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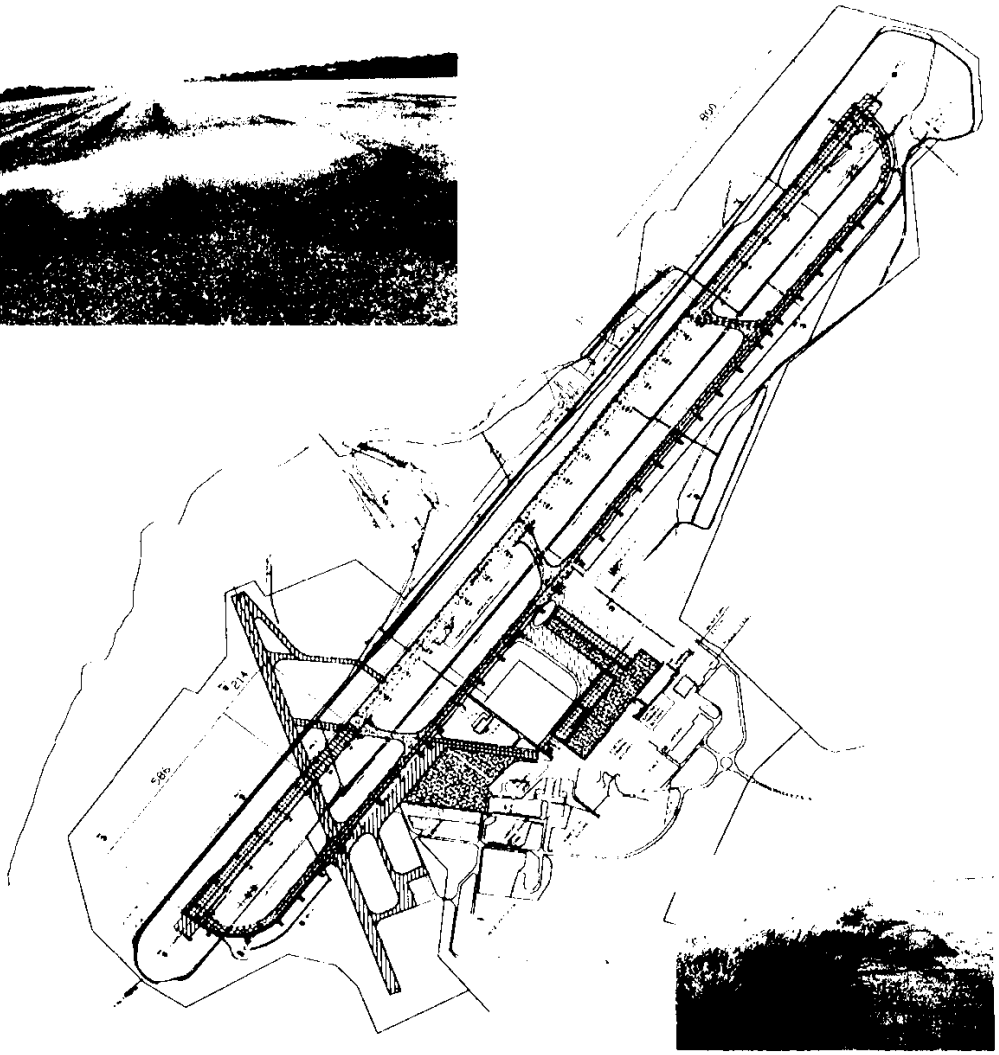
FINAL REPORT - VOLUME 1

Kenya Airports Authority

Consultancy Services For The Rehabilitation Of Aircraft Pavements At Moi International Airport, Mombasa



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APEC Ltd, Consulting Engineers
MAPERA COURT, 1ST FLOOR, LANG'ATA ROAD OPP. UHURU GARDENS,
P. O. BOX 9699-00300,NAIROBI, KENYA.

