Construction activities are associated with incidences of vandalism and theft of equipments and materials such as cement, explosives and other portable items that have ready-made market for home use. Construction activities will be conducted on airport grounds this provides opportunities for people residing in nearby settlements to have easy access to construction equipment and other materials. Impact associated considered as: **Negative, cumulative, short-term, and of moderate significance.**

7.1.3 MOBILIZATION / CONSTRUCTION PHASE

Main impact sources:

- Clearance of extension portions and if necessary access routes and sites for support facilities (storage, crew).
- Transportation of construction equipments, materials and labour.
- Setting up and operation of base camp.
- Construction works.

7.1.3.1 Vegetation Clearance

- Potential impact: **Loss Of Crops and Impairment of Landscape Aesthetics**

Clearance of vegetation will entail removal of banana and contained crops – found on the extension portion. The farms are small backyard gardens mainly used for home consumption. Clearance usually affects the natural aesthetic attraction of an area; however a large portion that will be cleared is located in an already cleared area.
Impacts associated considered as**: Negative, low significant**

7.1.3.2 Exploitation of Local Resources and Manpower.

- Potential impact: **Income to Local Suppliers and Service Providers**

The borrow pits and quarries either belong to private individuals or groups, villages or are owned by the Municipal Council.

Table 7.2: Income Expected from Exploitation of Local Resources

Type of material	Quantity Required by Project	Unit price	Total Tshs
Gravel	127,100 m^3	7,000.00	889,970,000.00
Aggregates	63,550 m^3	15,000.00	953,250,000.00
Sand	25,420 m^3	4,300.00	109,306,000.00

NOTE: The above stated quantities of materials are a provisional assessment for indicative purposes only and will be subject to confirmation at final Detailed Design stage

The Contractor and crew will also depend on other local supplies and services (food, accommodation, medicals) and employment of casual and semi-skilled labour, increased revenue to local councils. Impacts associated considered as: **Positive, cumulative, short-term, and of moderate significance.**

7.1.4 OPERATION PHASE

7.1.4.1 Increased Aircraft Traffic

- Potential impact: **Increased Commercial and Social Activities (Induced Development**)

Environmental impacts related to depletion of resources in the advent of the airport rehabilitation programme are highlighted under section 7.1.2.1 above. Table A 1 in the annex, indicates sectors and related resource demand which the rehabilitated airport is expected to stimulate including tourism, natural resources (fisheries, forestry, wildlife), energy, agriculture, industry, and urban development.

The project will have tremendous positive impacts by stimulating various commercial and social activities. At local scale this will entail income to local entrepreneurs and service providers at and close to the airport running shops for general goods and souvenirs, food and refreshment kiosks, restaurants, hotels/guest houses, transportation and delivery services. Bigger planes – Boeing 737, UN Monlic - with big capacity for passengers and cargo will enhance increased commerce and trade with neighboring countries: DRC, Rwanda and Burundi and facilitated UN activities in the region. The Kigoma Region government has plans for development of a Special

Economic Zone (EPZ) at Kichangachui area, aimed at stimulating investments and opportunities. The airport is one of the key entry points. The region has unexploited natural resources to match increase in the investments. Kigoma is endowed with unique tourism attractions including Gombe (*chimpanzees*) National Park, Mahale (*gorillas*) National Park, Livingstone center, and Lake Tanganyika (deepest lake in the world). However, mitigation measures are required taking cognizant that the are several planned and on-going upgrading of regional gravelled roads to bitumen level, the Malagarasi bridge and 22 km road and hydroelectric power at Maragarasi river that will also open the region to the outside. The open access mode of resource utilizations, the inability of government to restrict their use and other underlying factors, provide inadequate assurance of continued supplies of the resources for the various sectors in the longer –term. Impacts associated considered as**: Positive, cumulative, long-term, and of high significance.**

7.1.4.2 Air Emissions and Noise Pollution

- Potential impact: **Disturbance/ Nuisance and Public Health Hazards to Receptors**

Consequence of increased airport traffic is increased noise and disturbance to residents and institutions in the approach and takeoff paths of aircrafts. Even with the best available technologies, most of the other equipments (generators) and vehicles emit gases such as CO_2, NOx, SOx, particulate matters and hydrocarbons - regarded as residual air pollution. Effects of vibrations from heavy aircrafts to nearby buildings will not be significant if the building within the vicinity are constructed applied good engineering practice. Impacts associated considered as*:* **Negative, cumulative, long-term, and of high significance.**

7.1.4.3 Inadequacies in Operation and Maintenance

- Potential impact: **Deterioration Of Public Health And Sanitary Conditions**

Inadequate resources to maintain the airport facilities and services e.g. storm water channels and haphazard disposal of wastes as well as inadequate support structures and services not part of upgrading project e.g. lack of sustained water supply, power supply - may in future result in health hazards to workers and airport users and loss of aesthetics and disrupt airport operations. Water will be required for maintaining the sanitary conditions at the upgraded airport. Estimates are 20 litres / person/day. Inadequate supply has consequent health hazards from communicable diseases.
Impacts associated considered as*:* **Negative, secondary (indirect), cumulative, and of high significance.**

7.1.5 DECOMMISSIONING PHASE

7.1.5.1 Disposal of Demolished Waste

- Potential impact: **Contamination and Impaired Water**

In the event of future rehabilitations and upgrading, the runway and associated facilities may need to be demolished necessitating disposal of demolition waste. Haphazard disposal may cause contamination/impaired quality of receiving body – especially land, and water resources: Impact associated considered as: **Negative, short term and high significance.**

7.2 IMPACTS MITIGATION

Section 7.1 above has identified potential social impacts and their significance. This section provides a summary of mitigation measures of those impacts which are considered to be of moderate to high significance.

7.2.1 SITE SELECTION PHASE

(I) Cost of Compensation and Relocation Disturbances

To mitigate this Tanzania Airport Authority shall:

- Determine project affected people(PAP) with land rights or properties or crops
- Compensation calculation and payment shall be guided by Land Acquisition and Compensation plan/Resettlement action plan (RAP) that takes into considerations of applicable laws of land acquisition and compensation refer section 3.3
- To keep piece and harmony, compensation should be done before the commencement of the project.

