JOMO KENYATTA INTERNATIONAL AIRPORT

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT REPORT

JK1304 AUGUST 2006
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EXECUTIVE SUMMARY

Jomo Kenyatta International Airport (JKIA) is located approximately 13km to the east of the Nairobi Central Business District and is managed by the Kenya Airports Authority.

The area of land within the current operational boundary of JKIA covers 50,000m². The airport was constructed in 1975 and was designed to accommodate 2.5 million passengers per year. Current traffic is 3.5 million passengers per year.

The complete traffic forecasts for JKIA were prepared in 1993 by Sotrefravia and updated by the Belgian Airport Consultants in 2001. Based on the various calculations of planning peak hour traffic, the nominal schedules and JKIA’s potential as a hub, it was recommended that:

The terminal and apron be designed, developed and operated to handle in 2014:

- 1100 arriving international passengers in the planning peak hour;
- 970 departing international passengers in the planning peak hour;
- 175 arriving domestic passengers in the planning peak hour;
- 200 departing domestic passengers in the planning peak hour.

and, in 2024:

- 1280 arriving international passengers in the planning peak hour;
- 1250 departing international passengers in the planning peak hour;
- 230 arriving domestic passengers in the planning peak hour;
- 235 departing domestic passengers in the planning peak hour.

Forecasts carried out by the Government and historic trends identify that future passenger growth at JKIA is such that expansion and modification of the existing infrastructure and facilities and increase in the air traffic movements is required. This expansion is supported through the National Airports Masterplan Final Report prepared in 1993.

The Government's approach to airport expansion is to follow a balanced approach which:

- Recognises the importance of air travel to national and regional economic prosperity, and that not providing additional capacity where it is needed would significantly damage the economy and national prosperity;
- Reflects people's desire to travel further and more often by air, and to take advantage of the affordability of air travel and the opportunities it brings;
- Seeks to reduce and minimise the impacts of airports on those who live nearby, and the natural environment;
- Ensures that, over time, aviation pays the external costs its activities impose on society at large;
- Minimises the need for airport development in new locations by making best use of existing capacity where possible;
- Respect the rights and interests of those affected by airport development, and
- Provides greater certainty for all concerned in the planning of future airport capacity, but at the sometime is sufficiently flexible to recognise and adapt to the uncertainties in long term planning.

Assessment of alternatives has been addressed by the Terminal Master plan, Design, and Construction Final Report volume 1-report prepared by Queen's Quay Architects International –2005.

Key issues in the design considerations include:

- Separating departing and arriving passengers;
- Increase in the capacity of the terminal.
Four options were developed. Option 1 and 2 were developed with the premise of investigating different viable options for the airport expansion. Option 3 was then designed to take the best elements of the first two options to form a hybrid scheme.

GIBB Africa Ltd has prepared this Project Report to fulfil the legal requirements outlined in Section 58 to 69 of the Environmental Management and Coordination Act (EMCA) and Part I and II of the Environmental Impact Assessment and Audit Regulations. The Project Report is based on document review, field trips and discussions with the Project Architects.

The proposed project will have positive impacts as discussed below:

**Enhanced airport security**

Re-development of the primary check-in will ensure that only travelling public is allowed through a primary security check at the entrance of each terminal and after obtaining the boarding passes in the Departures Lobby, passengers proceed through a secondary security check as well as immigration counters for international Travellers, thus enhancing security.

**Increased air traffic movements**

The existing runway does not have sufficient capacity for the number of aircraft movements anticipated by 2014. The proposed development makes provision for construction of new taxiways at the eastern end of the runway in order to prevent aircraft waiting to get onto the runway, thus increasing air traffic movements.

**Increased car parking facility**

The proposed development has a provision for car parking which will increase the number of vehicles allowed at the airport.

**Modification of the existing infrastructure and facilities**

The proposed project design will contribute to improving existing infrastructure and facilities and the comfort of airport users in several ways as detailed in chapter 2 sections 2.4.

**Visual enhancement of the environment**

The development is proposed on previously developed land in areas already characterised by airport facilities, functions and infrastructure. The proposed development includes plan to landscape the developed areas using indigenous trees and lawns. This will bring about long term changes to landscape character by reconfiguration of features and elements within the existing boundary.

**Improved local socio-economy**

JKIA is the largest international airport in East Africa and the proposed expansion will contribute to the development of businesses, both local and international due to:

- Increased accessibility to the area could increase the number of tourists and tourism spending which will improve economy;
- Increase efficiency in air transport thus promoting trade;
- Increased accessibility of the area could help to encourage investment and trade benefiting the local economy.

**Creation of employment opportunities**

Construction and development projects world-wide creates employment opportunities for all cadres of staff directly or indirectly linked to the project. The proposed project, during construction will directly employ as a minimum, the following groups:
- Supervising engineering team;
- Contractor staff (managerial, skilled and unskilled labour force);
- Suppliers of plant, machinery, materials and essential services;
- Construction monitoring personnel from the various government agencies.

Wherever possible, the Contractor shall use local labour, and women must be encouraged.

From the project assessment, the following measures are recommended to mitigate the identified potential adverse impacts:

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<th>Anticipated Impact</th>
<th>Recommended mitigation measure</th>
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<td>Vegetation loss:</td>
<td>• The clearance of the site for construction purposes shall be kept to a minimum.</td>
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<td>• The Contractor shall clearly mark out the extent of clearing within the approved work-site.</td>
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<td>• Instruct all construction workers to restrict clearing to the marked areas and not to work outside defined work areas;</td>
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<td>• Landscaping of the site.</td>
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<td>Increase in mortality through bird strike.</td>
<td>• KAA should increase proportionately the intensity of its bird scattering activities and maintain its management of grassland to minimise the risk of bird strike.</td>
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<td>Erosion control:</td>
<td>• Earthworks should be controlled so that land that is not required for the construction works is not disturbed. Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain.</td>
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<td>• Excavated materials and excess earth will be kept at appropriate sites approved by the supervising engineer and the earth dumping sites designed in such a manner as to facilitate natural water discharge;</td>
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<td>• The Contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible.</td>
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<td>Air and noise pollution.</td>
<td>The Contractor shall be responsible for the control of air emissions and dust arising from his operations and activities and shall ensure the following:</td>
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<td>• Noise level is within acceptable limits and construction activities shall, where possible, be confined to normal working hours;</td>
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<td>• Noises sensitive areas like offices shall be notified at least 5 days before construction is commenced;</td>
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<td>• Workers are trained on management of air pollution from vehicles and machinery and dust minimisation techniques;</td>
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<td>• All construction machinery are maintained and serviced in accordance with the contractor's specifications;</td>
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<td></td>
<td>• Asphalt plants and concrete batching plants are well sealed and equipped with a dust removal device;</td>
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<td>• Dust generating activities (excavation, handling and transport of soils) are not carried out during times of strong winds;</td>
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<td>• Water is applied whenever dust emissions are visible at the site in the opinion of the opinion of the Resident Engineer;</td>
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<td>• Vehicles delivering soil materials are covered to reduce spills and windblown dust;</td>
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<td></td>
<td>• Vehicle speeds are limited to minimise the generation of dust on site and on diversion and access roads;</td>
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<td></td>
<td>• During operation phase of the airport, air and noise quality assessment should be undertaken to establish ambient conditions and whether any potential effects arising from additional air traffic emissions would be significant.</td>
</tr>
<tr>
<td>Anticipated impact</td>
<td>Recommended mitigation measure</td>
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</table>
| Water and soil contamination                           | • Construct oil-water interceptors or sumps to capture discharge of oils, fats and other polluting liquids from maintenance workshops, vehicle and equipment washing bays and kitchen drains;  
• A safety and emergency response plan to be developed for all operations with emphasis on the protection of the environment prior to start up by the contractor;  
• No grey water runoff or uncontrolled discharges from the site/working areas (including washdown areas) shall be permitted;  
• Water containing pollutants such as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site;  
• Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered;  
• Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted;  
• The Contractor shall take reasonable measures to control stormwater and the erosive effects;  
• No construction materials shall be stockpiled within areas that are at risk of flooding;  
• Plastic sheeting, sandbags or geofabric approved by the RE shall be used to prevent the migration of fines. |
| Public health and occupational health and safety        | • Implement measures to minimise waste and develop a waste management plan.  
• Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restrictions on site, frequency and personnel responsible for safety inspections and controls.  
• Daily site inspections should be done to ensure safe work practises are adhered to;  
• All workmen should be provided with personal protective equipment;  
• The Conditions of Construction in the tender documents should stipulate health, safety and environment regulations and work procedures;  
• The Contractor must appoint a foreman with knowledge on health, safety and environment regulations;  
• All injuries that occur on site must be recorded in the accident registers and corrective actions for their prevention be instigated as appropriate (Section 62 of the Factories and Other Places of Work Act);  
• Site personnel should be encouraged to report “near-miss incidents” in order to avoid potential problems and increase safety awareness;  
• Statistical records on accidents and incidents should be collated and analysed on a monthly basis and forwarded to the Supervising Consultant and/or displayed on the notice boards. |
| Rehabilitation of material sites                        | • The Contractor should cordon off the quarry and borrow areas and maintain fences and “make good” of the site afterwards;  
• The Contractor should rehabilitate the sites after completion and grading as per KAA Environmental Scientist preferable rehabilitation options. |
| Traffic Management                                      | • The Contractor should plan and implement traffic management programme on daily basis;  
• Comply with all applicable legislation and by-laws with regard to road safety and transport. |
<p>| Archaeological findings                                | • The Contractor should secure the location “as is” and immediately call the National Museums of Kenya’s Archaeology Section. |
| Hazardous material spill response:                      | An effective and efficient hazardous material spill emergency plan is necessary to minimise any detrimental effects to the environment and human health. |</p>
<table>
<thead>
<tr>
<th>Anticipated impact</th>
<th>Recommended mitigation measure</th>
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<tr>
<td>Water utilisation:</td>
<td>• The Contractor monitor water consumption and utilisation;</td>
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<td>• The Contractor should sensitize construction workers on the</td>
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<td>importance of proper water management.</td>
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<td>Additional demand for electricity supply:</td>
<td>• Develop an energy management plan.</td>
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<td></td>
<td>• Develop an energy management plan;</td>
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<td>• Construction machinery and vehicles should be maintained and</td>
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<td>used in accordance with manufacturer's specifications, to</td>
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<td>maximise efficiency and lower use of energy;</td>
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<td></td>
<td>• Construction workers should be sensitised on the importance of</td>
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<td>energy management.</td>
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<td>Increased wastewater (sewage):</td>
<td>• Maintenance of constructed sewer and wastewater handling</td>
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<td>systems.</td>
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<td>Production of waste:</td>
<td>• Develop a solid waste management plan prior to project</td>
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<td>commencing, identifying optimal waste re-use options and</td>
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<td>disposal areas;</td>
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<td></td>
<td>• Waste should not be burned on site or dumped in undesignated</td>
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<td></td>
<td>waste disposal areas;</td>
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<td></td>
<td>• Minimise waste production by utilising best available techniques</td>
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<td>for site preparation;</td>
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<td>• Re-use construction waste to the maximum extent possible;</td>
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<td>• Proper handling and storage procedures for hazardous wastes</td>
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<td>e.g. fuel oil should be stored in areas with hard standing and</td>
</tr>
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<td>containment to handle spills.</td>
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</table>

Construction at the site will be on-going for an approximate period of 36 months at a cost of USD. 25 million. Overall no adverse environmental impacts are foreseen that cannot be mitigated. A close down environmental audit should be undertaken upon completion of the Project to corroborate implementation of proposed mitigation measures.

NEMA approval can be issued on the basis of this report.
1 INTRODUCTION

1.1 Background

GIBB Africa Ltd has been commissioned by Queen's Quay Architects International to prepare an Environmental Impact Assessment Project Report for the expansions of Jomo Kenyatta International Airport, (JKIA) in Nairobi. The Project Report is to be submitted to the National Environment Management Authority (NEMA).

The JKIA is East Africa’s largest airport and was opened by the Government of Kenya in 1975, and operations began in 1978.

This Project Report has been prepared to provide sufficient and relevant information on the proposed project to enable the National Environment Management Authority (NEMA) establish whether the activities of the project are likely to have significant adverse environmental impacts. If the negative impacts are adequately addressed by mitigation measures, this Report can form a basis for the issuance of an Environmental Impact Assessment (EIA) Licence.

This Report documents the findings of an assessment and study of the proposed project site, project design and environmental concerns as relates to airport operations. Mitigation measures have been proposed for identified impacts and an environmental management plan for the implementation of the proposed measures has been presented.

1.2 Objectives

The objectives of the Environmental Impact Assessment (EIA) are:

- To fulfill the legal requirements as outlined in Section 58 to 69 of the Environmental Management and Co-ordination Act (EMCA) and Part I and II of the EIA/Audit Regulations;
- To obtain background biophysical information of the site and legal and regulatory issues associated with the project;
- To assess and predict the potential impacts during site preparation, construction and operational phases of the project;
- To make suggestions of possible alterations to the proposed design, based on the assessment findings;
- To propose mitigation measures for the potential significant adverse environmental impacts and safety risks;
- To allow for public participation;
- To lower project cost in the long term;
- To prepare an Environmental Management and Mitigation Plan.

1.3 Terms of reference

The Terms of Reference for this assessment are based on the NEMA Environmental Impact Assessment and Audit Regulations, dated June 2003. According to the Regulations, the Project Report should, where possible, contain descriptions of the following:

- The location of the project including the physical area that may be affected by the project’s activities;
- A summary description of the project;
• A concise description of the national environmental legislative and regulatory framework, baseline information and any other relevant information related to the project;
• Objectives of the project;
• The technology, procedures and processes to be used in the implementation of the project;
• Materials to be used in the construction and implementation of the project;
• The activities that shall be undertaken during the project construction, operation and de-commissioning phases;
• Products, by-products and waste generated by the project;
• Description of the potentially affected environment;
• The environmental effect of the project, including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated;
• Alternative technologies and process available and reasons for preferring the chosen technology and processes;
• Analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies;
• An environmental management plan proposing the measures for eliminating, minimising or mitigating adverse impacts on the environment, including cost, time frame and responsibility to implement the measures;
• Provision of an Action Plan for the prevention and management of foreseeable accidents and hazardous activities in the cause of carrying out activities or major industrial and other development projects;
• Measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies;
• An identification of gaps in the knowledge and uncertainties which were encountered in compiling the information;
• The project budget;
• The design of the project;
• Any other information that NEMA may require.

1.4 Methodology

The procedure used in undertaking the environmental assessment included the following:

• A desk-study to obtain background biophysical information of the site and legal and associated regulatory issues;
• Interviews with the Consulting Architects;
• Site visits for visual assessment of the baseline conditions and public consultation;
• Assessment and prediction of potential impacts during the site preparation, construction and operational phases of the project;
• Preparation of a Project Report, including the environmental management plan and mitigation measures.