With Assistance from

Consulting Engineering Services (India) Private Ltd

Proponent: The Kenya Airports Authority

Activity: Environmental Impact Assessment on the Proposed Rehabilitation of Aircraft Movement Pavements at the Moi International Airport Mombasa

Report Title: Environmental Impact Assessment (Project Report): Proposed Rehabilitation of Aircraft Movement Pavements at the Moi International Airport Mombasa

Name and Address of Firm of Experts:

APEC Consortium Limited
P. O. Box 9699, 00300
Nairobi, Kenya

Tel. 254 20 606283
Registration No. of Firm of Experts: 0836

Signed: _____ **Date:** _____

Mr. Harrison W. Ngirigacha (MSc. WERM, BSc. Chem.)
Lead EIA Expert, NEMA Reg. No. 0027
Associate Consultant,
APEC Consortium Ltd.

Name and Address of Proponent:

The Managing Director,
Kenya Airports Authority,
P. O. Box 19001 (Embakasi)
Nairobi, Kenya

Tel. 254 20 6611000, 6612000, 822111

Signed: _____ **Date:** _____

Disclaimer

This Environmental Impact Assessment Project Report is being submitted in accordance with the terms and conditions of contract in respect of provision of consultancy services for the proposed rehabilitation of aircraft movement pavements at the Moi International Airport. It has been carried out in accordance with the EIA regulations (Kenya Gazette Notice No 56 of 13 June 2003) and is subject to terms and conditions of the National Environment Management Authority (NEMA)

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ACRONYMS

EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
ICAO	International Civil Aviation Organization
JKIA	Jomo Kenyatta International Airport
KAA	Kenya Airport Authority
KCAA	Kenya Civil Aviation Authority
MIA	Moi International Airport
NAS	Nairobi Airport Services
NEMA	National Environmental Management Authority
SSJKE	Small Scale Jua Kali Enterprises

EXECUTIVE SUMMARY

Introduction

The Kenya Airport Authority (KAA) was established by an Act of Parliament (The Kenya Airport Authority Act, Cap. 395) to be responsible of planning, designing, maintenance and operation of all airports and aerodromes in the country. Among the broad activities of the organization include coordinating operations in airports and aerodromes, management of facilities within airports and aerodromes, overall management and administration of airports and aerodrome, provision of services and facilities necessary for aircraft operation as well as ensuring good environmental, health and safety status at all airports and aerodromes

Among the major facilities under the Kenya Airports Authority include the Jomo Kenyatta International Airport (JKIA), Moi International Airport (MIA), Eldoret International Airport (EIA). In addition, there are domestic airports including Wilson airport (Nairobi), Kisumu airport, Malindi airport, Lamu airport, Lokichogio airport and Ukunda airstrip. There are also numerous other airstrips within district headquarters, tourists destinations and state lodges.

Moi International Airport is located in a region attractive to tourists from all over the world who specifically comes for the scenic coastal destinations that stretches from Lungalunga in the south to Kiunga in the north. Among key areas of high interest include Shimoni and Diani in south coast, Kilifi, Malindi and Lamu in the north coast. Attractions in these areas include; Kisite Marine National Park, Shimba Hills National Park, Watamu and Malindi Marine National Parks, Kiunga Marine National Park, Dodor National Park and Tsavo National Park to mention a few.

The Airport is experiencing structural problems with its aircraft pavements that need to be addressed to enhance sustained capacity for upto 20 years, ensure safe aircraft operations and protection of the airport land from encroachments and loss through erosion. In view of this situation, KAA intends to undertake an upgrading of the aircraft pavements at MIA. This will involve design review and appropriate rehabilitation of the aircraft pavements (runways, taxiways and aprons) and drainage facilities including the linkages with the pavements and operation areas.

In compliance with EMCA, 1999 regulations on airports and airfield projects, environmental impact assessment study is mandatory. This will detail the positive and negative impacts from the proposed project and establish suitable mitigation and preventive measures for integration into the project implementation. APEC Limited Consulting Engineers have been engaged to carry out consultancy works on feasibility study, design, tender administration and supervision. This environmental impact assessment (project report) was undertaken as part of this process by Mr. Harrison Ngirigacha, an expert registered by NEMA in association with APEC Limited, also a registered firm of experts.

The EIA Process

The objective of this assessment was to identify the potential impacts associated with rehabilitation project and establish suitable mitigation measures for integration in the implementation. Specific objectives includes,

(i) To establish environmental issues relating to the proposed project,
(ii) To provide the baseline conditions of the project area and the airport grounds,
(iii) To identify significant impacts to the environment and social status around the airport, including linkages of the aircraft pavements and drainage systems to other airport operation components,
(iv) Establishment of appropriate mitigation and preventive measures for the significant impacts. The measures will be harmonized with existing airport operation procedures as well as ICAO guideline principles on airport management (specifically annex 14 that outline design and operation guidelines),
(v) Development of an environmental management action plan to facilitate implementation of the mitigation and preventive measures.