(II) Disruption of Economic and Social Activities and Services

Those activities which are going on at the airport premises are illegal and are against national and international laws; also against civil aviation safety regulations. To mitigate this impact the following shall be done:

- Tanzania Airport Authority shall strive to obtain legal rights to its land (Land right of Occupancy-Title Deed)
- Enforcement of national and international laws
- Awareness rising to community within the project core area

- Inclusion of local leaders (Ward/sub-ward chairpersons/executive officers or /and councilors in the airport security and safety committee.
- Relocation of electricity and telephones poles within the extension portions of the airport in collaboration with local utilities services providers (TANESCO and TTCL).

7.2.2 DESIGN PHASE

(I) Depletion of Resources/Conflicts with Land Owners and Resource Users

To mitigate this impact the following shall be done:

- Exploitation of construction materials shall be from the authorized source only as indicated in table 6.1.
- Re-use of the excavated soils and demolition rubbles as part of the sub base material.
- Use of water conservatively by instituting technologies (e.g. self lock water tape) and awareness raising notices to users, etc.
- Construction of under ground water reserve tank and introducing rainwater harvest system.
- Extraction of underground water resources.

(II) Visual Impacts / Public Health Hazards from Waste

To mitigate the impacts of wastes an efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport. The measures are elaborated in section 6.2.2 (III). Also Tanzania Airport Authority shall practice the following:

- Introduction of waste disposal bins, warning notices, "DOs & DoNTs" etc posted at strategic points, through the airport area.
- No, on site burial or open burning of solid waste shall be permitted at the airport. Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system.
- Waste management training for all personnel, operators and services providers at the airport.

(III) Health Hazards / Disturbances and Nuisance from Construction Works

To mitigate this impact Tanzania Airport Authority and the Contractor shall:

- Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphics programs in schools and communities.
- Institute traffic management and safety programme including, training and testing of heavy vehicles operators and drivers, enforcement of speed limits, maximum loading restrictions and compliance with all Tanzania transpiration law and standards.
- Inform community of airport construction activities and schedules.
- Noise generating equipments, operational for short periods or during the times which they will cause less disturbances.

(IV) Public Health Hazards and Safety from Social Interactions

To mitigate this impact Tanzania airport Authority shall develop AID/HIV control program. Collaborate and support municipal public health offices (Community Development and Health Departments) and Civil Society Organization (CSOs) in awareness/education programs to workers and public.

(V) Occupation Health and Safety

To mitigate this impact, Tanzania Airport Authority and contractor shall comply with relevant Tanzania (OSHA, 2003) and International Finance Cooperation's Performance Standards and regulations on health and safety requirements including the provision of Personal Protective Equipments (PPE), reasonable working hours and good working conditions and facilities. Also to develop and implement in-house manual/ guard lines on Health and Safety (H&S)

(V) Compromised Security due to Social Interaction

To mitigate the impact of the security Tanzania airport authority shall ensure the following:

- Outer boundary fence shall be constructed as part of this upgrading project and shall be scheduled as one of the first activities during the implementation of the project for the extended part of the airport.
- Only key construction personnel (Junior and semi skilled) to be accommodated at the site
- Enforcement of site security

- Screening of security personnel
- Prohibition of alcohol and drugs within the site

7.2.3 MOBILIZATION/CONSTRUCTION PHASE

(I) Loss of Crops and Impairment of Landscape Aesthetics

To mitigate this impact, compensation for crops will be part of the Tanzania Airport Authority Land Acquisition and Compensation Plan elaborated under section 7.2.1 above.

(Ii) Income to Local Suppliers and Service Providers

Measures for enhancement of this positive impact shall be:

- Optimization of local employment (allocate jobs fairly among the locals through involvement of local leaders) and sourcing of other supplies and services.
- Deliver skills and training
- Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers
- Municipal council in collaboration with Tanzania Airport Authority institute good revenue collection system from the Airport.

7.2.4 OPERATION PHASE

(I) Increased Commercial and Social Activities (Induced Development)

To enhance this positive impact to the community living in the vicinity and area of influence; Tanzania Airport Authority and Kigoma region shall ensure:

- Efficient airport operation
- Good security within the airport area and area of influence
- Undertakes Strategic Environmental Assessment (SEA) and include in the region investment strategies and plans

(II) Disturbance and Nuisance to Receptor due to Increase of Air Traffic.

To mitigate this impact Tanzania Airport Authority shall inform community living within the project vicinity of airport activities and freight schedules.

(III) Deterioration of Public Health and Sanitary Conditions due to Inadequacy Operation and Maintenance

To mitigate this impact Tanzania Airport Authority shall ensure the following:

- Availability of adequate resource particularly money for maintenance
- Regular maintenance schedule of structures should be put in place
- Proper operational and monitoring procedures should be put in place

7.2.5 DECOMMISSIONING PHASE

(I) Contamination and Impaired of Receiving Body (Water and Land)

Mitigation measure similar as explained in section 6.2.3 (II)

(II) Loss of Revenue

To mitigate this impact Tanzania Airport authority and other organizations employee should ensure:

- Extensive training and preparations for workers for new /self employment.
- Membership to Social Security Fund.

8 POTENTIAL ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

The Environmental Management Plan provides way forward for implementation of the identified mitigation measures. Tanzania Airport Authority shall be responsible for overall implementation of the Environmental and Social Management Plan. The Contractor shall implement components relevant to mobilization and construction. Tanzania Airport Authority environmental control officer shall be designated to make day to day follow ups (e.g. supervision and liaising with stakeholders). The estimated costs for implementing the mitigation measures are shown, and should be accommodated on bills of quantities as an item. The summary of the key issues of the Kigoma airport rehabilitation programme and their management are shown in Table 8.1

Table 8.1: Environmental and Social Management Plan

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
SITE SELECTION	Damage to airport building/erected structures and disruption of operations	• Provision of Reinforcement to the foundation/Base of the building • Use of column as structure support	Engineering Standards	Tanzania Airport Authority, consultant & contractor	Project Cost
	Cost of compensation and relocation disturbances	• Evaluation to be as applicable laws • Payment to be made promptly after evaluation • No project commencement prior payment of evaluation.	Level of complains	Tanzania Airport Authority	As per Evaluation
	Disruption of economic and social activities and services	• Construct of outer boundary wall. • Awareness rising to community • TAA obtain Title Deed • Inclusion of local leader in Airport security and safety committee • Enforcement of National & International laws • Relocation of electrical and telephone poles	ICAO standards Aerodromes act	Tanzania Airport Authority , Consultant and Contractor	Project Cost