1.5 Registration

As required by Regulation 14 of the NEMA Regulations, GIBB Africa Ltd is registered by NEMA as a “Firm of Experts for Environmental Impact Assessment and Audit” and is therefore authorised to undertake the EIA study and submit a Project Report. See Appendix 1 for a copy of the registration certificate.
2 PROJECT DESCRIPTION

2.1 Outline description of the proposed development site

Jomo Kenyatta International Airport (JKIA) is located approximately 13km to the east of the Nairobi Central Business District and is managed by the Kenya Airports Authority. The airport's main road access is through the Mombasa Road and Outer Ring Road. Bus connections from the city centre are provided at Ambassador Hotel Stage and through various bus stops within Jogoo Road, Outer Ring Road and Mombasa Road. There is no rail link to the airport.

The area of land within the current operational boundary of JKIA covers 50,000m². The airport was constructed in 1975 and was designed to accommodate 2.5 million passengers per year. Current traffic is 3.5 million passengers per year.

The airport runway is aligned in an east/west direction and is approximately 4117m. The majority of the airport facilities are located on the north side of the runway, with car parks and general aviation facilities located to the south. The airport facilities comprise:

- Passenger terminal building;
- Runway and taxiway system;
- Main passenger aircraft parking apron;
- Short and long term car parks (the main long term car park is located to the south of the arrival passenger facilities, short term car park for pre-book customers is located along the departure terminals);
- Air traffic control tower;
- Administration and operational offices within the terminal building;
- Ancillary facilities such as the fuel depots, flight catering, general aviation facilities, aircraft hangars and car hire.

2.2 Background to the development

JKIA is East Africa's largest airport. The complete traffic forecasts for JKIA were prepared in 1993 by Sorenvia and updated by the Belgian Airport Consultants in 2001. Based on the various calculations of planning peak hour traffic, the nominal schedules and JKIA's potential as a hub, it was recommended that:

The terminal and apron be designed, developed and operated to handle in 2014:

- 1100 arriving international passengers in the planning peak hour;
- 970 departing international passengers in the planning peak hour;
- 175 arriving domestic passengers in the planning peak hour;
- 200 departing domestic passengers in the planning peak hour.

and, in 2024:

- 1280 arriving international passengers in the planning peak hour;
- 1250 departing international passengers in the planning peak hour;
- 230 arriving domestic passengers in the planning peak hour;
- 235 departing domestic passengers in the planning peak hour.
2.3 Reasons for the development

Forecasts carried out by the Government and historic trends identify that future passenger growth at JKIA is such that expansion and modification of the existing infrastructure and facilities and increase in the air traffic movements is required. This expansion is supported through the National Airports Masterplan Final Report prepared in 1993.

The Government’s approach to airport expansion is to follow a balanced approach which:

- Recognises the importance of air travel to national and regional economic prosperity, and that not providing additional capacity where it is needed would significantly damage the economy and national prosperity;
- Reflects people’s desire to travel further and more often by air, and to take advantage of the affordability of air travel and the opportunities it brings;
- Seeks to reduce and minimise the impacts of airports on those who live nearby, and the natural environment;
- Ensures that, over time, aviation pays the external costs its activities impose on society at large;
- Minimises the need for airport development in new locations by making best use of existing capacity where possible;
- Respects the rights and interests of those affected by airport development, and
- Provides greater certainty for all concerned in the planning of future airport capacity, but at the sometime is sufficiently flexible to recognise and adapt to the uncertainties in long term planning.

2.4 Design considerations

Assessment of alternatives has been addressed by the Terminal Master plan, Design, and Construction Final Report volume 1-report prepared by Queen’s Quay Architects International –2005.

Key issues in the design considerations include:

- Separating departing and arriving passengers;
- Increase in the capacity of the terminal.

Four options were developed. Option 1 and 2 were developed with the premise of investigating different viable options for the airport expansion. Option 3 was then designed to take the best elements of the first two options to form a hybrid scheme. The elements of various design components and stakeholder comments are in Appendix 4.
2.5 Description of the proposed development

2.5.1 Description of the development

The key elements of the proposed development are described in Table 2-1:

<table>
<thead>
<tr>
<th>Proposed development</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walkways:</td>
<td>It is proposed that one ramp to the rooftop passageway is constructed for every 2 Gates.</td>
</tr>
<tr>
<td>Swing gates:</td>
<td>The swing gates will be developed along a finger on two separate levels.</td>
</tr>
<tr>
<td>Passenger drop off:</td>
<td>The proposed development will ensure that the passengers are dropped off along a canoped island providing maximum separation from the Terminal Building.</td>
</tr>
<tr>
<td>Primary check-in:</td>
<td>The proposed development will ensure that only travelling public is allowed through a primary security check at the entrance of each terminal.</td>
</tr>
<tr>
<td>Ticket counters:</td>
<td>The proposed development will provide at each terminal the ticket counters as follows: T1 – 24, T2 – 24, T3 – 15 and T4 – 12.</td>
</tr>
<tr>
<td>Secondary Security check-in:</td>
<td>The proposed development will ensure that after obtaining the boarding passes in the Departures Lobby, passengers will proceed through a secondary security check as well as Emigration Counters for International Travellers.</td>
</tr>
<tr>
<td>Concessions retail:</td>
<td>Two new zones of Retail will be developed between T1 &amp; T2 and T2 &amp; T3 on Level 1. Food and Beverage areas and new stands will be provided in T4 and T3 as well.</td>
</tr>
<tr>
<td>Departure lounge:</td>
<td>The intent of removing the Retail areas currently in the Departures Lounge Ring to Centralised zones is to clear the Lounge areas for comfortable seating where passengers can relax before their flights. The situation will be further improved by the segregation of the Arriving Passengers to a walkway on Level 2.</td>
</tr>
<tr>
<td>Airline Lounge:</td>
<td>Several Airline Lounge areas will be created for Lease along the Ring Building on Level 1.</td>
</tr>
<tr>
<td>Gates:</td>
<td>New gates will be created along a Pier Building. Six of those Gates will operate as swing Gates available for both International and Domestic Flights. There will be 1 new dedicated Domestic Gate on the Pier Building as well as 2 Remote Domestic Gates for the Year 2014</td>
</tr>
<tr>
<td>Arrivals route:</td>
<td>Arriving International Passengers will be segregated from Departing Passengers. The arrivals walkway will be constructed on Level 2, the current roof level of the Ring Building up to the point where they will be brought down escalators to connect to the current bridges that lead to the Arrivals Building.</td>
</tr>
<tr>
<td>Arrival bridge:</td>
<td>The 2 Arrivals Bridges will be refurbished with new glass cladding and new finishes.</td>
</tr>
<tr>
<td>Arrival immigration:</td>
<td>New facilities and finishes will be designed for Immigration and their associated functions. Current Airline Lounges will be relocated to the Departures Lounges.</td>
</tr>
<tr>
<td>Baggage Claim Hall:</td>
<td>New escalators will make it considerably easier to descend into the Baggage Claim Hall from the Immigration area. Skylights are proposed above the baggage claim devices to bring natural light into the space. The baggage claim raceways will be refurbished.</td>
</tr>
<tr>
<td>Customs:</td>
<td>The Customs area will be expanded to clearly define Red and Green routes. New counters and Customs offices will be provided.</td>
</tr>
<tr>
<td>Arrival Lobby:</td>
<td>New &quot;acacia&quot; tree canopies are proposed for the passenger Pickup curbs. The procast panels along the front face of the existing Arrivals Building will be removed to open up the building. Level 1 will be converted into a food court area where meters and greeters can linger.</td>
</tr>
<tr>
<td>Parking</td>
<td>4 Level plus Basement Parking Garage, approximately 60,000 sm. Exterior facades with row planters. An elevated Bridge will connect to the Arrivals Building.</td>
</tr>
</tbody>
</table>
2.5.2 Enabling works

(a) Demolition of buildings

Demolitions will involve removal of:

- Masonry products;
- Concrete products;
- Roofing Material.

Recyclable products will be handled as such, including ceiling tiles, light fixtures, air-conditioning units and miscellaneous metal products.

(b) Removal of panels

Precast concrete fins along the airdise of the existing Terminal to be removed. Select Precast panels along the Landside of the Terminal, cladding for the Bridges to the Arrivals Building, along the front façade of the Arrivals Building will also be removed. Precast concrete vent block on the east and west of the Arrivals Building to be removed.

(c) Asbestos Abatement

As apart of the construction work, identification of friable / non-friable asbestos and recommendation for removal will be carried out.

2.5.3 Construction programme and phasing

As apart of the engineering design work, a detailed programme for the development will be determined. Broadly this consists of phased but inter-related construction activities over a number of years anticipated between 2006 and 2009. Subject to approvals work to expand the terminal building is planned to start in October 2006. The associated developments would be phased out in line with the programme.

A provisional development timetable for the core elements of expansion is provided in Table 2-2.

Table 2-2: Provisional development timetable for core elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Contract category</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxi-way construction</td>
<td>Contract 1</td>
<td>June 2006</td>
<td>April 2007</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Car parking</td>
<td>Contract 2</td>
<td>Oct 2006</td>
<td>Oct 2007</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Terminal 4 construction</td>
<td>Contract 3</td>
<td>Oct 2006</td>
<td>-</td>
<td>Jan 2006</td>
<td>-</td>
</tr>
<tr>
<td>Refurbishment</td>
<td></td>
<td>-</td>
<td>Mar 2007</td>
<td>-</td>
<td>Dec 2009</td>
</tr>
</tbody>
</table>

2.5.4 General construction methodology

Standard construction techniques as contained in the JKIA construction code will be used. Project construction will be supervised by the Project Engineers and the Architects (Supervising Consultants /Project Managers). Construction activities have been divided into the following:

- Site preparation;
- Construction activities;
- Electrical and mechanical installations;

Key aspects to be considered during construction are:

- Recruitment of labour, both skilled and unskilled by the contractor;
- Procurement of construction materials;
  - Importation of aggregate and stone from approved quarries;
  - Procurement of cement, sand, ballast, timber.
- Building works, including:
  - Installation of services and interiors of the building;
  - Connection to the existing water supply, sewer system, drainage, power and telecommunication network;
  - Use of heavy and light machinery.
- Energy utilisation, major energy consuming activities include:
  - Lighting;
  - Excavation;
  - Transportation;
  - Hauling and hoisting of materials;
  - Mixing raw materials;
  - Waste handling trucking and disposal;
  - Testing and commissioning of the development.
- Water utilisation, including the following activities:
  - Washing of machinery and equipment;
  - Preparing of mixtures, including water based emulsion paints;
  - Concrete works, including curing;
  - General cleaning;
  - Landscaping;
  - Controlling dust on site;
  - Domestic utilisation (sanitary facilities).
- Waste production, including the following construction waste:
  - Excavated materials from the earth works;
  - Timber from used formwork;
  - Paints, lubricants and petroleum wastes;
  - Containers, cement paper bags and other packaging materials;
  - Metal, glass, plastic containers and other unwanted materials.
- Archaeological findings and aesthetics.

<table>
<thead>
<tr>
<th>Area of construction</th>
<th>Construction material/input</th>
<th>Anticipated waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 4 Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All walls and floors:</td>
<td>• Reinforced Concrete;</td>
<td>Stone cuttings from block shaping, dust and undersized/broken stones.</td>
</tr>
<tr>
<td></td>
<td>• Masonry and Plastered walls;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Insulated Glazed Curtain Wall systems.</td>
<td></td>
</tr>
<tr>
<td>Slabs, beams and columns:</td>
<td>• Reinforced Concrete + Steel.</td>
<td>Wastewater, used cement bags, excess oils, steel off cuts.</td>
</tr>
<tr>
<td>Formwork, roof support, doors,</td>
<td>• Plywood formwork;</td>
<td>Used formwork, broken timber, sawdust, spilt fixings and fittings.</td>
</tr>
<tr>
<td>wardrobes and cabinets:</td>
<td>• Hollow Metal Doors or glazed alum framed doors.</td>
<td></td>
</tr>
<tr>
<td>Roof:</td>
<td>• Prefin Insulated Metal roof;</td>
<td>Spolt fixings and off cuts.</td>
</tr>
<tr>
<td></td>
<td>• Single ply membrane on insulation on Concrete roof;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Polytetrafluoroethylene.</td>
<td></td>
</tr>
<tr>
<td>Windows:</td>
<td>• Insulated double-glazed curtain wall system.</td>
<td>Broken glass and timber off cuts.</td>
</tr>
<tr>
<td>Finishing and interiors:</td>
<td>• Lobby Areas – Epoxy Terrazzo;</td>
<td>Paint containers, waste paint, wastewater, waste trimmer, broken tiles, veneer.</td>
</tr>
<tr>
<td></td>
<td>• Seating Areas – Carpet;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Washrooms – ceramic tiles.</td>
<td></td>
</tr>
<tr>
<td>Area of construction</td>
<td>Construction material/input</td>
<td>Anticipated waste</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Car parking construction</td>
<td>Reinforced Concrete foundations, columns, walls, slabs</td>
<td>Wastewater, used cement bags, excess soils, steel off cuts.</td>
</tr>
<tr>
<td>Finishes</td>
<td>Hardened Concrete Washrooms – ceramic tiles.</td>
<td>Wastewater, used cement bags, excess soils, steel off cuts.</td>
</tr>
<tr>
<td>Taxi-way construction</td>
<td>Apron, Taxiways Shoulders</td>
<td>Heavy Duty Asphalt Pavement and Concrete Paving, Asphalt Pavement, Heavy Duty Asphalt Pavement.</td>
</tr>
</tbody>
</table>

(a) Waste disposal

Waste material, other than that which can be recycled and re-used on site, will be disposed off to unrehabilitated quarries within the KAA property. The masonry work, which will not be used on site, will be given out to schools as corporate social responsibility. A waste management plan shall be completed by the contractor prior to starting any construction or demolition and submitted to the Chief Engineers Office for acceptance. In addition to the regulatory requirements, all materials must be disposed off in approved landfill.

(b) Water supply and storage

Nairobi Water and Sewerage Company Ltd supplies JKIa with water through a 200mm diameter pipe, which discharges water into a 1.8 million litres underground concrete tank.

KAA recently upgraded its water distribution system and water storage capacity from the current 1.8 million litres to a total of 8.35 million litres, due to anticipated high demand for water at the airport and the proposed expansions by doing the following:

- Connection, to tap water from the EPZ main line supplying water to the Athi River facilities;
- Rehabilitation of 3 No. boreholes sunk strategically located around the airport;
- Increasing of water storage facilities from the existing volume of 1.8 million litres to a total of 8.35 million litres. New water storage facilities include:
  - 4.0 million litres low level concrete tank, 0.65 million litres elevated (30m) steel tank and 0.45 million litres elevated (10m) steel tank to tap from the boreholes all constructed at JKIa;
  - Comprises of a 1.0 million litres low level concrete tank and a 0.45 million litres elevated (10m) steel tank constructed at Embakasi;
  - A total of 14Km of new water distribution pipelines have been installed. The lines are to facilitate connections of storage facilities to arrivals building, Fire Crash & Rescue Station and Embakasi Terminal Area.