The proposed project will involve rehabilitation of an existing facility, specifically the pavements and drainage facilities. It is not expected to impart significant impacts to the environment and the society, though the overall airport operations could have notable linkages in this regard. In this connection, a comprehensive project report was found adequate such as to comply with the regulations through provision of baseline conditions, the project background, justification and potential implications as well as an outline of preventive measures.

The terms of reference was also reviewed to make it more focused and realistic and are herewith annexed. The preliminary inspections were carried out on the 2nd and 3rd of May 2008 with submission of a scoping report followed by a consultative forum undertaken on 21st – 22nd October 2008. The desk part of the process involved a close evaluation of environmental and social issues associated with the current and anticipated status of the airport facilities. This evaluation showed that impacts to the external environmental and social setting may not be significant (project involves rehabilitation of an existing facility). The scope of the study, therefore, was satisfied through this project report.

Key Findings

Drainage System

(i) The northern end of the airport grounds, with the main runway as the key feature, have all surface runoff collected in small channels and directed to a main drain existing between the radar and GP. Other areas draining into this channel include the general aviation area and runoff emanating from the middle of the main runway. Waste water discharging from Jomvu Kuu residential area also partly runs into this channel (most infiltrates into the sub-surface),
(ii) Significant sections of the airport grounds are notably below the surface drainage levels and hence runoff getting there does not get out of the grounds, but rather stagnates and slowly infiltrates into the ground. Such locations include the area

around the weather station and Kenya Civil Aviation Authority observatory station and also a strip of land along the boundary with Jomvu Kuu settlements. The drains have broken edges and seem to have low capacity to transmit storm water effectively,

(iii) Surface runoff from the aprons, aircraft support service areas (NAS), refueling yards, cargo terminal, the fire station, Kenya Aerotechs Services, Eurocraft Services and the Kenya Air force yard among other locations in the middle section of the airport grounds are drained into a major channel existing near the radar on the western border. Notable sections of the pavements are not well designed to discharge runoff into the available drains, leading to local flooding and water stagnation on unpaved land. Observations of the drain near the radar showed deposition of solid waste materials (plastics, dry grass, fabrics, etc.) and signs of oil residuals. This was an evident of drain status at operation areas, among them lack of oil and grit traps.

(iv) The southern end of the airport grounds including the crosswind runway of the airport grounds, Benair Engineering yard and end of the main runway are drained into a channel discharging directly into Port Reitz downstream of the Kenya Ports Authority grounds. The drain is clean and structurally sound.

(v) The landside area is naturally drained, but the car park is not provided with adequate surface runoff drains. At least two sections of the access roads were found flooded. The problem is however, not significant.

(vi) Residential area in the neighbourhood including Jomvu Kuu, Magongo, Changamwe, Chaani etc are provided with drainage systems. Development have also blocked most of the natural drains surface runoff, therefore, has potential to flow into the airport grounds from the higher ground such as Jomvu Kuu and Magongo estates. This further complicates drainage problems at the airport.

Waste Management

Common solid wastes emanating from MIA include mainly packaging materials, plastics, scrap metals, fabrics and general office wastes. Others include food remains from restaurants, aircrafts (NAS) and Kitchen at various locations around the airport. KAA has established a waste holding chamber located near airfreight terminal (a cubicle measuring 3m x 3m) for materials from aircrafts and offices. Solid waste collected here is then burned in an open yard to the extreme southwestern corner of the airport ground. All other operators on the site are expected to handle their wastes without compromising on each other. However, there are no overall guidelines for a harmonized solid waste handling procedures leaving operators to individually handle own wastes. Consequently, there are small heaps of solid refuse near the various yards.

Liquid wastes include oil and lubricant spills, car wash discharges and domestic sewage from various locations of the airport. While the sewage is collected from all points around the airport and discharged directly into the sea (no treatment undertaken) other wastes are washed into the open drains and discharged. Like solid wastes, there are no guidelines on handling of liquid wastes from specific point sources. Due to this there is evident of discharges of operation effluents into the open drains or on open grounds.