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
DESIGN	Depletion of resources/conflicts with land owners and resource users	• Exploitation from the authorized source only • Restoration of the borrow pits/quarries after use in association with local government and environmental NGOs • Leveling the area and Plantation of trees and grasses.	None	Tanzania Airport Authority & contractor	• Exploitation : part of the project cost • Restoration of borrow pits: 30,000.00 • Levelling and Plantation of trees and grasses: part of the project costs:
	Damage to rehabilitated structures due to ineffective storm water drainage and overflows.	• Proper hydrology analysis • Proper design	Engineering standards	Tanzania Airport Authority, Consultant and Contractor	Project costs

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
	Exploitation of Borrow pits/Quarries and other nature resources	• Exploitation of construction materials from authorized sources only. • Restoration of borrow pits/ quarries after use by leveling, seeding and or planting of trees and/or grasses. • Maintenance of construction equipments in good running conditions. • Refueling restriction at the workshop/base camp	None	Tanzania Airport Authority, Contractor and Kigoma Municipal council	Restoration cost: 10,000.00

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
	Contamination and Impaired Quality of Receiving Body-Land and Water	• Use excavated soil and rubbles to fill openings and to cover haphazard disposed municipal waste. • Introduce of waste disposal bins, warning notices. • Training to personnel, operators and services providers about waste management. • Liquid waste will be collected initially in cesspit tanks at the airport area and later disposed through municipal waste management system. • Introduction of regular monitoring system for waste collections and disposal.	None	Tanzania Airport Authority, Contractor and Kigoma municipal council for monitoring	• Monitoring and Training cost: 10,000.00
	Deteriorated/Impaired of Local Air quality due to Emission Generated from Construction Equipment	• Maintain Equipment in good running condition • Enforce vehicle road restrictions • Routine inspection of equipments	None	Tanzania Airport Authority and Contractor	Project costs

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
	Depletion of Resources/Conflict with Land owners and Resource Users	• Exploitation from authorized areas only • Re-use of excavated soils and rubbles • Use of water conservatively • Introduction of rain harvest system • Extraction of underground water resources	None	Tanzania Airport Authority, Contractor and Kigoma Municipal Council	
	Visual impacts / Public health hazards	• Introduce of waste disposal bins, warning notices. • Training to personnel, operators and services providers about waste management.	None	Tanzania Airport Authority and Kigoma Municipal Council	TAA budget and municipal budget

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
	Health Hazard/Disturbance and Nuisance from Construction Works	• Prevent public access to the construction site • Institute traffic management and safety programme • Inform community of on going airport construction activities and schedule • Scheduled Noise generated equipments	Tanzania Ministry of Health and WHO standards	Tanzania Airport Authority, Contractor and Kigoma Municipal council	Project cost
DESIGN	Public Health Hazard and Safety from Social Interaction	Develop HIV/AIDS program	Tanzania AIDS/HIV Policy	Tanzania Airport Authority, Kigoma Municipal Council and Local Civil Society Organizations	Cost as presented on HIV/AIDS Program

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
	Occupation health and safety	• Comply with relevant Tanzania (OSHA, 2003) and International Finance Cooperation's Performance Standards and regulations on health and safety requirements. • Develop and Implement in- house manual/guard lines on Health and Safety	None	Tanzania Airport Authority and Contractor	Project costs
	Compromised Security due to Social Interactions	• Construction of outer boundary • Only key personnel accommodated to the camp site • Enforcement of site security • Screening of security personnel • Prohibit of alcohol and drugs at the camp site	None	Tanzania Airport Authority and Contractor	Project costs

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
Mobilization/Construction	Destruction of vegetation cover / loss local biodiversity from vegetation clearance	• Indigenous vegetation in areas that will not be impacted by the project shall not be disturbed • Rehabilitation by planting grasses to all areas that will not be occupied by runway, taxiway, apron, buildings and other airport facilities on the project site • Avoid planting non-native and exotic species on the sit	None	Tanzania Airport Authority and Contractor	Project cost
	Deteriorated/Impaired of Local Air Quality due to Emission Generated from Construction Equipments	Mitigation similar as in Design Part 6.2.2 (IV)	None	Tanzania Airport Authority and Contractor	Project cost

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
	Contamination/Impairment of Quality of Receiving Bodies from Fuel, Oils, Lubricate Spillages/Leakage	• Routine maintenance and checks of contractor's equipments. • Training of personnel in proper storage, handling and clean up of contaminating materials into the environment • Storage and routine handling of fuel, lubricants, oils and other potentially contaminating materials to occur in weather protected areas equipped with secondary contaminant system for spills as appropiate. .	None	Tanzania Airport Authority, Contractor and Kigoma Municipal Council for monitoring	Monitoring cost: 10,000.00
	Damage/Disturbance to Sub-surface organisms	Contractor and Tanzania Airport authority during construction shall make sure that only those areas need to be excavated are ones excavated and backfilled after construction.	None	Tanzania Airport Authority and Contractor	Project cost

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
	Damage/Erosion of exposed Surfaces	• Contractor and Tanzania Airport authority during construction should make sure that construction will be as per engineering design and procedure; of which a minimum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant. • Divert runway water away from structures • Maintain gravel fill and/or re-vegetation around the structures	None	Tanzania Airport Authority and Contractor	Project cost
	Impairment of air quality due to dust	• Contractor should use water sprinkler when clearing land. • Protect stockpile of friable material subject to wind through wetting • Cover load with friable material during transportation • Restrict speed on loose surface roads to 30km/hr	None	Tanzania Airport Authority and Contractor	Project cost