(c) Sewage and sullage

The JKIa has four main sewer lines as follows:

(i) State pavilion sewer

These sewers serve the state pavilion and control tower buildings and joints the 450mm-diameter sewer from the central and terminal buildings at manhole MH 75. The sewer is shallow near the pavilion and becomes very deep (5.48m to invert) as it joins the main sewer. The sewer diameter is 150mm between manholes MH67 and MH68 and then 230mm between manholes MH68 and MH75.
(ii) Central and terminal building sewers

Two main sewers serve the central and terminal building area with sizes ranging from 100mm to 300mm diameter. These sewers discharge into a 450mm-diameter sewer at manhole MH13 and subsequently into manhole MH75 where it joined by the state pavilion sewer. The sewage subsequently flows into the wet well of the sewage pumping station via manholes M76, M77 and MH78.

(iii) Aircraft wastewater catchpit sewer

The wastewater collected from aircraft is disposed at the aircraft wastewater catchpit, manhole MH102 located within the solid waste dumping enclosure. A 150mm-diameter ductile iron sewer connects the wastewater catchpit to the 450mm-diameter sewer at manhole MH77, from where it flows to the sewage pumping station.

(d) Energy supply

The energy supply is derived from KPLC 66Kv distribution network and thereafter stepped down to and metered at, 11kV at the KAA main substation for distribution via 11kV distribution board and 4NO. (11/0.415kV) step down transformers rated at 1000KVA. Assessment of energy supply has been addressed by the Terminal Master Plan, Design, and Construction Final Report volume 1-report prepared by Queen's Quay Architects International –2005, it is reported that an additional load of approximately 1400KW is expected as a result of proposed renovations and extension of the Terminals.

(e) Landscaping

The design proposals will consider in a positive way the selective application of landscape elements both on the inside and the exterior of the terminal buildings. Landscaping will be used not only to beautify the terminal but also as buffers between well - wishers and passenger drop off and the buildings for security reasons. Consideration will also be given to irrigation lines to maintain year round luxuriant greenery. Elements of landscaping that are planned for different areas include:

- An ice cream parlor/ coffee terrace with paved sitting area;
- Ponds and fountains along drive way, and use indigenous plant materials, where applicable. The fountains will have elements that reflect Kenya's identity;
- Reinforcing the access into the airport through planting and possibly incorporating sculptural works with fountains;
- Landscaping lighting and signage.

2.5.5 Decommissioning

The decommissioning of the airport is not relevant to the current development and, therefore, will not be considered by the EIA.
3 POLICY LEGAL AND REGULATORY FRAMEWORK

3.1 Policy framework

The Kenya Government's environmental policy aims at integrating environmental aspects into national development plans. The broad objectives of the national environmental policy include:

- Optimal use of natural land and water resources in improving the quality of human environment;
- Sustainable use of natural resources to meet the needs of the present generations while preserving their ability to meet the needs of future generations;
- Integration of environmental conservation and economic activities into the process of sustainable development;
- Meet national goals and international obligations by conserving bio-diversity, arresting desertification, mitigating effects of disasters, protecting the ozone layer and maintaining an ecological balance on earth.

3.2 Legal framework

Kenya has approximately 77 statutes that relate to environmental concerns. Most of these statutes are sector specific, covering issues such as public health; soil erosion; protected areas; endangered species; water rights and water quality; air quality, noise and vibration; cultural, historical, scientific and archaeological sites; land use; resettlement; etc.

Previously, environmental management activities were implemented through a variety of instruments such as policy statements and sectoral laws, and also through permits and licences. For example, the Physical Planning Act of 1996 empowers local authorities to request existing facilities to conduct environmental assessments, while under the Local Government Act of 1998, it is an offence to emit smoke, fumes or dust which may be a source of danger, discomfort or annoyance.

With the enactment of the Environmental Management and Co-ordination Bill in December 1999, the institutional framework for environmental management was strengthened. The Environmental Management and Co-ordination Act of 1999 (the Act) provides for the establishment of a National Environment Management Authority (NEMA), which became operational in July 2002. NEMA has statutory mandate to co-ordinate all environmental activities.

The Environmental (Impact Assessment and Audit) Regulations, 2003, provide the basis for procedures for carrying out Environmental Impact Assessments (EIAs) and Environmental Audits (EAs).

3.2.1 Environmental Management and Co-ordination Act

The Environmental Management and Co-ordination Act (EMCA, the Act), received Presidential assent on 6 January 2000 and was gazetted on 14 January 2000.

The main objective of the Act is to:

- Provide guidelines for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya;
- Provide a framework legislation for over 77 statutes in Kenya that contain environmental provisions;
• Provide guidelines for environmental impact assessment, environmental audit and monitoring, environmental quality standards and environmental protection orders.

The Second Schedule to the Act specifies the projects for which an EIA or EA must be carried out. According to the Act, Section 58, all projects listed in the Second Schedule of the Act must submit a Project Report to NEMA.

3.2.2 The Factories and Other Places of Work Act

This is an Act of Parliament to make provision for health, safety and welfare of persons employed in factories and other places, and for matters incidental thereto and connected therewith.

(a) Building Operations and Works of Engineering Constructions

The provisions of the Factories Act relevant to engineering construction works are contained in the Abstract of the Act for Building Operations, and Works of Engineering Construction Rules. These are summarised in Table 3-1:

Table 3-1: Minimum health and safety requirements for engineering construction works

<table>
<thead>
<tr>
<th>Legal Requirements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Requirements</td>
<td></td>
</tr>
<tr>
<td>Give notice of particular operations or works:</td>
<td>Notice should be sent in writing to the Occupational Health and Safety Officer, not later than seven days after commencement of construction and building works except where the construction works will be complete in less than six weeks or notice had already been given to the Occupational Health and Safety Officer (Section 60 of the Act).</td>
</tr>
<tr>
<td>General Register:</td>
<td>A general register of every person undertaking building operations or construction works be kept in adherence to the prescribed form L.D.B.C.R.2. This register is kept at the site of operations or at the office of the person undertaking the operations or works. The register should contain:</td>
</tr>
<tr>
<td></td>
<td>• The certificate of registration of the workplace;</td>
</tr>
<tr>
<td></td>
<td>• Every other certificate issued by the Chief Inspector under this Act;</td>
</tr>
<tr>
<td></td>
<td>• The prescribed particulars as to the finishing (washing, white washing, colour washing, painting or varnishing) of the facility;</td>
</tr>
<tr>
<td></td>
<td>• The prescribed particulars as to every accident and case of occupational disease occurring in the workplace of which a notice is required to be sent to a labour officer under the provisions of any law for the time being in force;</td>
</tr>
<tr>
<td></td>
<td>• All reports and particulars required by any other provision of this Act to be entered in or attached to the general register;</td>
</tr>
<tr>
<td></td>
<td>• Such other matters as may be prescribed (Section 62 of the Factories and Other Places of Work Act).</td>
</tr>
<tr>
<td>Special rules and welfare:</td>
<td>Printed copies or prescribed abstracts of the Factories and Other Places of Work Act must be kept posted at the site of operations or works (Section 61 of the Factories and Other Places of Work Act).</td>
</tr>
<tr>
<td>Safety Requirements</td>
<td></td>
</tr>
<tr>
<td>Air receivers:</td>
<td>These should be of sound construction and be properly maintained. They should be thoroughly examined by a competent person at intervals of 24 months and the reports of such examinations attached to the General Register (Section 39 of the Factorises and other Places of Work Act).</td>
</tr>
<tr>
<td>Cylinders for compressed, liquefied and dissolved gases:</td>
<td>Such cylinders should be of good construction, sound material, adequate strength and free from patent defect. The cylinders should conform to standards specified under the Standards Act or to a prescribed standard specification, approved in writing, by the Director, Kenya Bureau of Standards. They should be thoroughly examined by a competent person at regular intervals and a maintenance register kept (Section 39A of the amendment of the Factories and Other Places of Work Act).</td>
</tr>
</tbody>
</table>
### Legal Requirements

<table>
<thead>
<tr>
<th>Legal Requirements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notification of accidents:</td>
<td>The particulars of an accident causing death or disablement of a worker for more than three days from earning full wages at the workplace where he was employed must be sent in the prescribed form (L.D.B.C.R 6) to the Occupational Health and Safety Officer and entered in the General Register. Certain dangerous occurrences must also be reported whether or not they cause disablement (Section 62 of the Factories and Other Places of Work Act).</td>
</tr>
</tbody>
</table>

### Health Requirements

| Sanitary accommodation:   | Sufficient and suitable sanitary conveniences must be available for persons employed. These must be kept clean and well lit (Sections 16 and 18 of the Factories and Other Places of Work Act). |

### Miscellaneous Requirements

| Prohibition of deduction from wages: | The occupier must not make a deduction from wages in respect of anything he has to do or provide in pursuance of the Factories Act or permit any person in his employment to receive payment from other employees for such services (Section 66 of the Factories and Other Places of Work Act). |
| Duties of persons employed:        | An employee must not wilfully interfere with or misuse any means, appliance, convenience or other thing provided in pursuance of the Act for securing health, safety or welfare provided for his use under the Act. He must not wilfully and without reasonable cause do anything likely to endanger himself or others (Section 65 of the Factories and Other Places of Work Act). |
| Inspection:                       | The Occupational Health and Safety Officer has the power to inspect every part of the premises by day or by night. He may require the production of registers, certificates and other papers. May examine any person alone or in the presence of any other person as he thinks fit and may require him to sign a declaration of truth of the matters about which he is examined. Every person obstructing an Occupational Health and Safety Officer is liable to a penalty (Section 69 of the Factories and Other Places of Work Act). |

### Health

Part IV of the Factories Act, Chapter 514, addresses provisions concerning health. These provisions are to be enforced by the Department of Occupational Health and Safety of the Ministry of Labour. Details of the various requirements are outlined in Table 3-2.

### Table 3-2 Relevant provisions concerning occupational health under the Factories Act

<table>
<thead>
<tr>
<th>Section</th>
<th>Provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 13:</td>
<td>Every factory shall be kept in a clean state and free from effluvia arising from any drain, sanitary convenience or nuisance.</td>
</tr>
<tr>
<td>Section 14:</td>
<td>Overcrowding white work is carried out may cause risk to health. A factory is deemed overcrowded if the amount of cubic space per person is less than ten (10) cubic feet.</td>
</tr>
<tr>
<td>Sections 15 and 16:</td>
<td>Effective and suitable provisions shall be made for ventilation of the workroom, sufficient and suitable lighting in every part of the factory and passages.</td>
</tr>
<tr>
<td>Section 17:</td>
<td>Drainage of wet floors should be done where any process renders the floor wet.</td>
</tr>
<tr>
<td>Sections 18 and 19:</td>
<td>Sufficient and convenient sanitary conveniences should be provided, maintained and kept clean and separately for each sex. The local authority shall enforce this, if the Minister in the Gazette so directs.</td>
</tr>
</tbody>
</table>

### Safety

Part V of the Factories Act elaborately deals with safety requirements, mainly from the point of view of avoiding accidents and injuries at work. Table 3-3 outlines the safety requirements under the Act.
Table 3-3  Relevant provisions concerning occupational safety under the Factories Act

<table>
<thead>
<tr>
<th>Section</th>
<th>Provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sections 21, 22 and 23:</td>
<td>All prime movers, transmission machinery and other dangerous machinery shall be securely fenced unless it is in such a position or of such construction as to be as safe to every person employed on the premises as it would be if securely fenced. Effective devices and appliances shall be provided and maintained for stopping and starting the moving parts and these should be readily and conveniently operated.</td>
</tr>
<tr>
<td>Section 25:</td>
<td>All the fencing and other safeguards shall be of substantial construction, constantly maintained and kept in position while the parts required to be fenced or safeguarded are in motion or use.</td>
</tr>
<tr>
<td>Section 26:</td>
<td>Every machinery that requires sinking or encasement shall be completely sunk or encased to prevent danger.</td>
</tr>
<tr>
<td>Section 27:</td>
<td>Any vessels containing dangerous liquids shall be securely covered or fenced to prevent contact with or danger of falling into such vessels. A notice indicating the nature of danger in a form readily understood by the workers shall be attached on the plant or vessel or the notice should be posted appropriately.</td>
</tr>
<tr>
<td>Section 28:</td>
<td>At least 18 inches should be allowed between a self-acting machine or materials carried thereon and the space over which a person is liable to pass in his employment.</td>
</tr>
<tr>
<td>Section 29:</td>
<td>Any person working on a machine liable to cause bodily injury shall get full instruction, training and if possible be adequately supervised.</td>
</tr>
<tr>
<td>Sections 30 and 32:</td>
<td>Every hoist, lift or cranes shall be of good mechanical construction, sound material and adequate strength and be properly maintained and protected with enclosures and on it shall be marked the maximum load it can carry.</td>
</tr>
<tr>
<td>Section 31:</td>
<td>All chains, ropes, tackles shall be of good construction, sound material, adequate strength and free from patent defects. A table shall show the safe working load of every kind and size of the aforementioned, which shall not be exceeded.</td>
</tr>
<tr>
<td>Section 34:</td>
<td>All floors, steps, passages and gangways shall be of sound construction and properly maintained and all openings on the floor securely fenced.</td>
</tr>
<tr>
<td>Section 35:</td>
<td>Where a person has to work in a confined space where dangerous fumes are likely to be present, means of egress shall be provided. Efforts to remove the fumes should be made, suitable breathing apparatus should be provided or be safely secured to a rope and held by a person outside should be provided to any person entering such place.</td>
</tr>
<tr>
<td>Section 36:</td>
<td>Explosion shall be prevented by enclosure of plants used in process of making any explosive or inflammable dust. Removal and prevention of possible ignition should be done.</td>
</tr>
<tr>
<td>Section 38:</td>
<td>Every air receiver shall have marked on it the safe working pressure.</td>
</tr>
<tr>
<td>Section 41 and 42:</td>
<td>Means of extinguishing fire should be provided in all factories and free passageway for means of escape in case of fire shall be provided.</td>
</tr>
<tr>
<td>Sections 51 and 52:</td>
<td>In any factory where dust or fumes or impurities are produced, persons should be protected against inhalation and its accumulation should be prevented. No person shall be permitted to eat in such place.</td>
</tr>
<tr>
<td>Section 53:</td>
<td>Protective clothing should be provided to persons in any factory where they are exposed to wet or offensive substances. Goggles or screens should be provided to protect eyes.</td>
</tr>
</tbody>
</table>

(d) Health and Safety Committee Rules

These rules are described in Legal Notice No. 31 of the Kenya Gazette Supplement No. 25 of 14 May 2004 and apply to all factories and other workplaces that regularly employ twenty or more employees. Among other items, the rules state that:
• The occupier of every factory or other workplace shall establish a Health & Safety committee;
• The Committee shall consist of safety representatives from the management and the workers;
• The factory occupier shall appoint a competent person from the management staff to be responsible for safety, health and welfare in the factory or workplace; and the person appointed shall be the secretary to the Committee;
• Every member of the Health & Safety Committee shall undertake a prescribed basic training course in occupational health and safety within a period of six months from the date of appointment or election, and thereafter further training from time to time;
• The occupier of every factory or workplace shall cause a health and safety audit of the workplace to be carried out at least once in every period of twelve months by a registered health and safety adviser.