Social Aspects

Major observations on social linkages include;

(i) There is serious land use conflict between the airport operations and settlements (mainly informal) on all sides of the ground. The hostile undertones coming from the immediate neighbouring residents are a clear indicator security threat. Illegal access into the airport grounds by residents especially on the Jomvu Kuu side. There is evidence of damaged fence following this intrusion forcing the authority to hire guards for this purpose in addition to the regular security,

(ii) Encroachments into the landing and takeoff corridor of the airport by informal settlements is also rapidly taking place again putting safety of aircrafts and passengers at risk,

(iii) Risk of safety for the growing settlement along the airport landing funnel corridor to the north, as well the immediate neighbourhoods of grounds. It seems land use planning around the airport is not properly synchronized with the airport operations and its physical expansions,

(iv) Noise to residents on immediate neighbourhoods, particularly on the northern end of the airport (Jomvu Kuu and Magongo estates). Airport operations are such that landings and takeoff happens early mornings (5am – 9am) and late evenings (5pm – 10pm), just when majority are at home and requiring least noise. This has no direct linkage with the rehabilitation works (levels not measured under this assessment),

(v) Risk to safety of aircrafts and passengers arising from undermined pavements and drainage of the airport facility. This is perhaps the leading justification of this rehabilitation works,

(vi) Environmental pollution arising from aerial discharge (from aircrafts, ground support machinery and vehicles accessing the airport), shoreline pollution (surface runoff and solid waste management) among others. Construction machinery could temporarily contribute to this situation.

Anticipated Impacts

Among the impacts anticipated from the project include;

(i) Oil and grease spills, solid wastes management and drainage of surface runoff have a potential to pollution surface water sources around the airport including sections of Port Reitz. This is currently happening, but additional spills could arise from construction machinery and material holding yards,

(ii) Noise from landings and takeoffs could be stressing and a nuisance to the immediate communities (especially Jomvu Kuu and Magongo estates) that may require long terms attention. This may not have direct relationship with the construction activities, but the construction machinery could contribute. However, effects in this regard would be on the construction workers and minimum to the external residents,

(iii) Drainage systems do not seem to intercept all surface runoff leading to excessive sub-surface retention of water. This is perhaps also contributing to

weakening of the pavement foundations. The situation will temporarily enhanced during the construction but being part of problem being addressed,

(iv) Sizing and orientation of the outfall drains with respect to the receiving slopes at the outfall is a potential threat to the stability of the soils on the western side of the airport grounds.

(v) Lack of a harmonized procedure for handling wastes (both liquid and solid) by all stakeholders and a streamlined infrastructure has far reaching implications on the ultimate environmental settings receiving the wastes. The Contractor need guidance on where to safely remove construction wastes within the current setting,

(vi) Material sites and the surrounding areas are faced with degradation and threat to health during extractions.

Mitigation Measures

(i) Encourage harmonized airport-wide environment procedures including solid waste management, wastewater disposal, utilization of drains, oil/grease handling among other aspects,

(ii) Waste holding areas (KAA waste house, Benair Engineering waste yard and the refueling areas) will need to be slabbed and appropriately drained,

(iii) Drains from oil/grease source point (Kenya Aerotech Ltd. yard, Eurocraft Services, refueling yards, Benair Engineering, the fire station and the aprons MUST be fitted with appropriate oil/grease interceptors.

(iv) The contractor should adopt the actions proposed under this report during the construction,

(v) An adequately sized cut-off drain is recommended along the northern section of the airport such as to exclude surface and sub-surface flows from Jomvu estate commercial activities to the north and Magongo estate runoff into the airport.

(vi) Water holding areas (Wet areas at KCAA observatory station, along boundary with Jomvu and sections between the radar and GP stations) requires to be drained for the safety of the run way and taxiways.

(vii) The entire pavement MUST be provided with adequate, easy to clean and maintain drains to be channeled into the main drainage systems towards the existing outfalls.

(viii) All drains MUST be fitted with appropriate grit chambers to ensure removal of solid materials (sand, grass, papers, plastics, etc.) every chamber should have a solid waste holding box.