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
	Loss of Crops and impairment of Landscape Aesthetics	Crops and land to be compensated by the project prominent	Number and serious of claims	Tanzania Airport Authority	Tanzania Airport Authority-budget
	Income to local suppliers and service providers	• Optimizations of local employments • Deliver skills and training • Ensure monitoring of labour standards among contractors, sub-contractors and service provider • Institute good revenue collection system	None	Tanzania Airport Authority and Kigoma Municipal Council	
Operation	Disrupted airport operations due to lack of maintenance of facilities and structures	• Availability of adequate resource particularly money for maintenance • Regular maintenance schedule • Proper operational and monitoring procedures • Enforcement of all regulations instituted by the airport • Monitoring and reporting for routine maintenance, repairs, replacement of all environmental sensitive areas.	As efficient as possible	Tanzania Airport Authority	Normal operation budget

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
	Impaired quality of receiving body (land and water) due to lack of maintenance of facilities and structure	• Regular maintenance schedule of airport facilities • Proper waste management collection and disposal schedule	As efficient as possible	Tanzania Airport Authority	Normal operation budget
	Deterioration of public health and sanitary conditions	• Availability of adequate resource particularly money for maintenance • Regular maintenance schedule • Proper operational and monitoring procedures	As efficient as possible	Tanzania Airport Authority	Normal operation budget
	Increase Commercial and Social Activities (Induced Development)	• Efficient airport operation • Good security within the core and area of influence • Undertake strategic environment assessment	None	Tanzania Airport Authority and Kigoma Regional Secretariat	Normal operation budget
	Disturbance and Nuisance to Receptor due to Increase of Air traffic	Information to community living within the airport vicinity on airport activities and flight schedules	None	Tanzania Airport Authority	Normal operation budget

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/Standard	Responsibility	Estimated Costs [USD]
	Deterioration of Public Health and Sanitary Conditions Due to Inadequacy Operation and Maintenance	• Availability of adequate resource particularly money for maintenance • Regular maintenance schedule • Proper operational and monitoring procedures	As efficient as possible	Tanzania Airport Authority	Normal operation budget
Decommissioning	Loss of jobs	• Extensive training and preparations for workers for new /self employment. • Membership to Social Security Fund Bodies (System)	None	Tanzania Airport Authority and other airports related services provider, like Tanzania Civil Aviation Authority, Tanzania meteorological agency, etc	Normal operation budget
	Contamination/Impaired Quality of Receiving Body	• Proper handling and disposal procedure for solid and liquid waste	None	Tanzania Airport Authority	Not known

9. ENVIRONMENTAL & SOCIAL MONITORING PLAN

Environmental and social monitoring plan (Table 9.1) provides the application of Environmental Management Plan as well as dealing with ad hoc or unforeseen issues which need to be mitigated. Detailed on parameter to be monitored have been considered along with costs estimates and responsible institution(s).Table 9.1 summarises key environmental and social monitoring issues of the Kigoma airport rehabilitation project.

Table 9-1: Environmental and Social Monitoring Plan

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (USD)
SITE SELECTION	Damage to airport building/erected structures and disruption of operation	Number of Incidents	Twice per year	Project area	Incidence	As minimum as possible	Tanzania Airport Authority	
	Cost of compensation and relocation disturbances	Number of complains and seriousness of complain	Before implementation of the project	Project Area	Number of people paid, Amount of money paid and period taken to be paid.	All affected people are compensated ; according to the Land Act of 1999	Tanzania Airport Authority	To be known after evaluation
	Disruption of economic and social activities and services	Number of affected people and resettled	Just before construction and once every year after construction	Project area	Number of affected individual	All affected people are compensated ; according to the Land Act of 1999	Tanzania Airport Authority	
DESIGN	Depletion of resources/conflicts with land owners and resource users	Number of Incidents	Regular during construction	Quarries, Borrow pits and Water source	Incidence	No conflict at all	Tanzania Airport Authority, Contract and Municipal council	

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (USD)
	Damage to rehabilitated structures due to ineffective storm water drainage and overflows.	Storm water collection system	Once every year	Project area	None	No effect at all	Tanzania Airport Authority	
	Exploitation of Borrow pits and other nature resources	Area exploitation and level of water	Frequently During construction	Construction materials and water sources	Meter cube	Level to water not to be less than the permitted level and exploited area as minimum as possible	Tanzania Airport Authority and Municipal Council	
	Contamination and Impaired Quality of Receiving Body- Land and Water	Number of incidents	Continuously during the project life	Project area	Numbers	As minimum as possible	Tanzania Airport Authority, Contractor and Municipal Health Officer	
	Deteriorate/impaired of Local Quality due to Emission Generated from Construction Equipments							

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (USD)
	Depletion of Resources/Conflict with Land Owner and Resources Users	Claims and seriousness of claims	Frequently during construction period	Borrow pits	Number	Not at all	Tanzania Airport Authority; Municipal Council and Contractor	Operation Cost
	Visual impacts / Public health hazards	Number of affected individual	Every month during project construction and after every six month during operations	Project area	Number	As minimum as possible	Tanzania Airport Authority, Contractor and Municipal health officer	
	Health Hazard/Disturbance and Nuisance from Construction Work	Number of affected individual	Every month during project construction and after every six month during operations	Project area	Number	As minimum as possible	Tanzania Airport Authority, Contractor and Municipal health officer	
	Occupation health and safety	Availability of protective gears	Once every month	Construction site	None	All workers use protective gears	Tanzania Airport Authority and Contractor	Project cost

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (USD)
	Compromised Security due to Social Interactions	Incidence	Frequently	Project area	Incidence	No burglary at all	Tanzania Airport Authority	Operation cost
MOBILIZATION/CONSTRUCTION	Destruction of vegetation cover / loss local biodiversity from vegetation clearance	Impacted ecological features	Frequently during construction	Project area	m^2	As minimum as possible	Tanzania Airport Authority and contractor	Project cost
	Contamination/Impairment of quality of receiving Bodies from Fuel, Oils, Lubricate, Spillages/Leakage	Number of incidents	Continuously during the project life	Project area	Numbers	As minimum as possible	Tanzania Airport Authority, Contractor and municipal health officer	
	Damage/Disturbance to Sub-surface organisms	Impacted ecological features	Frequently during construction	Project area	None	As minimum as possible	Tanzania Airport Authority and Contractor	Project cost
	Damage/Erosion of exposed Surfaces	Damage/Soil erosion tendencies	Twice every year	Project area	None	As minimum as possible	Tanzania Airport Authority	Project cost
	Impairment of air quality due to dust	Concentration of pollutants in ambient air (dust, noxious gas)	Once every month	Project area	ppm, mg/m^3,	Tanzania, WHO standards	Tanzania Airport Authority	