The above legal notice also describes the functions and duties of the Health & Safety committees, meetings and minutes, and roles in the Committee. It further describes the duties of the occupier and those of the Health & Safety Adviser.

(e) Medical Examination Rules

These are described in Legal Notice No. 24 of the Kenya Gazette Supplement No. 22 of April 2005. The Medical Examination Rules apply to all those employees in employment or who have been in employment in every workplace to which the provisions of the Factories and Other Places of Work Act (Cap 514) apply. The Rules describe the following:

• Occupations requiring medical examination;
• Duties of employer and employees as to medical examination;
• Reports on examination;
• Certificate of redeployment;
• Certificate of fitness;
• Notification of occupational diseases;
• Offences and penalties.

(f) Noise Prevention and Control Rules

These rules are described in Legal Notice No. 25 of the Kenya Gazette Supplement No. 22 of April 2005 and state the noise regulations that apply to every factory, premises, place, process and operations to which the provisions of the Factories and Other Places of Work Act (Cap 514) applies. These Rules describe the following:

• Permissible noise levels;
• Noise prevention programme;
• Noise measurements and records;
• Information on noise and training of workers;
• Noise measuring equipment;
• Engineering controls;
• Installation and maintenance of machinery or plant;
• Means of communication;
• Hearing protection;
• Noise hazard areas;
• Workers responsibility in noise hazard areas;
• Duties of the occupier;
• Medical examination and hearing tests;
• Compensation and notification of occupational hearing impairment;
• Noise programme review;
• Offences and penalties.
(g) Relevant Sectoral Legislation

While the Act supersedes all other environmental legislation, numerous other laws and regulations influence the various aspects and activities of the Project, which include the following among others:

- Kenya Airports Authority Act, Cap 395;
- The Civil Aviation Act, Cap 394;
- Air passengers Tax Act, Cap 475;
- Electricity Power Act No.11 of 1997;
- Building Code (1997);
- Petroleum Act, Cap 116 (rev 1972);
- Water Act (2002); Cap 272
- Public Health Act, Cap 242 (rev 1986);
- Local Government Act (rev. 1986) Cap 265;
- Local Government Regulations (1963) Cap 265;
- Workmen's Compensation Act (rev. 1988) Cap 254;
- Employment Act & Other Labour Related Laws;

3.3 Administrative framework

In 2001, the Government established the administrative structures to implement the Act. The main administrative structures are described in the following sections:

3.3.1 The National Environment Council

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

3.3.2 The National Environment Management Authority

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

3.3.3 The Standards and Enforcement Review Committee

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

3.3.4 The Provincial and District Environment Committees

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

- Representatives from all the ministries;
- Representatives from local authorities within the province/district;
- Two farmers / pastoral representatives;
- Two representatives from NGOs involved in environmental management in the province/district;
- A representative of each regional development authority in the province/district.
3.3.5 The Public Complaints Committee

The Act (EMCA) has also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate complaints relating to environmental damage and degradation. Its members include representatives from the Law Society of Kenya, NGOs and the business community.

3.4 Regulatory framework

3.4.1 The Environmental Impact Assessment and Audit Regulations

The Environmental Impact Assessment and Audit Regulations state in Regulation 3 that “the Regulations shall apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act”.

Regulation 4(1) further states that:

“...no proponent shall implement a project:

(a) likely to have a negative environmental impact; or
(b) for which an environmental impact assessment is required under the Act or these Regulations;

unless an environmental impact assessment has been concluded and approved in accordance with these Regulations...”

3.4.2 Standards and enforcement

Part VIII of the Act deals with environmental quality standards. It establishes a Standards and Enforcement Review Committee (SERC), whose functions include the establishment of standards for all environmental media.

A work plan has been set up by SERC to include committees to draw up standards for the following:

- Water quality;
- Waste quality;
- Chemicals;
- Land use;
- Biodiversity;
- Economic instruments.

These committees are in the process of finalising their respective standards, however none have been gazetted. Therefore the local authority standards or standards promulgated under sectoral legislation apply.

3.4.3 Licenses and Permits

According to the Act, licenses and permits will be required for:

- Effluents;
- Emissions;
- Hazardous wastes;
- Registration of toxic substances;
- Noise;
• Noxious smells.

Appendix 2 gives a tabulated summary of offences and penalties for non-compliance and in cases where pollution has occurred, together with the relevant provisions of the Act.

3.4.4 Key Regulatory Agencies

The regulatory agencies of relevance to the Project are shown in Table 3-4 below.

**Table 3-4 Regulatory Agencies**

<table>
<thead>
<tr>
<th>Regulatory agency</th>
<th>Responsible Ministry</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenya Airports Authority:</td>
<td>Ministry of Transport.</td>
<td>Responsible for drawing JKIA Construction code.</td>
</tr>
<tr>
<td>Department of Occupational Health and Safety:</td>
<td>Ministry of Labour.</td>
<td>Responsible for the implementation of the Factories and Other Places of Work Act.</td>
</tr>
<tr>
<td>Kenya Civil Aviation Authority:</td>
<td>Ministry of Transport.</td>
<td>Responsible for Air safety Regulations.</td>
</tr>
<tr>
<td>Medical Officer of Health:</td>
<td>Ministry of Health.</td>
<td>Responsible for the implementation of the Public Health Act.</td>
</tr>
</tbody>
</table>

All lead agencies are listed in the Schedule III of the Act.

3.5 International conventions

Kenya has ratified or acceded to numerous international treaties and conventions, as described below:

**Vienna Convention for the Protection of the Ozone Layer**: Inter-governmental negotiations for an international agreement to phase out ozone depleting substances concluded in March 1985 with the adoption of this Convention to encourage inter-governmental co-operation on research, systematic observation of the ozone layer, monitoring of CFC production and the exchange of information.

**Montreal Protocol on Substances that Deplete the Ozone Layer**: Adopted in September 1987 and intended to allow the revision of phase out schedules on the basis of periodic scientific and technological assessments, the Protocol was adjusted to accelerate the phase out schedules and has since been amended to introduce other kinds of control measures and to add new controlled substances to the list.

**The Basel Convention**: Sets an ultimate objective of stabilising greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system.

**Kyoto Protocol**: Drawn up in 1997, pursuant to the objectives of the UN Framework Convention on Climate Change, in which the developed nations agreed to limit their greenhouse gas emissions, relative to the levels emitted in 1990.
4 ENVIRONMENTAL SETTING

4.1 Socio-economic environment

The land where the airport is located belongs to the Government of Kenya under the management of Kenya Airports Authority (KAA).

The airport falls within Embakasi Division, in Nairobi District. The airport is situated in a predominantly industrial, residential and military area, although most sections of the area are open and undeveloped for the airport operations.

The properties adjacent to the airport include the following:

North: Residential areas and industries.
East: Military areas and Residents plots.
West: Kenya Pipeline Depots and vacant land.
South: Vacant land and residential plots.

4.2 Physical environment

4.2.1 Climate

<table>
<thead>
<tr>
<th>Climate Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean maximum temperature</td>
<td>25.5°C</td>
</tr>
<tr>
<td>Mean minimum temperature</td>
<td>12.5°C</td>
</tr>
<tr>
<td>Rainfall pattern</td>
<td>Bimodal, with wet seasons in March to May and mid-October to mid-December.</td>
</tr>
<tr>
<td>Mean annual rainfall</td>
<td>765mm</td>
</tr>
<tr>
<td>Relative humidity range</td>
<td>40-97%</td>
</tr>
</tbody>
</table>


4.2.2 Soils

The soils within the area have been developed on infill from volcanic ashes and are poorly drained, deep, very dark greyish brown, firm, moderately strongly calcareous, slightly sodic clay, with a humic topsoil. (Ref: National Atlas of Kenya, 1985, Survey of Kenya).

4.2.3 Topography

The area falls within the Athi plains, a plateau that rises from 700m in the east to 1700m above sea level in the west and is interrupted by an escarpment and series of hill masses, the highest being Kilimambogo that rises to 2144m above sea level (Ref: EP Saggerson 1991:Geological Report No.98, Geology of the Nairobi Area).

4.2.4 Geology

The Middle and Upper Kerichwa Valley Tuffs cover the area. The Middle tuffs have been variously named Nairobi building stone, Nairobi freestone, lava, devitrified trachyte, pitchstone, axiolitic phonolite and rhyolite. They are dense welded tuffs of ash-flow origin with fairly uniform characteristics, important differences being in colour and variation of texture that are sometimes emphasised by weathering. The Upper Kerichwa Valley Tuffs are unconsolidated, rock patches are undulated and agglomeric. The tuffs have irregular jointing which consists mainly of sub-vertical or curvilinear fractures that cause the rocks to break into irregularly shaped blocks. The joints permit the downward percolation of groundwater and different blocks, often in juxtaposition, may be variably wet and dry. The colour of deposits range

4.2.5 Hydrogeology

The area is underlain by volcanic rocks, which were deposited by the solidification of flowing lavas and ash and have very gentle slope eastwards away from the Rift Valley. The period when these deposits occurred also included periods of quiescence and stability during which erosion took place. These periods can be identified by bands of soils and sediments that are found between the lava flows. It is within these bands that groundwater is found and this is exploited by boreholes drilled in the Nairobi area.

The Upper Athi Series, which is the most important aquifer beneath most of the area, comprises a heterogeneous combination of lake beds, re-worked sediments, air-fall tuffs, ignimbrites, ashes and occasional intercalated lava flows. This aquifer is generally deep, averaging approximately 140 m below ground level (Ref: Hydrogeology of the Nairobi Area, by E.A.L. Gevaerts, Ministry of Natural Resources and Wildlife. Water Development Department. Technical Report No. 1, 1964).

4.2.6 Water resources

The airport lies within the Athi River Catchment, with the tributary of the Athi River passing about 5 km east of the Airport.

4.3 Biological environment

The surrounding undeveloped area consists largely of the following:

- Bushed grassland – Grassland with scattered or grouped shrubs, the shrubs being conspicuous but have a canopy cover of less than 20%;
- Grassland – Dominated by grasses occasionally other herbs, sometimes widely scattered or grouped trees and shrubs, the canopy cover does not exceed 2%.

The airport has medium sized indigenous trees, some ferns, shrubs and grassland.

There is a variety of wild animals seen on the area, but the variety is affected by the extent of development which is taking place. Various gazelle, zebra and giraffe are frequently seen.
5 ASSESSMENT OF ENVIRONMENTAL IMPACTS

5.1 Introduction

Construction related activities generally cause alterations to the bio-physical and social environment. The proposed project is not an exception. The alterations can bring about positive or adverse impacts. The positive impacts do enhance the environmental conditions but the negative impacts can be severe if they are not identified during project planning stages and appropriate mitigation measures designed.

The impacts have been categorised as positive and adverse impacts. During construction phase some benefits such as improved business and creation of employment to the local communities are expected. Most of the positive impacts are anticipated during the operation phase. The negative impacts are anticipated mainly during construction. Mitigation measures for the identified impacts have also been addressed in this chapter.

5.2 Impacts due to the location of the project

The project is an expansion of JKIA. The airport has been in existence for over 30 years and the environment within the airport has been significantly altered. Therefore, negligible impacts due to location are anticipated. Impacts are expected during construction and operation. These are discussed in the following sections.

5.3 Analysis of impacts

An overview of the project description has been presented in Chapter 2.

The potential impacts of the proposed project have been listed in Table 5-1 below and analysed into different categories based on the perceived environmental impacts.

Table 5-1 Analysis of impacts

<table>
<thead>
<tr>
<th>Environmental and social Impact</th>
<th>Positive/ negative</th>
<th>Direct / Indirect</th>
<th>Temporary / permanent</th>
<th>Major / Minor</th>
<th>Occurrence Design and Construction</th>
<th>operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhanced airport security.</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Increased air traffic movements.</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Increased car parking facility at the airport.</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Modification of infrastructure and facilities at the airport.</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

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EIA Project Report 5-1 August 2006
<table>
<thead>
<tr>
<th>Impact</th>
<th>Positive</th>
<th>Direct</th>
<th>Permanent</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved socio-economy.</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
</tr>
<tr>
<td>Visual enhancement of the environment of the airport.</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
</tr>
<tr>
<td>Creation of employment.</td>
<td>Positive</td>
<td>Direct</td>
<td>Temporary/Permanent</td>
<td>Major</td>
</tr>
<tr>
<td>Construction material disposal.</td>
<td>Negative</td>
<td>Direct</td>
<td>Temporary</td>
<td>Minor</td>
</tr>
<tr>
<td>Vegetation loss.</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Minor</td>
</tr>
<tr>
<td>Soil erosion.</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Minor</td>
</tr>
<tr>
<td>Air and noise pollution.</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
</tr>
<tr>
<td>Changes in vibration and vortex.</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Minor</td>
</tr>
<tr>
<td>Water and soil contamination.</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Minor</td>
</tr>
<tr>
<td>Public health impacts</td>
<td>Negative</td>
<td>Indirect</td>
<td>-</td>
<td>Minor</td>
</tr>
<tr>
<td>Landscape scarring at quarries.</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
</tr>
<tr>
<td>Road safety and delays.</td>
<td>Positive</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
</tr>
<tr>
<td>Changes in water supply.</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
</tr>
<tr>
<td>Overwhelming of wastewater treatment systems.</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
</tr>
<tr>
<td>Occupational health and safety problems.</td>
<td>Negative</td>
<td>Direct</td>
<td>Permanent</td>
<td>Major</td>
</tr>
</tbody>
</table>

5.4 Impacts during the construction and operation phase

5.4.1 Positive impacts

The significant positive impacts expected from the design, construction and operation phases include the following and are discussed in the subsequent section:

- Enhanced airport security;
- Increased air traffic movements;
- Increased car parking facility at the airport;
- Modification of the existing infrastructure and facilities at the airport;
- Visual enhancement of the environment of the airport;
- Improved local socio-economy;
- Creation of employment.
(a) Enhanced airport security

Re-development of the primary check-in will ensure that only travelling public is allowed through a primary security check at the entrance of each terminal and after obtaining the boarding passes in the Departures Lobby, passengers proceed through a secondary security check as well as immigration counters for International Travellers, thus enhancing security. Arriving and departing travellers will be segregated.