(ix) The outfall drains should be designed such as to reduce the hydraulic pressure created by the total surface runoff from the airport grounds. Sub-surface water will also be eliminated from the cut-off drains and hence reduced risk of land slide along the area.

(x) Appropriate agreements will require to be completed on the material sites with regard to modes of extraction, duration of extraction, feelings of the neighbouring land uses and responsibilities on rehabilitation,

(xi) All material sites MUST rehabilitated upon completion of the works.

Environmental Management Plan (EMP)

The environmental management plan is guided by the defined project objectives along with the overall corporate strategies and policies on environment management under the Environmental Division. The current main responsibilities of the environmental division include ensuring that KAA adheres to all environmental related requirements and regulations in her operations, to advise KAA projects implementation on environmental integration and implementation and integrate local and international guidelines for new projects and ongoing airport management, e.g. ICAO into operations.

In view of these responsibilities, the key guiding principles this EMP during the proposed rehabilitation works at MIA are;

(i) The works are confined within the airport grounds implying no direct interaction with the surrounding communities and economic activities. Delivery of construction materials, however, may have effects to the external social and environmental setting along the delivery routes.
(ii) There are existing direct linkages of pavements to point sources of environmental pollution such as to include contaminated surface runoff and lack of appropriate connection to the nearest open drains.
(iii) Drainage system around the airport could provide a pathway of pollutants from in-house sources to the external environments including the sea water.
(iv) Aerial emissions from construction works (earth moving, material management and machinery operations) will have direct implications with settlements to west (Jomvu Kuu and Miritini estates).
(v) There are environmental issues associated to the airport operations and the rehabilitation area that should be implemented in the long term.

Conclusions

Following on the above, it is noted that the proposed rehabilitation works will not have significant impacts to the external environmental and social setting. However, it is observed that;

(i) All the works will be confined in-house with little or no interaction with the neighbourhood. The main works will involve surface milling of the pavements and minimal excavations and earth moving. In this regard, discharge of dust and particulate matter into the neighbouring areas are insignificant while emissions will be relatively low,
(ii) There are various operators providing services with Moi International Airport including support ground aircraft services, catering, ground maintenance, cargo handling, security, travel agents and airline managements. The airport, however, lacks a harmonized procedure for handling environmental related aspects such as to be related to use of common pavements and discharge controls into drainage systems,
(iii) The airport do not have a defined handling procedure for waste (solid refuse, dry vegetation matter and oil/grease) emanating from the airport grounds. There are,

therefore, notable solid waste holding points and spills near every generator's yard with direct linkages to the pavements and drainage sections,

(iv) Defects developing on then pavements are to a large extent associated with drainage status of the airport ground. High water table, failed drainage provisions of the airport and compromised drainage infrastructure on the surrounding land are among factors affecting the drainage efficiency within and around the airport grounds,

(v) It is noted that there is significant discharge of sewage and surface runoff from the neighbouring residential estates (surface and sub-surface flows) that needs to be intercepted. This runoff was apparently not designed for in the initial airport development but evidence of ponding at various locations and permanent wet areas on the northern end a short distance from the runway is an indication of drainage linkage to the weakening runway foundation and other pavements,

(vi) The airport drainage coverage is generally inadequate in terms of reaching key areas requiring draining, isolation of pollution point sources and the carrying capacity of the existing drains system. The network also seems to have suffered serious structural failures from blockages, collapsing sub-surface drainage components and increasing storm water flows,

(vii) The drainage outfalls were observed to pass through a geologically delicate ground (steep slopes of red un-cohesive soils that have been exposed through vegetation clearing by the squatting communities). The land is, therefore, highly damaged during heavy storm water from surface erosion and land slips. Gabions recently constructed do not top withstand the force of the storm water either,

(viii) There are notable social related issues linked to the airport grounds including encroachments by neighbouring residents, solid waste disposal into the grounds, vandalism of installations (drains, lighting systems and fences) and occupation of the drainage outfall areas to the western side.