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (USD)
	Loss of crops and Impairment of Land Aesthetics	Number of complains and seriousness of complain	Before implementation of the project	Project Area	Number of people paid, Amount of money paid and period taken to be paid.	All affected people are compensated ; according to the Land Act of 1999	Tanzania Airport Authority	
	Income to local suppliers and service providers	Number of employed people and services providers	Once after every three month	Project area	Number	As maximum as possible	Tanzania Airport Authority	
OPERATION	Disrupted airport operations due to lack of maintenance of facilities and structures	Performance of the facilities	Once per year	Kigoma airport (Project area)	None	Good performance record	Tanzania Airport Authority	
	Impaired quality of receiving body (land and water) due to lack of maintenance of facilities and structure	Number of incidents	Continuously during the project life	Project area	Numbers	As minimum as possible	Tanzania Airport Authority, Contractor and municipal health officer	

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (USD)
	Deterioration of public health and sanitary conditions	Number of affected individual	Every month during project construction and after every six month during operations	Project area	Number	As minimum as possible and all affected individuals are attended	Tanzania Airport Authority, Contractor and municipal health officer	
DECOMMISSIONING	Loss of jobs	▪ Number of employers registered in social security schemes ▪ Remittance of monthly contribution	Once every six month	Tanzania Airport Authority Headquarter and Headquarters of other associated services provider.	▪ Number of employers registered in social security schemes ▪ Remittance of monthly contribution	All workers	Tanzania Airport Authority and other airport services providers	
	Contamination/Impaired Quality of Receiving Body	Number of incidents	Continuously during the project life	Project area	Numbers	As minimum as possible	Tanzania Airport Authority, Contractor and municipal health officer	

10 COST BENEFIT ANALYSIS

10.1 Financial Cost Benefit Analysis to the Company

Cost-benefit analysis is normally done in the framework of feasibility study of an activity. The aim of cost-benefit analysis is to inform assist the project developer to make a decision on:

- Whether it makes economic sense to continue with the project;
- Whether the chosen option is cost effective alternative;
- The estimate of the size of a project.

In this project the costs of the Kigoma airport rehabilitation project will include:

- Capital expenditures
- Operating and Maintenance costs;
- Staff costs;
- Materials;
- Research and Development; and
- Environment, Health and Other social costs.

Benefits may include:

- Better, understanding of the target resource;
- Accurate targeting of the resource to avoided unnecessary costs to extract the resources;
- Potential for additional revenues generated from new resources;
- Protection of environment and health; and
- Provision of other social benefits.

10.2 Quantifiable and Non-Quantifiable Benefits to Communities

There will be direct and indirect benefits to the communities as follows:

a) The project will employ about 360 for the construction and about 60 personnel for the airport operation. The majority of the non-skilled labour will be recruited from the communities around the project. A good number of skilled staff will be recruited from within Tanzania.

b) Through taxes to the Government, Tanzania Airport Authority will be indirectly contributing to development projects such as roads, medical care and education services.

c) The presence of Airport in the area has drastically increases business opportunities in the area, hence increase revenue.

10.3 Quantifiable and Non-Quantifiable Benefits to Government

The government of Tanzania will directly benefit from taxes collected from passengers, foreign and local investors will be investing to the region. Apart from tax generation, the investment will also enhance the economic growth and ancillary private sector development spurred by the operations and activities associated with the airport. The image of the government in investment sector will also be enhanced nationally and internationally that will increase attractions from other local and foreign investors and ensure continued economic growth.

10.4 Possible Costs to Communities

It is a fact that airport rehabilitation entails social and environmental impacts. These have been elaborated clearly in Chapters 6 – 9. There will be individual in the communities who will be affected more than others. However, Tanzania Airport Authority is committed to mitigate the negative social and environmental impacts.

10.5 Possible Costs to Government

Tanzania Airport Authority is the government institution and in this project is the representative to of government. Therefore all environmental and social impact that has been identified in chapter 6-8 will be direct costs to the government.

10.6 Environmental Cost Benefit Analysis

Environmental cost benefit analysis is assessed in terms of the negative versus positive impacts. Furthermore, the analysis is considering whether the impacts are mitigatable and the costs of mitigating the impacts are reasonable. As it has been mentioned in Chapters 6 – 9, the potential benefits of the project, in terms of financial and social benefit are substantial. The environmental impacts are reasonably mitigatable and the financial resources needed to mitigate negative impacts, when compared to the required investment, are relatively small.

10.7 Social Economic Cost Benefit Analysis

Availability of modern and good airport in the regions is expected to accelerate social economic development. There are several governmental initiatives such as the attraction of foreign and local investors to the regions which can not be realised without reliable mode of transport. If reliable transport is established, one should expect more investments to be established and thus create employment for the communities.

11. CONCLUSION AND RECOMMENDATIONS

11.1 Conclusions

The Environmental Impact Assessment (Environmental Issues) Study has been completed in accordance with the Tanzanian Legislations including the Environmental Management Act (2004), the Environmental Impact Assessment and Audit regulations (2005). The Environmental Studies Team has carried out field surveys to collect the environmental and some social data and to discuss with the regional and local authorities concerning the environmental issues of the proposed rehabilitation of Kigoma airport and the proposed mitigation measures. The environmental team also carried out consultation with the representatives of the local communities around the project area to integrate their requirements in the project. Also this consultation enabled the Consulting team to have a physical feeling of the local conditions around the project site.

The Environmental Impact Assessment Report has identified a number of impacts both positive and negative and other residual cumulative issues pertaining to the proposed rehabilitation of Kigoma airport project developed in Kigoma, Kigoma region by Tanzania Airport Authority on behalf of government of Tanzania. The issues/impacts have been described and assessed in detail to gain adequate understanding of possible environmental effects of the proposed project – from site selection to decommissioning, in order to formulate mitigation measures in response to negative aspects which have emerged. The Environmental Management plan provides way forward for implementation of the identified mitigation measures.

The estimated costs for implementing the mitigation measures are just indicative. The consultant has used informed judgment to come up with these figures.

The study concludes that although the project can have significant and wide-ranging impacts on the environment, the project is environmentally suitable and socially acceptable subject to the implementation of the Environmental Management Plan and Environmental Monitoring Plan as proposed in chapter 8 and 9.