(b) Increased air traffic movements

The existing runway does not have sufficient capacity for the number of aircraft movements anticipated by 2014. The proposed development makes provision for construction of new taxiways at the eastern end of the runway in order to prevent aircraft waiting to get onto the runway, thus increasing air traffic movements.

(c) Increased car parking facility

The proposed development has a provision for car parking which will increase the number of vehicles allowed at the airport.

(d) Improvement of the existing infrastructure and facilities

The proposed project design will contribute to improving existing infrastructure and facilities and the comfort of airport users in several ways as detailed in chapter 2 sections 2.4.

(e) Visual enhancement of the environment

The expansion is proposed on previously developed land, in areas already characterised by airport facilities, functions and infrastructure. The proposed development includes plan to landscape the developed areas using indigenous trees and lawns. This will bring about long term changes to landscape character by reconfiguration of features and elements within the existing boundary.

(f) Improved local socio-economy

JKIA is the largest international airport in East Africa and the proposed expansion will contribute to increased businesses opportunities, both locally and internationally due to:

- Increased accessibility could increase the number of tourists and tourism spending which will improve economy;
- Increased efficiency in air transport thus promoting trade;
- Improvement of airport recreation facilities could help to encourage investment and trade benefiting the local economy.

(g) Creation of employment opportunities

Construction and development projects world-wide creates employment opportunities for all cadres of staff directly or indirectly linked to the project. The proposed project, during construction will directly employ as a minimum, the following groups:

- Supervising engineering team;
- Contractor staff (managerial, skilled and unskilled labour force);
- Suppliers of plant, machinery, materials and essential services;
- Construction monitoring personnel from the various government agencies.

Wherever possible, the Contractor shall use local labour, and women must be encouraged.

The proposed project will also directly or indirectly employ a number of people during operation due to increased facilities.
5.4.2 Potential adverse impacts

The following significant adverse impacts due to the proposed project have been identified and discussed in the subsequent section:

- Loss of vegetation;
- Soil erosion;
- Air and noise pollution;
- Water and soil contamination;
- Public health impacts from work operations;
- Visual intrusion at the borrow sites;
- Delays in transportation.

(a) Vegetation loss

The bulk of the airport land comprises runways, taxiways, car parking, and buildings. The land between the runways consists of species of semi improved grassland, managed according to standard 'long grass policy'. There are also areas of landscape mature trees associated with the entrance to JKIA.

The southern edge of the airport in the vicinity of the proposed area for the new car park (see photographs) has an area of semi improved grassland dominated by acacia trees. Construction works will involve clearing of vegetation in areas that are needed for site works. Some of these areas are habitats for different insects, butterflies, rodents and birds.

(b) Soil erosion

Erosion can be caused by earthworks during construction especially at borrow sites, embankments and earth dumping areas resulting in loss of topsoil.

(c) Air and noise pollution

Air pollution will arise from exhaust and engine emissions and from dust. Noise pollution will usually arise from blasting quarries and construction machinery. During construction, dust, noise and air pollution are expected especially from the aggregate crushers and asphalt plants, at work sites during site preparation and from construction machinery. Dust arising from construction activities has the potential to cause a nuisance. The potential nuisance can be experienced either as short-term events or long term accumulation.

During construction, noise can also be a nuisance to staff work in the offices within the premises. The level and distribution of construction dust emissions will vary according to factors such as the type, duration and location of activity, weather conditions and the effectiveness of mitigation measures.

During the operation of the airport noise will emanate from airborne, ground operations, and road traffic noise, which are likely affect those working within the airport. The increase in air pollution is mainly going to emanate from:

- Increased aircraft operations (including take-off, landing, taxing, engine testing, running of auxiliary power units (APUS) and ground power units (GPUs) on aprons, and engine testing);
- Increased airdside and land side vehicle emissions;
- Increased refueling of aircraft.

The dominant pollutant emissions to air associated with the above include:

- Nitrogen oxides;
- Volatile organic compounds;
- Carbon monoxide;
• Carbon dioxide;
• Sulphur dioxide; and Particulates.

(d) Vortex and vibration

With the expansion and the current developments taking place around the airport, it is expected that a few properties directly under the flight path in close proximity to the airport will be affected. Since no detailed evaluation has been undertaken at the airport in its current state, the extent of effects of vortex and vibration during expansion is not known.

(e) Water and soil contamination

Construction equipment generates large amounts of waste oil and its proper handling is critical, since haphazard storage and leakage can result in the contamination of soils, surface and ground waters. Oil products can also lead to contamination of surface and groundwater if there is a lack of fuelling, maintenance and servicing protocol for construction machinery at the Contractor's work camp.

(f) Public health impacts

Construction camps include workers' eating areas and the grounds where equipment is stored and serviced and where materials are stockpiled. These camps bring a temporary influx of people in an area or within close proximity to the project site. This may stimulate small scale businesses especially for the women who provide catering services to the labour force.

Local services at the airport such as water supplies, sanitation and waste disposal can be overstretched by the sudden increase in population during construction and later during operation. Proper sanitation arrangements must be made for the labourers during construction phase and for the project's operation phase.

(g) Landscape scarring

The project will require the use of stone and gravel from material sites for the base and sub-base. Materials sites (quarry and borrow areas) if not reinstated and rehabilitated after project completion, causes landscape scarring, which creates unpleasant changes in scenery when a gaping hole is left behind due to the excavation. The potential borrow sites visited are existing pits that have been partially exploited but not graded or rehabilitated.

(h) Road safety and delays in transportation

During construction, changes in baseline traffic as a result of construction activity are expected and this would slightly affect the normal operations of the airport.

Increase in traffic flows associated with construction vehicles, heavy trucks and bulldozers are expected to result in some traffic congestion. Furthermore, car parking spaces will be reduced temporarily during construction as the new multi-storey car park is being built and the existing one converted to Terminal buildings. This could cause minor inconveniences and expected problems will include sound nuisance, increased emission of air pollutants, and risk of accidents.

(i) Occupational health and safety

The occupational health and safety problems may result from poor handling of equipment, lack of proper clothing for construction and any other physical injuries emanating during both construction and operation of the airport.
5.5 Mitigation of impacts

The proposed mitigation for identified impacts is briefly described in the following sections.

(a) Controlled clearing of vegetation

The overall negative impact of the airport expansion on the environment will be limited considerably because the developments are within already built up airport environment. However, it is recommended that the Contractor must ensure:

- The clearance of the site for construction purposes is kept to a minimum. The stockpiling of materials etc shall be encouraged;
- There is a possibility of encountering near the proposed quarry site wildlife, this animals should be avoided and not perturbed and poaching or game hunting is forbidden;
- For the overall enhancement of the environment at the airport it is the responsibility of Contractor to ensure that landscaping programmes are implemented;
- The extent of clearing is clearly marked out and within the approved work-site. No construction activity shall occur outside defined work areas;
- Approval for each ancillary site prior to the commencement of related activities.

(b) Erosion control

During construction, earthworks should be controlled so that land that is not required for the construction works is not disturbed. Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain. Excavated materials and excess earth will be kept at appropriate sites approved by the supervising engineer. Wherever possible, the earth dumping sites will be designed in such a manner as to facilitate natural water discharge.

The Contractor shall take reasonable measures to control storm water and the erosive effects. During construction the Contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible.

(c) Air and noise pollution control

During construction, dust emissions should be reduced by sprinkling water at work sites, and quarry areas. Reduction of air emissions from exhausts and noise abatement should be achieved by contracting new equipment or well serviced and maintained equipment.

Dust, air pollution and noise pollution from aggregate crushers, concrete batching and asphalt plants (if allowed within the premises) should be reduced by ensuring that the plants are located downwind. Temporary barriers or dust nets can also be installed. During the construction phase regular dust monitoring should be undertaken to understand the impact of dust nuisance to the airport activities and community.

Air emissions from construction machinery, including dust, is regarded as a nuisance when it reduces visibility, costs private property, or is aesthetically displeasing. Dust generated by construction related activities must be minimised. The Contractor shall be responsible for the control of air emissions and dust arising from his operations and activities. In summary the contractor shall ensure the following:

- Noise level is within acceptable limits and construction activities shall, where possible, be confined to normal working hours;
- Noise sensitive areas like offices shall be notified at least 5 days before construction or rehabilitation works is due to commence in their vicinity. Any excessively noisy activity shall be conducted outside of office hours, where approved by the Resident
Engineer (RE).
- Workers are trained on management of air pollution from vehicles and machinery;
- All construction machinery are maintained and serviced in accordance with the contractor's specifications;
- Asphalt plants and concrete batching plants are well sealed and equipped with a dust removal device;
- Workers are trained on dust minimisation techniques;
- Dust generating activities (excavation, handling and transport of soils) are not carried out during times of strong winds. The RE shall suspend earthworks operations wherever visible dust is affecting properties adjoining the airport;
- Water is applied whenever dust emissions (from vehicle movements or wind) are visible at the site in the opinion of the RE.
- Vehicles delivering soil materials are covered to reduce spills and windblown dust;
- Vehicle speeds are limited to minimise the generation of dust on site and haul routes;
- Any complaints received by the Contractor regarding dust will be recorded and communicated to the RE.

During operation phase of the airport, air and noise quality assessment should be undertaken to establish ambient conditions and whether any potential effects arising from additional air traffic emissions would be significant.

(d) **Control of water and soil contamination**

The contractor should construct sealed areas for the storage of fuel, oils, bitumen and chemicals so as to avoid any accidental discharge that would pollute soil and water resources. Where necessary, oil-water interceptors or sumps should be constructed to capture discharge of oils and other polluting liquids in storage and dispensing areas. Machinery and vehicle servicing and maintenance should be done off-site at commercial workshops and service stations to avoid pollution incidents.

At the work sites the contractor will be expected to maintain strict surveillance of spillage of fuel products and leakage of machines. A safety and emergency response plan will need to be developed for all operations with emphasis on the protection of the environment prior to start up.

In addition, the contractor will be expected to ensure that no construction materials are stockpiled within the areas that are at risk of flooding and ensure the following:

- No grey water runoff or uncontrolled discharges from the site/working areas shall be permitted;
- Water containing such pollutants as cement, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site. This particularly applies to water emanating from concrete batching plants and concrete swirls;
- Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered;
- Wash areas should preferably be off-site. If not possible, be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted;
- The Contractor shall notify the RE of any pollution incidents on site.

(e) **Public health and occupational safety**

Proper maintenance and efficiency of existing wastewater systems should be addressed as proposed in the master plan. Moreover the entire sanitary sewer leaving a building space or land parcel must comply with sewer regulations of the Nairobi City Council as contained in Part IV of the Jomo Kenyatta International Airport Draft Construction Code.

During Construction, the contractor will be required to prepare a waste management plan for the work sites and equipment camp at the start of the project. The contractor will need to liaise with the KAA Chief Engineer on suitable waste disposal locations. The site is to be kept clean,
neat and tidy at all times. No burying or dumping of any waste materials, vegetation, litter or refuse shall be permitted. The Contractor shall implement measures to minimise waste and develop a waste management plan to include the following:

- All personnel shall be instructed to dispose of all waste in a proper manner;
- At all places of work the contractor shall provide litter collection facilities;
- The final disposal of the site waste shall be done at the location that shall be approved by the RE, after consultation with local administration and local leaders;
- The provision of sufficient bins (preferably vermin and weatherproof) to store the solid waste produced on a daily basis;
- Wherever possible, materials used or generated by construction shall be recycled;
- Provision for responsible management of any hazardous waste generated during the construction works.

Workmen should be provided with suitable protective gear (such as dust masks, ear muffs, helmets, overalls, industrial boots etc.) particularly during quarrying, blasting, handling tar and while working on the aggregate crushers, concrete batching and asphalt plants. There must be fully equipped First Aid kits on site and a Safety Officer who has first aid training and knowledge of safety procedures. In addition the contractor must have insurance cover for the workmen.

The contractor will be required to adhere to Factories and Other Places of Work Act, especially the Building Operations and Works of Engineering Construction Rules and its subsidiary and supplementary regulations on Safety and Public Health in the construction activities.

The Contractor shall institute HIV/AIDS awareness and prevention campaign amongst his workers for the duration of the contract.

(f) Rehabilitation of materials sites

During excavation of material sites, it is advisable to cordon off the quarry and borrow areas. The contractor should be instructed to maintain fences and “make good” of the site afterwards.

Scraped topsoil can be used for re-vegetating the sites after completion and grading.

The already identified materials sites for this project belong to the KAA. If the contractor chooses to exploit materials from this site then he will have to consult the KAA Environmental Scientist on the preferable rehabilitation options.

(g) Traffic management

- To avoid traffic delays to the airport during construction, the contractor will be required to plan and implement traffic management programme on daily basis;
- The Contractor shall comply with all applicable legislation and by-laws with regard to road safety and transport;
- Access to the construction site and works area shall utilise existing roads and tracks where possible;
- All temporary access routes shall be rehabilitated at the end of the contract to the satisfaction of the Resident Engineer;
- Damage to the existing access roads as a result of construction activities shall be repaired to the satisfaction of the Resident Engineer. The cost of the repairs shall be borne by the Contractor.
5.6 Costs of mitigation

Construction related costs for mitigation of environmental impacts will be included in the Bill of Quantities (BoQ) of the project.
6 ENVIRONMENTAL MANAGEMENT AND MITIGATION PLAN

6.1 Environmental management

The purpose of the environmental management plan (EMP) is to ensure environmental impacts are identified, avoided, or mitigated during the planning, design, construction, and operation of all new projects.

The EMP has been developed with project knowledge and information available to date. As project commencement and scheduling plans are developed and changed, components of the EMP might require amending. This is therefore a working document, which can be updated whenever new information is received or site conditions change.

Table 6-1 presents the EMP. It outlines corresponding management strategies proposed in Chapter 5 that will be employed to mitigate potential adverse environmental impacts and assigns responsibility for the implementation of the mitigation measures.

6.1.1 Objectives of the EMP

The objectives of the EMP are:

- To bring the project into compliance with applicable national environmental and social legal requirements social policies and procedures;
- To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimise, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts.

6.1.2 Responsibilities

In order to ensure the sound development and effective implementation of the EMP, it will be necessary to identify and define the responsibilities and authority of the various persons and organisations that will be involved in the project.

The following entities will be involved on the implementation of this EMP:

- Ministry of Transport;
- Kenya Airports Authority;
- Consultants;
- Contractor;
- National Environmental Management Authority (NEMA).

(a) Ministry of Transport and Kenya Airports Authority

JKIA is managed by KAA, which falls under the Ministry of Transport. Therefore, the responsibility for ensuring that mitigation measures specified in this EMP and the contract documents are implemented will lie with the KAA and its parent Ministry of Transport.

The environmental monitoring staff from KAA and if necessary, representatives from NEMA will undertake monitoring during construction and operation phases of the project.