(ix) While the rehabilitation works do not have a direct interaction with the neighbourhood, the construction works will generate significant wastes comprising of scrap asphalt concrete, spoil overburden, machine parts, timber, scrap metal, packaging materials, etc. that will require safe disposal,

(x) Due to small land area available for the airport operations, the rehabilitation works could pose a safety concern to the aircraft operators, passengers and the construction workers,

(xi) Materials sites for gravel, hard stones and sand are outside the project area. The sites are privately owned, but the implications (dust, emissions, noise, safety, vegetation removal, etc.) of material extraction are likely to affect their entire neighbourhoods. It is appreciated that the Contractor and the landowners are responsible in this regard.

(xii) Finally, the airport grounds has notable social and ecological linkages (not related to the propose rehabilitation works) that could compromise the gains from this rehabilitation. These include safety of the landing and takeoff corridors, implications of the operations to the immediate neighbourhoods, security of airport installations and sanitation infrastructure.

Recommendations

The following recommendations have been found appropriate in addressing the above observations;

(i) The drainage design should integrate a cut-off drain on the northern part of the airport to intercept raw sewage and surface runoff emanating from the immediate neighbouring estates and other incidental storm water that may compromise on the stability of the main runway,

(ii) The Contractor(s) shall be advised to ensure minimal interference with the neighbouring communities with respect to their safety at all times such as to include control of dust and other emissions and elevated noise levels among others,

(iii) Review the drainage capacity and coverage such as to include the low lying sections of the airport grounds, yards under various service providers, workshops areas, waste holding areas around the grounds as discussed in this report,

(iv) Drainage designs should provide oil/grease traps and grit chambers for all drains, and specifically at workshops and machine service areas (listed in the main report), waste holding areas, the apron, pavement receptions and discharge points to the outfalls. The interceptors and grit chambers will be cleaned on regular basis and the materials safely disposed off,

(v) Stabilize the drainage outfall areas by designing wider drains, construction of concrete drains OR improved firm gabions on strong bases pillars as discussed in the design proposal. Then re-vegetation with deep rooted but short indigenous trees and allowing grass and short shrubs is recommended to hold the soil together,

(vi) Management of wastes generated in the pavement rehabilitation and drainage construction will be the responsibility of the contractor. External dumping shall be on approved grounds while in-house re-use (e.g. filling of the gullies at the outfalls) shall be with approval from KAA's Environmental Division,

(vii) Air quality and noise are aspects inseparable between the construction activities and routine airport operations. While advising the Contractor to ensure minimal emissions and noise levels, it would be recommended that KAA's Environmental Division initiate air quality surveys and noise mapping around the airport ground and the immediate surroundings in the long term,

(viii) The encroachments and conflicting settlements around the airport are not directly related to the proposed rehabilitation works. The implications on the gains from the works call for medium to long terms interventions. A corporate social responsibility strategy should be established to enhance co-existence in the short term. For long term safety solutions, initiate negotiations through appropriate channels on safety issues focusing on the encroaching Jomvu Kuu and Magongo estates as well as the settlements on the landing and takeoff corridors with a view to acquiring a safety buffer all around the airport.

(ix) Rehabilitate all material sites upon completion of the proposed works. In this regard, appropriate agreements between the contractor and materials site owners will be necessary to facilitate apportionment of rehabilitations responsibilities.

CHAPTER 1: INTRODUCTION

1.1 Background

The Kenya Airport Authority (KAA) was established by an Act of Parliament (The Kenya Airport Authority Act, Cap. 395) to be responsible of planning, designing, maintenance and operation of all airports and aerodromes in the country. Among the broad activities of the organization include;

(i) Coordinating operations in airports and aerodromes,
(ii) Management of facilities within airports and aerodromes,
(iii) Overall management and administration of airports and aerodrome,
(iv) Provision of services and facilities necessary for aircraft operation,
(v) Ensure good environmental, health and safety status at all airports and aerodromes

Among the major facilities under the Kenya Airports Authority include the Jomo Kenyatta International Airport (JKIA), Moi International Airport (MIA), Eldoret International Airport (EIA). In addition, there are domestic airports including Wilson airport (Nairobi), Kisumu airport, Malindi airport, Lamu airport, Lokichogio airport and Ukunda airstrip. There are also numerous other airstrips within district headquarters, tourists destinations and state lodges.