11.2 Recommendations

It is recommended that based on the findings of the Environmental Impact Assessment exercise and supplementary information, the project proponent (Tanzania Airport Authority) should implement the environmental management plan. The environmental management plan provides guidelines on managing/mitigation of impacts and monitoring performance.

In addition to the environmental management plan, it is recommended that Tanzania Airport Authority should appoint an environmental control unit which will be responsible for monitoring the application of the environmental management plan, as well as dealing with *ad hoc* or unforeseen issues which need to be mitigated.

While a number of environmental impacts have been identified and assessed, none of these are considered to be that severe after mitigation as to prevent the further planning, design and construction of the proposed development.

Belva Consult Limited of Dar es Salaam, Tanzania and Sir Frederick & Partners Limited of United Kingdom are of the opinion that the environmental impacts identified may be mitigated. The proposed environmental management plan and environmental monitoring plan if implemented will safeguard the integrity of the environment.

12. REFERENCES:

1. Ministry of Works- Environmental Assessments and Management Guidelines for Road Sector, December 2004.
2. Ministry of Water and Livestock Development: National Water Policy July 2002.
3. National Environment Management Council: Tanzania Environmental Impact Assessment Procedure and Guidelines

   Volume 1: General EIA Guidelines and Procedures

   Volume 2: Screening and Scoping Guidelines

   Volume 3: Report Writing Guidelines and Requirements

   Volume 4: Review and Monitoring Guidelines

   Volume 5: General Checklist of Environmental Characteristics
4. United Republic of Tanzania: National Environmental Policy (NEP) 1997.
5. United Republic of Tanzania: The Environmental Management Act, 2004.
6. United Republic of Tanzania: The Mining Act 1998.
7. United Republic of Tanzania; Land Act 1999
8. United Republic of Tanzania; Land Act 1999 (Act No 4 of 1999), the Land Regulations 2001, Subsidiary Legislation (Suppl. No. 16 of 4th May 2001)
9. United Republic of Tanzania, Highway Ordinance 1969
10. United Republic of Tanzania; Land Regulations 2001
11. Kigoma Municipal Council ; Municipal Profile -2005
12. Kigoma Region Profile 2005
13. United Republic of Tanzania; Village Land Act 1999.
14. United Republic of Tanzania, Tanzania Country Study on Biological Biodiversity. Vice Presidents Office, UNEP, June 1998.
15. United Republic of Tanzania; Report of the Presidential commission of Enquire into Land Matters, Volume 1; 1992.
16. The Land Acquisition Act of 1967
17. United Republic of Tanzania: National Environment Action Plan (NEAP 1994)
18. The National Land Policy (1996)

19. Transport Policy (2002)

ANNEXES

ANNEX I - REQUIREMENT OF NATURAL RESOURCES BY DIFFERENT DEVELOPMENT SECTORS

Table A 1 below indicate the different kinds of natural resources/systems that the different development sectors requires as raw materials or support services to maintain sustained production. It has not been possible to work out the exact amounts that are currently available *(resource base),* amounts that are actually being used or the futures needs because of lack of information about the resources and ecosystems and extent and trends of their utilization. Drawing from the table, the different sectors are currently dependant on resources which could be limited in the longer-term. In line with the Tanzania growth strategy, the government is proposing/implementing aggressive industrial growth and other economic development strategies in a bid to become a middle-income country by 2025. At the current levels of economic growth (about 5% annually), Gross Domestic Product (GDP) contribution from environmental products and services and natural resources will need to increase and the pressures on the resources and environment will collate with this economic output.

Table: A1 Natural Resources Required by Different Development Sectors

Fisheries Sector (marine and freshwater) *Inshore, prawn, offshore*	**Forestry Sector** *Mangrove and coastal forests (upland)*
• Fish stocks • Intertidal areas (fishing grounds) • Fishing grounds (deep waters) • Mangrove areas (breeding/nursery areas) • Land (for infrastructure, markets • Beaches (landing site)	• Fuel-wood • Poles • Timber • Non–forested areas (reforestation)
Agriculture Sector Rain-fed subsistence, Rain-fed large scale, Irrigation	**Aquaculture Sector** Fauna: large scale (shrimp); small scale (crabs, shrimp, finfish, oysters)
Arable land Wetland Fresh water	◆ Land (reclaimed) ◆ Land (infrastructure) ◆ Inter-tidal areas ◆ Beaches (landing sites) ◆ Fresh water
Tourism Sector Infrastructure Recreational Souvenirs	

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- Fresh water
- Land
- Seafood, wildlife meat
- Sporting grounds
- Beaches
- Pristine habitats
- Marine species (shells, trophy etc.

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- Brackish water
- Stock (natural recruitment)
- Natural seeds

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Industry Sector

- Fresh water
- Land
- Non-forested mangrove areas

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Energy Sector

Gas and oil (exploration & exploitation) Hydropower

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Urban Development

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- Fresh water
- Land (processing + transmission)
- Marine ground (Benthos

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- Land
- Food (seafood + agro)
- Water
- Fuel wood
- Beaches
- Intertidal areas (water sporting)

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Wildlife Sector

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<tr><td>

- Land
- Water

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ANNEX II - TERMS OF REFERENCE

1. Introduction

During scoping several key environmental issues of concern were identified after holding consultations with stakeholders of the project and also after reviewing various literature related to the project. The outcome of the scoping exercise is the scoping report which is the basis of the draft terms of reference.

The purpose of Terms of Reference (TOR) therefore, is to provide formal guidance to the Proponent /EIA Consultant of the Kigoma Airport project on the range of issues that must be addressed in the EIA process. They form the basis for subsequent review process. In these Terms of reference, strategies for addressing the issues identified during scoping have been in cooperated to make the EIA focused.

2. Objectives of the EIAs Study

Construction and Rehabilitation of airport activities are included in the mandatory list of the projects that are required to develop full EIA by the Environmental Management Act No 20 of 2004. Part IV 0f EIA regulations G.N. 349 of 2005 provides the general objectives for carrying EIA, among others list comprise the following:

- To ensure that environmental considerations are explicitly addressed and incorporated into the development decision making process.
- To anticipate and avoid, minimise or offset the adverse significant biophysical, social and relevant effects of development proposal.
- To protect the productivity and capacity of natural ecosystems and ecological processes which maintain their functions.
- To promote development that is sustainable and optimises resources use and management opportunities.