KAA has developed JKIA Construction Code for all the all works at the airport premises, which the Contractor must comply with in the execution of the proposed works.
(b) The Resident Engineer

The Resident Engineer (RE) will be appointed by the Supervising Consultant and will be required to oversee the construction programme and construction activities performed by the Contractor, in compliance with the present EMP.

It is recommended that prior to commencement of actual construction; the Consultant should submit a work site plan that complies with the national environmental guidelines and an updated EMP for the different phases of the work. The environmental plan should specify in particular the location of borrow areas, disposal area of construction debris and arrangements for traffic management. The plan should take into consideration the mitigation measures proposed in this EIA Project Report.

The Supervising Consultant should also appoint an Environmental and Safety Officer or Consultant who will be responsible for the following tasks:

- Drafting environmental aspects during project implementation;
- Managing environmental and safety aspects at the work sites;
- S/He shall participate in the definition of the no working-areas and the location of campsites, borrow pits, quarries and other areas;
- Recommending solutions for specific environmental problems;
- S/He shall facilitate the creation of a liaison group with the stakeholders at the airport and shall monitor the compliance EMP;
- Organising consultations at key stages of the project with the stakeholders and interested parties;
- S/He will be required to liaise with the KAA Environmental Officer or NEMA on the level of compliance with the EMP achieved by the Contractor on a regular basis for the duration of the contract;
- Controlling and supervising the implementation of the EMP;
- Preparing quarterly environmental progress or "audits" reports on the status of implementation of measures and management of work sites.

(c) The Contractor

The Contractor will be required to comply with the requirements of the EIA, this EMP and the Part IV of the JKIA Construction Code which include specifications for Environmental standards at the airport.

(d) National Environment Management Authority

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

6.2 Environmental guidelines

In addition to the mitigation presented in Chapter 5 and to facilitate the use of the EMP, the following environmental management guidelines are presented according to the sequence of project stage activities as follows:

- Pre-construction;
- Site preparation;
- Site Housekeeping;
- Health, Safety and Security;
- Operation.
6.2.1 Pre-construction

The RE and the Contractor will undertake the following:

- Ensure the tender documents specify required standards and certification for procurement of all materials and appliances;
- As far as possible, ensure that the environmentally friendly and sustainable materials are used. Materials not to be used for construction include:
  - Wood wool slab in permanent formwork to concrete;
  - Calcium silicate bricks or tiles;
  - Asbestos in any form;
  - Asbestos substitutes or any naturally occurring or man-made mineral fibres;
  - Lead, lead paint or any other materials containing lead which may be inhaled, ingested or absorbed;
  - Vermiculite, unless it is established as being fibre-free;
  - Any products containing cadmium that are regarded as being injurious substances (refer to the UK Environmental Protection ( Controls on Injurious Substances (No. 2) Regulations 1993);
- Any other substances regarded as being deleterious building materials, which are not in accordance with statutory requirements or with current, accepted good building practice at the time of specification or construction.
- The RE should ensure that the Contractor is instructed in the use of all materials that may have negative environmental (including health) effects;
- Undertake a pre-construction inspection of each section of the proposed development. The inspection shall involve a site review and any identified ancillary sites required by the Contractor. It will serve to:
  - Identify site-specific construction or environmental problems;
  - Identify services any existing facility that are required to be relocated and / or reinstated;
  - Identify cut and spoil disposal or storage sites.

6.2.2 Stakeholder consultation

KAA shall facilitate stakeholder consultation with a view of making changes and satisfying progress as need arises.

6.2.3 Environmental training and awareness

- The Contractor must be aware of the environmental requirements and constraints on construction activities contained in the provisions of the EMP;
- The Contractor will be required to provide for the appropriate Environmental Training and Awareness as described in these guidelines in his costs and programming;
- An initial environmental awareness training session shall be held prior to any work commencing on site.

The training should include reference, but not be restricted, to the following:

- Basic awareness and understanding of the key environmental features of the work site and ways to minimise environmental impacts;
- Relevant requirements of the EMP;
- Prevention and handling of fire;
- Health risks pertinent to the site, including prevention of diseases.

6.2.4 Site layout plans

The Contractor will produce a plan illustrating proposed working and 'no-go' areas. The plan should include reference to the following aspects where pertinent as and where these are required:
• Proposed working areas;
• 'No-go' areas;
• Quarries, borrow pits and spoil areas;
• Labour force eating areas;
• Sanitation/ablation facilities;
• Storage, spoil, stockpile and lay down areas;
• Hazardous and fuel storage areas;
• Batching plant and workshop/equipment areas;
• Vehicle wash areas;
• Waste disposal facilities;
• Access routes;
• Project security gates and gatehouses.

6.2.5 Site security

The Contractor will need to take the following measures:

• Appropriate fencing, security gates, shelter and/or security guards are to be provided at the Construction Site to ensure the security of all plant, equipment and materials, as well as to secure the safety of site staff;
• Site staff that are found to be involved in incidences of theft or pose other security risks to the airport operations are to be dismissed and reported to KAA.

6.2.6 Environmental programs

Environmental aspects are based on organisational activities and specific operations, and consider the current and future airport environment. The environmental programmes that will need a follow-up during the construction and operations phases include the following:

• Environmental Audit;
• Increased Aircraft Noise;
• Hazardous Materials Spill Response;
• Water Quality.

(a) Environmental Audit (EA)

The purpose of an EA is to ensure the environmental management plan during the planning, design, construction, and operation of the project is implemented and updated at each stage accordingly. Environmental impacts to be audited are outlined in the EMP and may include changes of air, soil and water quality, waste management impacts, personal safety, social issues and aesthetics.

(b) Aircraft Noise

KAA must maintain a good working relationship with nearby communities while balancing demands for a safe, convenient, and 24-hour service airport. Regular qualitative airborne noise, noise from ground operations and road traffic noise associated with the airport noise assessment must be undertaken to ensure compliance with local regulations.

(c) Hazardous materials spill response

The use of some hazardous materials is necessary for the day to day operations of the airport. The more often they are handled and used, the greater the possibility for accidental release into the environment. Hazardous material spills can have severe impacts on the environment by contaminating the soil and making their way into the ground water or other water supplies.

An effective and efficient hazardous material spill emergency plan is necessary to minimise any detrimental effects to the environment and human health. The purpose of the plan is to ensure proper assessment, management, cleanup, and regulatory compliance of any
hazardous material's spill occurring at the JKIA.

(d) Water Quality

There is always a risk that substances commonly associated with airport operations can enter the storm water systems, sanitary systems or groundwater systems as pollutants. To ensure compliance with water quality regulations and guidelines, wastewater systems will need to be sampled and monitored on a regular basis. The purpose is to provide information and guidelines on water quality issues.

(e) Ozone depleting substances

These are compounds which, upon decomposition, destructively interact with the Earth's ozone layer, resulting in ozone depletion. Of particular concern for their ozone depletion capabilities are halons (bromofluorocarbons) and CFCs (chlorofluorocarbons). Halons are used in fire extinguishing equipment, primarily for electrical fires in portable extinguishers, while CFCs are used as refrigerants in air conditioning and cooling systems. The purpose of the environmental management plan is to minimise the potential ozone depleting effects of CFCs by recovering, containing and monitoring the use of CFC containing material/equipment.

6.2.7 Equipment maintenance

It should be demonstrated that all equipment and facilities comply with the standards as set out in the tender and equipment spare parts are available in the market in the event that a replacement is required. The maintenance team will develop a programme of regular maintenance and ensure that the relevant skills are always available.
Table 6-1  Environmental management and mitigation plan

<table>
<thead>
<tr>
<th>Environmental / Social issue/aspect/activity</th>
<th>Anticipated impact</th>
<th>Standard / Guideline</th>
<th>Management and mitigation</th>
<th>Monitoring requirements</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| Vegetation loss:                            | Impact on ecology. | EMCA.                | - The clearance of the site for construction purposes shall be kept to a minimum.  
- The Contractor shall clearly mark out the extent of clearing within the approved work-site.  
- Inform all construction workers to restrict clearing to the marked areas and not to work outside defined work areas;  
- Landscaping of the site.                                                                          | Weekly reporting on mitigation measures implemented and effectiveness of mitigation.    | Contractor/  
Resident  
Engineer/ KAA  
Environmental  
Officer.                                           |
| Erosion control:                            | Soil degradation, siltation. | EMCA, Agricultural Act; Building Code. | - Earthworks should be controlled so that land that is not required for the construction works is not disturbed. Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain.  
- Excavated materials and excess earth will be kept at appropriate sites approved by the supervising engineer and the earth dumping sites designed in such a manner as to facilitate natural water discharge;  
- Protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible. | Weekly reporting on mitigation measures implemented and effectiveness of mitigation.    | Contractor/  
Resident  
Engineer/ KAA  
Environmental  
Officer.                                           |
<table>
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</table>
| Air and noise pollution.                     | Degradation of air quality; Health hazard. | EMCA, Factories Act (Noise Prevention and Control Rules); Public Health Act | The Contractor shall be responsible for the control of air emissions and dust arising from his operations and activities and shall ensure the following:  
- Noise level complies with the Noise Prevention and Control Rules;  
- Noise sensitive areas like offices shall be notified at least 5 days before construction is commenced;  
- Workers are trained on management of air pollution from vehicles and machinery and dust minimisation techniques;  
- All construction machinery are maintained and serviced in accordance with the contractor's specifications;  
- Asphalt and concrete batching plants are well sealed and equipped with a dust removal device;  
- Dust generating activities (excavation, handling and transport of soils) are not carried out during times of strong winds.  
- Vehicles delivering soil materials are covered to reduce spills and windblown dust;  
- Vehicle speeds are limited to minimise the generation of dust on site and on haul routes;  
- During operation phase of the airport, air and noise quality assessment should be undertaken to establish ambient conditions and whether any potential effects arising from additional air traffic emissions would be significant. | Weekly reporting on health and safety considerations, mitigation measures implemented and effectiveness of mitigation. | Contractor/ Resident Engineer/ KAA Environmental Officer. |
| Water and soil contamination                  | Soil, water and groundwater contamination. | EMCA, Public Health Act. | Construct oil-water interceptors or sumps to capture discharge of oils, fuels and other polluting liquids from workshops, vehicle and equipment washing bays;  
- A safety and emergency response plan to be developed for all operations with emphasis on the protection of the environment;  
- No grey water runoff or uncontrolled discharges from the site/working areas (including washdown areas) shall be | Weekly reporting on health and safety considerations, mitigation measures implemented and effectiveness of mitigation. | Contractor/ Resident Engineer/ KAA Environmental Officer. |
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<th>Responsibility</th>
</tr>
</thead>
</table>
| Public health and occupational health and safety | Health and safety risks from:  
- Public health problems;  
- Physical injury from slipping falling and handling equipment;  
- Fire;  
- Inhalation of gas, oil or paint fumes and dust;  
- Water containing pollutants such as cement, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site;  
- Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered;  
- Equipment Storage or wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted;  
- The Contractor shall take reasonable measures to control stormwater and its erosive effects;  
- No construction materials shall be stockpiled within areas that are at risk of flooding; | Weekly reporting on health and safety considerations, mitigation measures implemented and effectiveness of mitigation. | Main Contractor/ Resident Engineer/ KAA Environmental Officer. |
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</table>
| Rehabilitation of material sites           | Health hazard.    | EMCA.              | • Site personnel should be encouraged to report "near-miss incidents" in order to avoid potential problems and increase safety awareness;  
• Statistical records on accidents and incidents should be collated and analysed on a monthly basis and forwarded to the Supervising Consultant and/or displayed on the notice boards. | Monthly reporting on status and rehabilitation options. | Contractor/Resident Engineer/ KAA Environmental Officer. |
| Traffic Management                         | Traffic congestion, time delays etc. | EMCA. Traffic Act. | • Cordon off the quarry and borrow areas and maintain fences and "make good" of the site afterwards;  
• Rehabilitate the sites after completion and grading as per KAA preferred rehabilitation options.                                                                                                                  | Before the start of main construction works. | Contractor/Resident Engineer/ KAA Environmental Officer. |
| Archaeological findings                    | Destruction of natural heritage / loss of archaeological findings. | National Museums of Kenya. | • Plan and implement traffic management programme on daily basis;  
• Comply with all applicable legislation and by-laws with regard to road safety and transport.                                                                                                                                 | Reporting on any unusual finding. | Project Manager / Supervising Consultant and Main Contractor. |
| Increase in mortality through bird strike. | Increase in risk of Mortality through bird strike. | EMCA; Kenya Civil Aviation Authority. | • The Contractor should secure the location 'as is' and immediately call the National Museums of Kenya's Archaeology Section.                                                                                     | Daily reporting. | KAA Environmental Officer. |
| Hazardous materials spill response:        | Health hazard. | EMCA, Building Code. | • KAA should increase proportionately the intensity of its bird scaring activities and maintain its management of grassland to minimise the risk of bird strike.  
• An effective and efficient hazardous material spill emergency plan is necessary to minimise any detrimental effects to the effects to the environment and human health. The purpose of the plan is to ensure proper assessment, management, cleanup, and regulatory compliance of any hazardous materials spill occurring at the JKIA.  
• Record and document water consumption;  
• Report on any irregularities. | | Main Contractor. KAA Environmental Officer. |
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Water utilisation:</td>
<td>• Water wastage;</td>
<td>EMCA, Building Code.</td>
<td>• Monitor water consumption and utilisation;</td>
<td>• Record and document water consumption;</td>
<td>Main Contractor. KAA Environmental Officer.</td>
</tr>
<tr>
<td></td>
<td>• Increase in project costs;</td>
<td></td>
<td>• Sensitive construction workers on the importance of proper water management.</td>
<td>• Report on any irregularities.</td>
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<td></td>
<td>• Poor hygiene and sanitation.</td>
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<tr>
<td>Additional demand for electricity supply:</td>
<td>Numerous power shortages.</td>
<td>EMCA.</td>
<td>• Develop an energy management plan.</td>
<td>Develop consumption trends.</td>
<td>KAA Chief Engineer.</td>
</tr>
<tr>
<td>Energy utilisation:</td>
<td>Energy wastage.</td>
<td>EMCA.</td>
<td></td>
<td></td>
<td>Main Contractor.</td>
</tr>
<tr>
<td>Increased wastewater (sewage):</td>
<td>Surface and groundwater pollution.</td>
<td>Monitoring the performance of sewer lines, septic tanks and soak pits.</td>
<td>• Maintenance of constructed sewer and wastewater handling systems.</td>
<td>Regular monitoring of the septic tanks and soak pits.</td>
<td>KAA Chief Engineer.</td>
</tr>
<tr>
<td>Production of waste:</td>
<td>Soil degradation and surface water pollution.</td>
<td>Water Act; EMCA; Agriculture Act.</td>
<td>• Develop a solid waste management plan prior to project commencing, identifying optimal waste re-use options and disposal areas;</td>
<td>Report on all waste production and handling procedures.</td>
<td>Project Manager / Supervising Consultant/ Main Contractor/ Property owner.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Waste should not be burned on site or dumped in undesignated waste disposal areas;</td>
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<td></td>
<td></td>
<td></td>
<td>• Minimise waste production by utilising best available techniques for site preparation;</td>
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<td></td>
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<td></td>
<td>• Re-use construction waste to the maximum extent possible;</td>
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<td></td>
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<td></td>
<td>• Proper handling and storage procedures for hazardous wastes e.g. fuel oil should be stored in areas with hard standing and containment to handle spills.</td>
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</tr>
</tbody>
</table>
CONCLUSION

This Project Report has been prepared to provide sufficient and relevant information on the proposed project to enable the National Environment Management Authority (NEMA) to establish whether the activities of the project are likely to have significant adverse environmental impacts. If the negative impacts are adequately addressed by mitigation measures, this Report can form a basis for the issuance of an Environmental Impact Assessment (EIA) Licence.