Moi International Airport is located in the coast region known worldwide for its attractions to tourists from all over the world who specifically comes for the scenic coastal tourist destinations that stretches from Lungalunga in the south to Kiunga in the north. Among key areas of high tourist interest include Shimoni and Diani in south coast, Mombasa, Kilifi, Malindi and Lamu in the north coast. Attractions in these areas include historical sites, clean sand beaches, Kisite, Watamu, Malindi and Kiunga Marine national Park, Shimba Hills National Park, Dodor National Park and Tsavo National Park to mention a few tourist destinations.

The airport also serves a highly commercial with local and international investors all along the coast. Among the investors include hoteliers, industrialists, travel agents, general traders (importers and exporters) as well as the main entry and exit for the greater eat and central African region. Today, business and holiday makers are able to fly into Mombasa and out within their programmes while tourists and business people can jet into the coast direct from the countries saving time and money. Agricultural and other products from the region have easy access to the airport and to the markets. These are among the many central roles played by this airport to the national and regional economy.

1.2 Problem Description

Moi International Airport is experiencing structural problems with its aircraft and other pavements that need to be addressed urgently to enhance sustained airport capacity for upto 20 years, ensuring safe aircraft operations, an all time environmental considerations at

various operation points and protection of the airport land from encroachments and soil loss through erosion. Among the issues identified at the airport grounds include;

(i) The airport pavements and particularly those used by aircrafts (runways, taxiways and aprons) have developed weak sections that could get worse with time risking the safety of the aircrafts.
(ii) On the other hand, drainage systems within the grounds do not seem to effectively capture all surface runoff from certain parts of the airport leading to flooding phenomenon and/or accumulation of sub-surface water levels with potential effects to the pavements,
(iii) Exit drainage outfalls together with the current land uses along the lower edges of the airport grounds seems to undermine the stability of the soils leading to risks of soil losses through landslides and surface erosions,
(iv) There are crucial environmental linkages to the subject components such as to include surface runoff management (internal and external), oil spills from certain internal operations, solid waste management at sources, safety aspects, soil erosion and social issues among others.
(v) Construction materials (gravel and hard stone ballast) will be obtained from external sources that will also require rehabilitation upon completion of the works.

In view of the above, KAA intends to undertake rehabilitation works of the aircraft pavements at the airport and improve the drainage system around the airport. This has so far involved a review of the existing design layout of the affected components and propositions on appropriate rehabilitation of the aircraft pavements (runways, taxiways and aprons), drainage facilities as well as the drainage outfalls around the airport grounds.

In compliance with EMCA, 1999 regulations on airports and airfield projects, environmental impact assessment is mandatory such as to identify positive and negative impacts from the proposed project and establish suitable mitigation and preventive measures for integration into the project implementation. APEC Limited Consulting Engineers was engaged to carry out consultancy works on feasibility study, design, tender administration and supervision. Environmental impact assessment study, prepared by Mr. Harrison W. Ngirigacha (Registered Lead EIA Expert) is part of this process as presented in this report.

1.3 Study Objectives and Scope

The proposed upgrading works will involve rehabilitation of the aircraft pavements, rehabilitation of the drainage network infrastructure of airport grounds as well as stabilization of sloppy grounds to the west and southwest of the airport grounds. While appreciating the positive intentions of the proposed project, the works have limited potential implications on the physical and social environment of the airport and its immediate surroundings during the construction and commissioning stages.

The objective of this EIA project report is to identify the potential impacts associated with rehabilitation works and establish suitable mitigation measures for integration in the implementation of the rehabilitation works. Specific objectives includes,

(i) To present a clear description of the project,
(ii) To provide the baseline conditions of the project area,
(iii) To establish environmental issues relating to the proposed rehabilitation project,
(iv) To identify significant impacts to the environment and social status around the airport, including linkages of the aircraft pavements to other airport operation components,
(v) Establishment of appropriate mitigation and preventive measures for the significant impacts. The measures will be harmonized with existing airport operation procedures as well as ICAO guidelines on airport management (specifically annex 14 on guidelines for airports development and operations),
(vi) Development of an environmental management action plan to facilitate implementation of the mitigation and preventive measures.