Consequently, Tanzania Airport Authority would like to undertake Environmental Assessment so as to translate the principles of sustainable development and environmental protection into strategies and actions that can be practically applied to her project of rehabilitation and expansion of Kigoma airport.

The objectives of the EIA are:

- To establish baseline information on both natural and built environment including socio-economic conditions of the proposed project area.
- To identify, predict and evaluate foreseeable impacts, both beneficial and adverse, of the proposed investment; and
- To develop mitigation measures that aim at eliminating or minimising the potential negative impacts and promote positive ones.
- To develop management clauses and monitoring aspects to be observed during project implementation.

This requirement clearly presents a broad challenge on what type of activity that is environmentally friendly need to be dealt with at Kigoma airport and associated areas in the Kigoma municipal.

3. Description of the Project

Tanzania airport authority (TAA) on behalf of the government proposed rehabilitation and expansion of Kigoma airport. Currently Kigoma airport is can accommodate only medium size aircraft; the maximum aircraft the airport can accommodate is ATR 72. Therefore TAA intend to rehabilitate and expand the airport to accommodate Boeing 737 as a maximum aircraft of which 3100 x 45 m of runway will be constructed, included taxiway and apron.

In future TAA intend to construct a modern terminal building which will be of the same capacity and standard with that rehabilitate airport.

4. Scope of Work.

The EIA shall be conducted in accordance to the guidelines laid down by the Environment Management Act (EMA, 2004). The main steps to be followed by the Consultant in the environmental impact assessment will involve:

Identifying, collecting and analyzing information which includes:

- Project characteristics and activities;
- Baseline data of the environmental and socio-economic setup;
- Predicting impacts;

- Evaluating impact significance:
- Identifying and proposing mitigation measures:
- Preparing the Management and Monitoring Plan and Follow up; and
- Presenting the information which involves writing an environmental Impact Assessment Statement (EIS).

4.2 The Consultant shall Carryout the following tasks:

4.2.1. Stakeholders Consultations

Consultations with stakeholders have been undertaken in this scoping stage of the EIA. Main stakeholders and their concerns are elaborated under chapter 5. *The Consultants shall* carry this further during the impact study.

4.2.2. Baseline Data and Information

4.2.2.1 Study area

In order to cover assessment of all key issues related to the project, the study area should be much wider than at Kigoma airport area were many of the project facilities and services will be located. This is because some of the impacts might have local, regional or national implication. The Consultant shall, further determine and set the project boundaries particularly spatial boundaries (i.e. impact area coverage and area of influence).

4.2.2.2 Description of the Project

The Consultant shall give details of:

- Location of all project-related development and operation sites;
- General layout of airport, design basis, size, capacity;
- Pre-construction activities and construction activities;
- Organizational relationships, mandates and interactions among the different parties to be involved in the project.

4.2.2.3 Description of the Environment

The Consultant shall:

- Provide general description of the project environment and sources of information for anyone requiring a more extensive description (especially the EIA reviewers);
- Identify those features that are particularly important in the project area;

- Maps at appropriate scales to illustrate the surrounding areas likely to be environmentally and social affected.
- Identify areas that require special attention in the project implementation. The areas may represent unique or sensitive geomorphologic characteristics, biotopes, or species.

Environmental Impact Assessment shall specifically focus on these ecological components to ensure that the proposed development does not harm the well being or these characteristics.

5 Legislative and Regulatory Considerations.

The scoping report has identified some of the policies and legislation.
The Consultant shall describe how relevant the identified local, national and international regulations and standards governing environmental quality, health and safety, protection of sensitive areas and endangered species, land use control etc. in relation to the project activities.

6 Impact Assessments

Below are listed tasks to be undertaken by the consultant during EIA, using baseline data and information gathered. Extent to which each will be undertaken will depend on the issues identified during scoping. The consultant will strive to balance the tasks in order to achieve the described objectives of the EIA.

To avoid ambiguity in the impact assessment (identifying potential impacts, relevant environmental factors and mitigative measures) the Consultant shall make use of the checklist covering the major areas of impact as provided for in the EIA guidelines.

6.1 Task 1: Identification and Prediction of Impacts.

Under this activity the consultant shall:

- Identify issues and concerns in order to find suitable remedies;
- Identify linkages among project components and the issues;
- Identify where project activities or elements interact with social and biophysical environment (direct impacts);
- Identify indirect impacts of the project on the environment;
- Identify cumulative impacts that may be anticipated;
- Identify residual impacts if any;
- Predict probability, magnitude, distribution and timing of expected impacts;

6.2 Task 2: Estimation of the Significance of the Impacts.

The consultant shall:

- Determine which environmental components are mostly affected by the project or its alternatives;
- List issues raised by the public and classify them according the level and frequency of concern whenever possible;
- List regulatory standards, guidelines etc. that need to be met; and
- Rank predicted impacts in order of priority for avoidance, mitigation, compensation and monitoring.

6.3 Task 3: Development of Management Plan to Mitigate Negative Impacts, and Development of Monitoring Plan.

The consultant shall:

- Determine appropriate measures to avoid or mitigate undesirable impacts;
- Assess and describe the anticipated effectiveness of proposed measures;
- Ascertain regulatory requirements and expected performance standards;
- Determine and assess methods to monitor impacts for prediction accuracy remedial measures for effectiveness;
- Determine and assess methods to monitor for early warning of unexpected effects;
- Re-assess project plans, design and project management structure;
- Describe follow-up scheme and post-project action plan for achieving EIA objectives; and
- Assess the level of financial commitment by the project proponent for the management and monitoring plan, and follow up activities.

The consultant shall be guided by the cost-effectiveness principles in proposing amelioration measures. Estimation of costs of those measures shall be made. The assessment will provide a detailed plan to monitor the implementation of the mitigation measures and impacts of the project during construction and operation.

6.4 Task 4: Identification of Institutional Needs to Implement Recommendations.

The Consultant shall review the institutional set-up - community, ward, District/ Regional and national levels - for implementation of the Management and Monitoring Plans recommended in the environmental assessment. The assessment shall identify who should be responsible for what and when.