This Report documents the findings of an assessment and study of the proposed project site, project design and neighbour's concerns. Mitigation measures have been proposed for identified impacts and an environmental management plan for the implementation of the proposed measures has been presented.

Overall, it is recommended that this Project can proceed and the proposed mitigation measures implemented, as the development is consistent with the current development of the area. NEMA approval can be issued on the basis of this report.

The construction will be on-going in different phases for a period of approximately three years at an estimated cost of USD. 25million.
## APPENDICES

| Appendix 1 | Copy of NEMA Registration Certificate for GIBB Africa Ltd |
| Appendix 2 | Summary of offences and penalties for non-compliance; |
| Appendix 3 | Photographs |
| Appendix 4 | Documentation from KAA |
| Appendix 5 | Public consultation form |
Appendix 1  Copy of NEMA Registration Certificate for GIBB Africa Ltd
THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT
CERTIFICATE OF REGISTRATION AS AN ENVIRONMENTAL IMPACT
ASSESSMENT/AUDIT EXPERT

This is to certify Ms. Gibb (Eastern Africa)
of P.O. Box 300020, Nairobi, (Address) has been registered as an Environmental Impact Assessment Expert in accordance with the provisions of the Environment Management and Coordination Act and is authorized to practice in the capacity of a Lead Expert/Associate Expert/Firm of Experts (Type) Firm Expert.

Dated this 10th day of February, 2004.

Signature

(Seal)

Director General
The National Environmental Management Authority
Appendix 2 Summary of offences and penalties for non-compliance
<table>
<thead>
<tr>
<th>Item</th>
<th>Offences</th>
<th>Penalties for an offence</th>
<th>Additional requirements</th>
</tr>
</thead>
</table>
| General offence | Offence against a provision of the Act, where no penalty is specifically provided for. | • Fine of not more than Kshs 350,000.  
• Imprisonment for not more than 18 months.  
• Or both such fine and imprisonment. |                         |
| Inspection  | Offences in respect of inspection, including:  
• Hinder or obstruct an environmental inspector in his duties;  
• Failure to comply with a lawful order made by an inspector. | • Fine of not more than Kshs 500,000.  
• Imprisonment for not more than 2 years.  
• Or both such fine and imprisonment. |                         |
| EIA         | Failure to submit project report contrary to the requirements of Section 58 of the Act.  
Failure to prepare an EIA in accordance with the requirements of the Act.  
Knowingly give false information in an EIA report. | • Fine of not more than Kshs 2,000,000.  
• Imprisonment for not more than 2 years.  
• Or both such fine and imprisonment. |                         |
| Records     | Failure to keep records required under the Act.  
Fraudulently or knowingly altering records.  
Fraudulently or knowingly making false statements in any records required under the Act. | • Fine of not more than Kshs 500,000.  
• Imprisonment for not more than 18 months.  
• Or both such fine and imprisonment. |                         |
| Standards   | Violation of any environmental standard established under the Act;  
Contraves any measure prescribed under the Act;  
Uses the environment or natural resources in a wasteful and destructive manner contrary to measures prescribed under the Act. | • Fine of not more than Kshs 500,000.  
• Imprisonment for not more than 2 years.  
• Or both such fine and imprisonment. |                         |
<table>
<thead>
<tr>
<th>Impact Item</th>
<th>License or permit</th>
<th>Requirements</th>
<th>Application</th>
<th>Condition</th>
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</table>
| Effluents           | Licence to discharge effluents | • Required by the owner or operator of any trade or industrial undertaking, which discharges an effluent.  
• Duty to supply plant information.  
• Submit to the Authority accurate information about the quantity and quality of effluents and other pollutants within 90 days after the commencement of the Act.  
• Or the Authority may demand. | • Applications to be made in the prescribed form and accompanied by the prescribed fee to the relevant local authority operating or supervising a sewerage system.  
• In the case of an owner, operator of a trade or industrial undertaking who was discharging effluents or pollutants into the environment before the Act, the application shall be made within 12 months after the commencement of the Act.  
• Where there is no sewerage system, the developer or owner shall, before being granted a license to discharge effluents, install an appropriate plant for the treatment of effluents. | The Authority may reject the application for an effluent discharge license, and will provide reasons within 21 days of its decision.  
The effluent discharge licence may be subject to such conditions as the Authority may determine and may vary the conditions attached to it if:  
• the licencsee violates any provision of the Act;  
• the licencee violates any condition imposed in the licence;  
• the Authority considers it in the interest of the public or the environment to do so. |
| Wastes and Hazardous wastes | Licence for wastes | • Required for a person to generate hazardous wastes, handle, store, transport, classify or destroy wastes or operate a waste disposal site or plant. | • Applications to be made in the prescribed form and accompanied by the prescribed fee to the Authority.  
• Any person who owns or operates a wastes disposal site or plant, or generates hazardous wastes, shall apply to the Authority for a licence within 6 months after the Act comes into force. | The Authority may reject the application for a licence for wastes, and will provide reasons within 21 days of its decision.  
The hazardous waste licence may be subject to such conditions as the Authority may determine.  
The hazardous waste licence may be cancelled if:  
• the licencsee violates any provision of the Act.  
• the licencee violates any condition imposed in the licence.  
• the Authority considers it in the interest of the public or the environment to do so. |
Appendix 3 Photographs
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<tr>
<th>Plate</th>
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<td>Plate 1</td>
<td>Arrivals Building: Several Changes are proposed within this section.</td>
<td><img src="image1" alt="Photograph" /></td>
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<td>Plate 2</td>
<td>Current long stay parking area.</td>
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<td>Plate 3</td>
<td>Area proposed for the development of new parking.</td>
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<td>Plate 4</td>
<td>Section of the area proposed for development of new Terminal.</td>
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<td>Plate 5</td>
<td>Aircraft wastewater catchpit sewer.</td>
<td><img src="image1.jpg" alt="Image" /></td>
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<td>Plate 6</td>
<td>Solid waste collection point.</td>
<td><img src="image2.jpg" alt="Image" /></td>
</tr>
<tr>
<td>Plate 7</td>
<td>Cluttered waste next to the area used for repairs.</td>
<td><img src="image3.jpg" alt="Image" /></td>
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<td>Plate 8</td>
<td>Aeroplanes repairs section.</td>
<td><img src="image4.jpg" alt="Image" /></td>
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<td>Plate 9</td>
<td>Section of well maintained grassland:</td>
<td>![Plate 9 Image]</td>
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<td>Plate 10</td>
<td>Storm drainage within the airport.</td>
<td>![Plate 10 Image]</td>
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<td>Plate 11</td>
<td>Storm drainage within the airport possible attraction of birds within the airport.</td>
<td>![Plate 11 Image]</td>
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<td>Plate 12</td>
<td>Semi improved grassland, managed according to the standard “long grass policy”:</td>
<td>![Plate 12 Image]</td>
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<td>Plate 13</td>
<td>Area proposed for the runway.</td>
<td><img src="plate13.jpg" alt="Image" /></td>
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<tr>
<td>Plate 14</td>
<td>Vacant section of the airport where Base and Sub-materials for construction will be derived.</td>
<td><img src="plate14.jpg" alt="Image" /></td>
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<tr>
<td>Plate 15</td>
<td>Section of the old quarry where construction waste will be deposited.</td>
<td><img src="plate15.jpg" alt="Image" /></td>
</tr>
<tr>
<td>Plate 16</td>
<td>Section of the old quarry. Notice the accumulation of stagnant water.</td>
<td><img src="plate16.jpg" alt="Image" /></td>
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Appendix 4 Documentation from KAA
RE: KAA/ES/450/CON VOL.3

31st MAY, 2006

M/S QUEEN'S QUAY ARCHITECTS INTERNATIONAL
100 Scarsdale Road, Suite 200
Toronto, ON M3B 2RB
CANADA

Fax 1-416-203-2101

Attn.: Mr. Mohan Chal

Dear Sir,

RE: ENVIRONMENTAL IMPACT ASSESSMENT FOR JKIA EXPANSION PROJECT - EXEMPTION OF THE PROJECT FROM PHYSICAL PLANNING ACT AND GOVERNMENT PLANNING REGULATIONS

Reference is made to your email of 22nd May, 2008 on the above subject.

We have an understanding with the Department of Physical planning and the Local Government that as the Government Authority responsible for planning, design, maintenance of Aerodromes, Kenya Airports Authority does not require other approvals for development of airport facilities. The above project is therefore exempt from Physical Planning and other Government Planning Regulations.

Yours faithfully,

GEORGE W. MUHOGO
MANAGING DIRECTOR
Appendix 5 Public consultation form
IV Comments & Opinions

We would like to thank all those who have taken the time to review the Inception Report and the Draft Report and Design Options and submitted their comments and opinions to date. We are listing these submissions in this section. Most of these will be addressed as we proceed into the next Phase of the Contracted Work.

The comments are listed by date.

November 19, 2004
Mr. J.K. Mailutha, Deputy Commissioner, JKIA

We acknowledge receipt of the copy of the Inception Report regarding the above subject.

We have studied the report and based on the peak hour traffic, schedules and JKIA’s potentially as a hub, Customs concerns are as listed here below:

1) **Dual Channel System.** In accordance with regulations 44/45 there must be established at every place of arrival and within the Baggage Hall at every Port “Red and Green Channels” with an inscription of the word “CUSTOMS”. This is in line with International Standards.
2) Clear separation of arriving and departing passengers
3) Separate staff Entrance/Exit for Airport employees, separate from arriving/departing passengers.
4) **Office Space.** Lack of offices of Administration and Technical Services e.g. passenger body searches.
5) **Customs Warehouse.** The current facility cannot cope with the volume of goods for imports and transit.
6) Baggage Trolleys to be re-allocated. Present location poses a security risk.
7) Enough space to be created between the conveyor belts and examination benches.
8) **Departures**
   - Customs Clearance Counters
   - Administration and Technical Offices at all the Units
   - Units to be re-designed for Passengers to check-in with the Airline first before undergoing Security/Customs checks.

December 03, 2004
Mr. W. N. Omolo, Director General, Kenya Civil Aviation Authority [KCAA]

KCAA has formed an Internal Committee to follow-up on Air Navigation Safety concerns that may require attention during the terminal building modernization process.
The two options presented represents a well structured expansion programme which when implemented should improve passenger comfort, quick flow and more aircraft handling capacity of JKIA.

To go along with the expansion of the terminal building KCAA recommends that improvement should be done on the only available Runway 06/24. The construction of a rapid Exit Taxiway or Extension of Taxiway G to join the end/beginning of Runway 06/24 would allow for faster landing and takeoff rates as JKIA.

Further comments on the proposals from KCAA will be communicated to you as the committee work progresses.

December 23, 2004  
Mr. Yogaish Sapra, Managing Director, Maya Duty Free Ltd

Re: Re-organization & upgrading of passenger terminal, J.K.I.A

Further to your letter dated 10/12/04; I would like to make the following comments:

1). I would like to know if there will be a special provision of a service entrance, goods loading zones, goods lift, and goods / service corridors. I consider these very important for the ease of passage of goods to shops, and stores without interfering with the main passenger movement areas.

2). Will there be provision of storage areas close to the Duty Free Shops.

3). At present our stores are located in the main building area, will we have access from the area to the ring building to supply our goods.

4). I have noticed some small retail areas marked next to the main Duty Free Shops, for what sort of retail are these areas.

5). You will be moving all the Duty Free shops into the two designated areas in your plan, what procedure will be used to allocate the areas in these spaces.

6). When do you envision as the commencement date of the works.

December 24, 2004  
Mr. C.N. Kimemia, Ministry of Transport
Flexibility of application of messages on selected areas i.e. both graphic (print & electronic) should be considered. Use of modern material & easy to maintain systems highly recommended.

KTB and other stakeholders would be keen to make use of the areas above to post messages intended to promote Kenya's tourism, trade & investment attractions. These messages would serve to provide a clear linkages with & reinforce other related messages that are disseminated in source markets through a variety of media including trade shows & exhibitions.

2) The balancing of high/modern technology & traditional Kenyan architectural styles & decorations would also add considerable value aesthetically. We are currently utilising a stand at high profile international trade shows that features maasai manyattas (As agreed, I will send you a soft copy for your reference). Previously we successfully used a stand that featured smart tents, off-white in colour with wooden uprights.

3) Colour is a key aspect of Kenyan/African people. Warm vibrant colours to be cleverly interspersed with neutral hues with care taken not to overdo the colour element. The current large areas of grey concrete is very "cold" and unwelcoming. The idea as discussed is to create a uniquely "Kenyan experience" to be savoured by travellers (both new & return visitors).

4) I quite like the idea of dedicating specific areas for landscaping, fountains & the introduction of plenty of natural light. Tropical plants should also be introduced (bringing nature into the airport) in appropriate areas in the interior e.g. adjacent to the walkways.

5) Stunning/brilliant works-of-art made from ecologically friendly material where possible, (easy to maintain) to be positioned on carefully selected areas of the airport.

6) An airport hotel with exhibition & conference facilities is a smart idea even if implemented at a latter phase.

We wish you every success & look forward to working with you to the successful conclusion of this very important project.

Other thoughts:

Professional blend of music, both foreign & Kenyan/African with a bit more of the latter would add to creating a Kenyan ambience. Piped music to be played on modern equipment. Acoustics well taken care of.
Embakasi and to move domestic passenger facilities to the current Presidential Pavilion. (alternatively, a temporary structure could be created between Unit 3 and the Pavilion for the handling of domestic passengers and baggage). Additional apron / aircraft parking positions should be created relatively close to the terminal. Passengers can be brought from / to parked aircraft by busses, just like at any other airport in the world. In order to free-up more parking space, also General Aviation could be moved to Embakasi, provided a suitable road is available / constructed within the perimeter to transfer passengers / baggage / ground services equipment / KAA vehicles etc.

3) The above implies that I strongly suggest to combine the phasing which currently proposed. In my view, the upgrade of Unit 3 and the construction of Unit 4 should be done simultaneously.

Drawings:

1) I do not see an expansion of the number of check-in desks. The current capacity at peak hours (at least in Unit 1) is not sufficient to say the least. I do understand that, with the addition of a fourth unit, the absolute number of check-in positions at JKIA will increase but nevertheless we should (at least technically) cater for the construction of extra check-in positions plus baggage handling facilities in the current units.

2) In the current check-in areas, there is a lack of space for airport ticketing & passenger assistance desks and (airport) information counters. The plans show that the check-in area will be increased towards the road side. I suggest that, in that expanded area, room will be created for ticketing desks and information counters. Currently, in case of cancellations, denied boarding situations etc., passengers are handled by staff from offices behind the check-in counters. Often (frustrated) passengers queue in front of these offices, disturbing and disrupting the 'normal' passenger services processes. By creating ticketing / passenger assistance offices for the airlines / handling agents, we can separate 'standard' handling from the handling of disruptions.

3) In the same area, today there is already a lack of suitable office space for airline representatives, handling agents etc. This problem will become (much) worse after the entrance to the check-in area (incl. security checks) will be relocated to one side of the building and the exit from the check-in area to the immigrations to the other side of the building. Just for your info, in the areas designated for entrance / exit of the check-in area in the present plans, you currently find offices for British Airways, Regional Air, Emirates, Kenya Airways, KLM, Saudi Arabian Airlines etc. Would there be any possibility to create a floor on top of the check-in area, where offices could be created? Other suggestions? Airline and
baggage. The current 'cages' in the arrival hall are extremely ugly. All (customs) offices that do not necessarily need to be in the arrivals hall from an operational point of view should be removed to other office space in the arrivals building.

8) It is not clear at what point arriving passengers with destination Nairobi will be separated from arriving passengers transferring to connecting flights. In the current plans, the departure lounge at level 1 will be a sterile area, with security checks for local departing passengers provided straight after check-in. In my view, arriving passengers transferring to connecting flights should first go through a security check before they mix with passengers who checked-in locally. If this is not done, there is a potential security risk since the security standards at other airports, where transferring passengers arrive from, are not necessarily equal to those applied in Nairobi. Therefore, all arriving passengers should go to level 2 and only at the point that passengers with destination Nairobi are going towards the arrival hall, connecting passengers should be allowed into level 1, after passing through a security check.

Other issues:

1) Even in the current set-up of JKIA, the parking space for ground services equipment (highloaders, tractors, conveyor belts, push back tractors, passenger steps, ground power units, water carts, toilet carts, pallet and container dollies etc. etc.) belonging to KQ and the handling agents is rather limited. If the shared ramps for arriving passengers between the gates are going to be built, the parking space for this equipment is going to diminish further. Moreover, a part of the equipment (mainly baggage carts and pallet/container dollies) is currently parked where the future car park and unit 4 are planned. It is the responsibility of the airport authority to provide suitable parking space for the equipment used by the operators and this space should be in close proximity of the place where the actual work is being carried out. In a more detailed design, different locations should be designated for this purpose as well as for storage of baggage containers.

2) Option 3a, with shared / split gates in my view is not practical. It does improve the use of your apron but it will definitely lead to operational clashes with the use of 1 passenger gate by 2 different aircraft.

3) The finger of option 3 seems highly unpractical to me. Apart from the whole swing-gate issue (if's that proven technology at other airports?), which I fear will lead to operational chaos, I foresee practical problems with immigrations, customs etc. If the relocation of the presidential pavilion would be approved, there would be no objection to plan an international finger on that side of the terminal for the long term. As far as I understand, the international gates planned in the unit 4 finger are not required in the very near future. This would allow for the construction of a much smaller domestic
A. GENERAL COMMENTS

1) There appears to be little difference between the plans for 2014 and 2024.

2) The Kenya Association of Air Operators is not in favour of the relocation of the Domestic Terminal to the north side of Runway 06 at Embakasi. It is the contention of the KAOAO that such a move would be detrimental to the smooth ground transfer of passengers from domestic to international flights and vice versa. The pick-up and drop off of international passengers at JKIA with General Aviation charter aircraft would also be exceedingly cumbersome. Moreover, fuelling of passenger jets at a Domestic Embakasi Terminal would be difficult and the towing of aircraft between the domestic and international terminals would result in substantial expenses and problems in crossing Runway 06/24.

3) In view of Point 2 above, Option 3, with a Domestic Terminal 4 within the existing 'Ring Building', is preferred. The construction of this Domestic Terminal should be 'fast tracked' as much as possible.

4) It is understood that the present capacity of the JKIA is limited and that the existing Domestic Terminal 3 is urgently required to meet increasing demand by international arrivals and departures. This proposal is, of course, attractive because it can be implemented relatively quickly and a modest cost. However, the relocation of domestic arrivals and departures to Embakasi entails several disqualifying drawbacks. It is therefore suggested that, in the first instance, a "temporary domestic terminal" be constructed immediately on the large parking area to the east of the existing access promenade, near the Presidential Pavilion. Meanwhile, construction could begin immediately and simultaneously on Terminal 4 and on the Parking Garage, as proposed in Option 3. This would minimise the time span within which the 'temporary domestic terminal' near the Presidential Pavilion would have to be in use. If apron space for domestic and international flights is insufficient, such aircraft could be parked in remote locations and served by busses. Construction of additional apron space should be commenced in the early stages of developments the issue of the congestion of the Domestic Terminal the lack of apron space, more so than the building facility. Additional building at this stage will not solve the problem. Terminal 4 and expanded apron gets built first, Domestic moves in, Terminal 3 gets renovated thereby increasing the International capacity.
Pedestrian and trolley traffic circulation within the 'ring' perhaps merits further study, considering the distances involved (several hundred metres) and the necessity to cross the busy 'ring road'.

7) It is not clear how the pick-up of passengers with taxis and private vehicles would function at the proposed Domestic Terminal? The drop-off zone will have to be split into departures and arrivals.

Whilst these are our initial comments, the Association looks forward to continued involvement in the planning process. We would be pleased to discuss the above and other issues pertaining to this project, at your convenience.

January 17, 2005
Mr. Titus Naikuni, CEO & MD, Kenya Airways

In response to your report submitted on 10th December 2004, we have now reviewed the set of drawings with the explanation notes and come up with the following comments:

In both the short-term and medium-term, we are in favour of Option 3 with the domestic terminal integrated in the plan.

Our comments are as follows:

Parking Spaces

1) Cargo Apron Space – currently, the Cargo Apron space is not sufficient and overflow cargo aircraft are forced to park adjacent to the passenger main terminal. The Cargo Apron can only accommodate three 747 freighters or 4 DC8s. Our recommendation is to extend the current Cargo Apron southward to be within our boundary area.

2) Passenger Aircraft Gates around the terminals – although the number of gates (connecting to aircraft) has increased, the 2014 plans have not produced any additional parking positions. On the contrary, the number of aircraft parking positions around the terminal building in 2014 has reduced from the current 22 to 21 Gates (which includes Terminal 4). Our recommendation is two-fold for Apron Parking space:
   • Complete the new apron as soon as possible (refer to as K in A1a as marked on the attachment)
   • Extend the other Remote Parking area by 2004 (marked as Z on attachment) to include the zone with the shaded area. This would decongest the gates for aircraft requiring longer layovers or night-stops.

Lounges
2) On the proposed lounge relocation, KQ has just invested considerably in a new premium lounge. It is crucial to know the time-lines of the planned lounge relocation (i.e. when do we need to relocate our lounge before the terminal completion).

3) It is mentioned that the existing Gates from 4 to 13 would be maintained. How can shared ramps be introduced every 2 Gates. How will the new walkway be introduced?

4) Check-in Counters – as IATA is moving towards common user self-service check-in, the need for the introduction of common user self-service (CUSS) facilities in the future becomes a necessity, how is this addressed in the renovation plans?

5) The Health facility that meets ICAO’s requirements has not been addressed in the current setting. Where will this be located?

We would appreciate if the issues outlined above could be critically discussed in a forum of stakeholders.
# RE-ORGANIZATION AND UPGRADE OF FACILITIES AT JKIA

**STAKEHOLDERS & STEERING COMMITTEE PRESENTATION MEETING**  
**ON 3RD DECEMBER 2004 AT 9.00AM, JKIA BOARD ROOM, 3RD FLOOR**

## BEST OPTION - SURVEY

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<td>Operations Manager</td>
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## RE-ORGANIZATION AND UPGRADE OF FACILITIES AT JKIA

### STAKEHOLDERS & STEERING COMMITTEE PRESENTATION MEETING
**ON 3RD DECEMBER 2004 AT 9.00AM, JKIA BOARD ROOM, 3RD FLOOR**

### BEST OPTION - SURVEY

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<tr>
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<th>Ministry of Transport</th>
<th>Mr. Charles N. Kimemia</th>
<th>Chief Air Transport Office</th>
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<th>3</th>
<th>4</th>
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<td>Issac Mnuutu</td>
<td>Partner</td>
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<td>24</td>
<td>MSC Inc. - Project Managers</td>
<td>Mohan Chal</td>
<td>CEO</td>
<td></td>
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<tr>
<td>25</td>
<td>Muumbi Associates - Quantity Surveyors</td>
<td>Harrison Muumbi</td>
<td>Partner</td>
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<td>Office of the President</td>
<td>Mr. Gilbert M. Siang'a</td>
<td>Under Secretary</td>
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<td>27</td>
<td>Office of Vice-President - Immigration</td>
<td>Mr. E.G. Rintaugu</td>
<td>Immigration Officer</td>
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<td></td>
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<td>Swissport Kenya</td>
<td>Jeroen L. de Crong</td>
<td>General Manager</td>
<td></td>
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<tr>
<td>29</td>
<td>Kenya Airways</td>
<td>Mr. Jimmy Kibathi</td>
<td>Head of Marketing</td>
<td></td>
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<td>30</td>
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<td>Mr. John Dore</td>
<td>Regional Manager</td>
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<td>31</td>
<td>K.C.A.E.</td>
<td>Eng. Mangeni</td>
<td>Chief Engineer</td>
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<td>British Airways</td>
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<td>Manager EA</td>
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<td>Simon Jaffry</td>
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<td>K.C.A.P.</td>
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<td>ED. &amp; Managing Director</td>
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</table>
# Re-organization and Upgrading of Facilities at JKIA

**Stakeholders & Steering Committee Presentation Meeting**  
**On 3rd December 2004 at 9.00am, JKIA Board Room, 3rd Floor**

## Attendance Record

<table>
<thead>
<tr>
<th>No</th>
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<th>Title</th>
<th>Signature</th>
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<tr>
<td>1</td>
<td>AFRAA</td>
<td>Mr. Christian Folly-Kossi</td>
<td>Secretary General</td>
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<tr>
<td>2</td>
<td>Airline Operators Committee</td>
<td>Ms. S. Wamae (Kenya Aerotech)</td>
<td>Operations Manager</td>
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<tr>
<td>3</td>
<td>Board of Airlines Representatives</td>
<td>Charles Kutwa</td>
<td>Chairman</td>
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<tr>
<td>4</td>
<td>IATA</td>
<td>Dr. Peter S. Chikumbo</td>
<td>Regional Director Africa</td>
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<tr>
<td>5</td>
<td>JKIA Tour and Travel Operators Association</td>
<td>Joel Ngachir</td>
<td>Secretary</td>
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<tr>
<td>6</td>
<td>Kenya Airports Authority</td>
<td>Mr. George Muhoho</td>
<td>Managing Director</td>
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<td>7</td>
<td>Kenya Airports Authority</td>
<td>Engineer Mukwana</td>
<td>Project Director</td>
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<td>8</td>
<td>Kenya Airports Authority</td>
<td>Engineer Chamwada</td>
<td>Project Manager</td>
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<td>9</td>
<td>Kenya Airports Police Unit</td>
<td>Mr. D.K. Kibenei</td>
<td>Commandant</td>
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<td>10</td>
<td>Kenya Airways</td>
<td>Mr. Titus Naikuni</td>
<td>General Managing Director / CEO</td>
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<td>11</td>
<td>Kenya Association of Air Operators</td>
<td>Captian T.A.D. Wattis</td>
<td>Z Boskovic Air Charters</td>
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<td>12</td>
<td>Kenya Association of Air Operators (KAA)</td>
<td>Col. (Rtd) E. K. Wathuka</td>
<td>Chief Executive</td>
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<tr>
<td>13</td>
<td>Kenya Association of Tour Operators (KATO)</td>
<td>Fred Kaigua - CEO</td>
<td>CEO</td>
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<td>14</td>
<td>Kenya Association of Travel Agents (KATA)</td>
<td>Roger Silvester</td>
<td>Chairman</td>
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<td>15</td>
<td>Kenya Civil Aviation Authority (KCAA)</td>
<td>Kuto C.A., Anna</td>
<td>Director General</td>
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<td>16</td>
<td>Kenya Duty Free</td>
<td>Mr. Ajay Kholari</td>
<td>General Manager</td>
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<td>17</td>
<td>Kenya Pipeline Co. Ltd</td>
<td>Mr. Peter Mecha</td>
<td>Operations Manager</td>
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<td>Kenya Railways Corporation</td>
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<td>Mr. J.K. Mailutha</td>
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<td>Maya Duty Free</td>
<td>Mr. Yogoish Sapra</td>
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<td>22</td>
<td>Ministry of Health</td>
<td>Ms. Jesica Omai</td>
<td>Port Health Officer</td>
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### ATTENDANCE RECORD

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<td>British Airways</td>
<td>Simon Hammad</td>
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<td>H. Trembena</td>
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<td>Eng. Musungu</td>
<td>Chief Engineer</td>
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<td>Abraham J. Oomoe</td>
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<td>S. M. Chepchuchen</td>
<td>KCAA KRAA</td>
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<tr>
<td>37</td>
<td>KCAA</td>
<td>Josph Ouma</td>
<td>Operations</td>
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**Note:** The attendance record includes various names and titles, representing different organizations and positions related to the re-organization and upgrading of facilities at JKIA for the stakeholder and steering committee meeting on 3rd December 2004.
**DOCUMENT CONTROL SHEET**

**FORM MP180 / B**

**CLIENT:** QUEENS QUAY ARCHITECTS INTERNATIONAL  
**PROJECT:** EIA Project Report for the expansion of JKIA  
**JOB NO:** JK 1304.

**TITLE:** DRAFT REPORT

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<td>Elizabeth Ndinya</td>
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<tr>
<td><strong>DATE</strong></td>
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<td><strong>DATE</strong></td>
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GIBB Africa Ltd,  
Shell & BP House,  
Harambee Avenue,  
P O Box 30020  
Nairobi GPO 00100,  
KENYA  
Tel +254 (02) 251880/250577  
Fax +254 (02) 210694/244493

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**Issue 5 : Nov 2004**