6.5 Task 5: Drawing Recommendations.

The consultant shall:

- Highlight key concerns and considerations associated with the acceptance and implementation of recommended actions;
- Determine resources requirements for implementing recommendations;
- Determine capacity and resourcefulness of the client to meeting such commitment;
- Explain rationale for proposed development and benefits and costs vis-à-vis the no-project option;
- Ascertain degree of public acceptance of or reaction to recommendations.

6.6 Task 6: Environmental Impact Statement (EIS).

The assessment shall result into an EIS focusing on findings of the assessment, conclusions and recommended actions, supported by summaries of data collected etc. This shall be a concise document limited to significant environmental issues. The report format will be as per NEMC EIA guidelines.

6.7 Task 7: Review

The review report from NEMC may require further input (data collection, consultation inputs etc.). The consultant shall undertake to provide extra information and inputs until the project review is satisfactorily concluded.

7 Peoples Participation

The assessment shall establish the level of consultation of the affected stakeholders before designing the project, level of involvement in the running and maintenance of the project facilities as this is an important aspect for both environmental and project sustainability.

The assessment will provide a framework:

- For coordinating the environmental impact assessment with other government agencies, Marine Parks and Reserves; and
- For obtaining the views of affected groups, and in keeping records of meeting and other activities, communications, and comments and their disposition.

A people's participation report will be prepared as part of the EIS i.e. apart from the socio-economic and cultural impact report (which basically are dealing with consultant's perception and interpretation of issues).

8 Study Team

The consultants shall deploy consultants/experts with the demonstrable practical experience in conducing EIA studies. Specific experience in civil works, ecology and sociology.

9 Reporting and Report Presentation

The final draft of the EIS document should be concise, following the report writing guidelines in the National EIA Procedure and Guidelines (NEM, Draft 1997), for simplifying the review process.

10 Records of Meetings

The consultants shall provide record of the names of organizations, government and departments and individuals whose views will obtain. The record will also provide description of views and information that will be obtained.

11 References

The objective of this section is to identify and record the written materials used in the study. This is extremely important because some of the material used as back ground information may be in unpublished form, and yet it may be necessary that these are available during the review proces

ANNEX III - PUBLIC NOTICES AND ADVERTISEMENTS

ATTENTION! ATTENTION! ATTENTION!

PUBLIC NOTICE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF REHABILITATION AND UPGRADING OF KIGOMA AIRPORT PROJECT

Tanzania Airport Authority (TAA) intends to undertake a project for the rehabilitation an upgrading of Kigoma Airport as part of the national effort to upgrade high priority commercial airports across the country. The Kigoma project will involve rehabilitation and extension of graveled surfaced runway of 1767m x 30m, apron and taxiways to a surfaced bitumen standard.

On behalf of TAA, M/S Sir Fredrick Snow & Partners Ltd of UK in association with BELVA Consult Limited of Tanzania are undertaking a study of the impacts of the project to the existing environment, and social and economic set ups as required by the government (Environmental Management Act No 20, 2004).

If you have any issue or concern regarding this project, express/send them to the below offices where details of the project are also found.

Director General
Tanzania Airport Authority (TAA)
Julius Nyerere International Airport – Terminal I
P. O. Box 18000, Dar es Salaam, Tanzania
Tel. 255-22-2842402/3, Fax: 255-22-2844495.
Email info@airports.go.tz

EIA Consultants, Belva Consult Ltd, P.O Box 75212 Dar es Salaam, Tel: 255-22-2775919, Fax: 255-22-2775910, *Email:* belva@bol.co.tz, *Director*: 255-754-270400, 0754 291997

Director General, National Environmental Management Council (NEMC), P.O Box 63154 Dar es Salaam, Tel: 255 (022) 2127817, 0713 608930, *Email:* nemc@nemctz.org

Also to

The Kigoma Regional Secretariat, Kigoma-Ujiji Municipal Executive Director; Executive Officers & Chairpersons at Ward and "Mtaa" levels.

ATTENTION! ATTENTION! ATTENTION!

ILANI! ILANI! ILANI!

TANGAZO

TATHIMINI YA ATHARI KWA MAZINGIRA NA JAMII: MRADI WA UKARABATI NA UPANUZI WA KIWANJA CHA NDEGE KIGOMA

Mamlaka ya Viwanja vya Ndege Tanzania (TAA) inakusudia kufanya ukarabati na upanuzi wa Kiwanja cha ndege cha Kigoma ikiwa ni sehemu ya uboreshaji wa viwanja vya ndege vyenye umuhimu wa kibiashara kitaifa. Mradi huu utahusisha ukarabati na upanuzi wa njia ya kutua na kuruka ya changarawe ya 1767m x 30m kuwa kiwango cha rami.

Kampuni ya M/S Sir Fredrick Snow & Partners Ltd ya Uingereza ikishirikiana na Belva Consult Ltd ya Tanzania, kwa niaba ya TAA, wanafanya tathmini ya athari ya mradi huu kwa mazingira na jamii, kama ilivyoagizwa na serikali (Sheria ya Mazingira Na. 20 ya 2004).

Kama una maoni kuhusu huu mradi unaweza kuyatoa/kuyatuma katika ofisi zifuatazo:

Mkurugenzi Mkuu
Tanzania Airport Authority (TAA)
Uwanja wa Ndege wa Kimataifa wa Julius Nyerere – Terminal I
S.L.P 18000, Dar es Salaam, Tanzania
Simu. 255-22-2842402/3, Fax: 255-22-2844495.
Barua Pepe info@airports.go.tz

Washauri, Belva Consult Ltd, S.L.P 75212 Dar es Salaam, Simu: 255-22-2775919; Fax: 255-22-2775910; Mobile: 255-754-270400, 0754 291997; Barua Pepe: *belva@bol.co.tz*

Mkurugenzi Mkuu, Baraza la Taifa la Usimamizi na Hifadhi ya Mazingira, S.L.P 63154 Dar es Salaam, Simu: 255 (022) 2127817, 0713 608930, Barua Pepe: *nemc@nemctz.org*

Au Kwa

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ILANI! ILANI! ILANI!

ANNEX IV - LIST OF STAKEHOLDERS CONSULTED