1.4 Methodology Outline

The goal of this assessment was to facilitate appreciation of the anticipated impacts to the environment and provide preventive measures. In order to achieve this goal, requirement under the EIA regulations as outlined under the Kenya Gazette Notice No. 56 of 13th June 2003 (established under EMCA, 1999) have been adopted together with the ICAO guidelines on aerodrome operations. The key steps followed for this study are briefly discussed below;

1.4.1 Scoping

This was a process of identifying critical areas of environmental concerns within and around the airport in terms of their significance. It involved a preliminary evaluation and discussions with the KSS staff on the ground. The project area was also assessed in respect of the existing infrastructure, verification of the weaknesses as highlighted in the terms of reference, identification of key points of waste generation and associated management pathways and establishing the status of physical environment within and around the airport. Social linkages to the proposed rehabilitation works, general operations and environmental management practices were also evaluated. During the scoping process, the terms of reference was also reviewed with a view to focusing to the specific environmental linkages associated with the proposed works. The preliminary inspection (scoping) was carried out on 2nd and 3rd of May 2008 and a scoping report together with revised terms of reference (copy in annex III of this report) submitted to the client shortly after.

1.4.2 Detailed Field Evaluation

This was perhaps the most important stage of this assessment. The airport was physically evaluated in detail with respect to drainage, hydrology, geology, soils, water sources, water demand and uses and waste management practices. Social interactions with respect to environmental quality, safety aspects and surrounding community linkages were also assessed. Other activities undertaken included interviews of the stakeholders and consultations with relevant sections of the local communities.

Among the stakeholders operating within the airside of the airport include;

(i) Kenya Civil Aviation Authority (KCAA),
(ii) NAS (Mombasa branch),
(iii) Mombasa refueling yard (Total and Kenol Oil),
(iv) Kenya Aerotech Services,
(v) Eurocraft Services,
(vi) Airfreight Terminal Officials,
(vii) Benair Engineering,
(viii) Blue Sea Services,
(ix) Kenya Air Force base.

Stakeholders operating on the landside included security, cafeterias and eating places, airline operators, taxi operators and tour operators. Among identifiable communities were residents of Magongo, Jomvu Kuu, Chaani and Port Reitz estate (neighbouring the airport on different directions), commercial and industrial operators as well as public institutions, Transporters and road users, Provincial Administration, Environmental authorities and Mombasa City Council to mention a few,

1.4.3 Project Report Preparation

The proposed project works will involve rehabilitation of an existing facility, the airport pavements and drainage systems. Associated impacts to environment and the society are expected to be generally low though the overall airport operations could have notable linkages to internal and external environmental and social setting. In this connection, this project report was found adequate such as to comply with the EIA regulations through description of related baseline conditions, the project background, justification and potential implications and an outline of preventive measures.

This project report comprises of the following chapters;

1. Executive summary
2. Introduction
3. Project Site Description
4. Rehabilitation Alternatives
5. Environmental Baseline Outline
6. Social baseline Outline
7. Anticipated impacts and mitigation measures
8. Environment Management Plan
9. Policy and Legal Framework
10. Conclusions and recommendations
11. Annexes

CHAPTER 2: STATUS REVIEW

2.1 Location

Moi International Airport (MIA) is the second largest airport in Kenya after Jomo Kenyatta International Airport in Nairobi. It is situated on the Mombasa mainland off Port Reitz in Vikombani area of Mombasa city in coast Province. The airport lies immediately south of the main Mombasa – Nairobi highway and sandwiched between Jomvu Kuu and Miritini estates to the west, Mikindani and upcoming new settlements to the north, Changamwe, Magongo and Chaani are among the highly populated estates on the immediate east and southeast of the airport while Port Reitz estate in on the south.

The approximate geographical location of the airport is 04° 02' 05"S and 039° 35' 39"E at an elevation of about 61m above sea level outside Mombasa island and approximately 6km west of the city centre with the main runway running north – south direction on the western side of the airport grounds.

2.2 Airport Components

Moi International Airport was constructed in the 1940s, then as Port Reitz Airport and later expanded in 1979 and further improved in 1992. The facility comprises of the following components;

(i) The main runway (03/21) measuring about 3,356m long and 7m wide. It is fully equipped with VOR/DME, SALS, PAPIs and edge, threshold and lighting,
(ii) Crosswind runway (15/33) measuring 1,359m long and with a threshold, edge markings and clear lighting,
(iii) The apron area has the main passenger new terminal, the old passenger terminal and the general aviation aprons. They are constructed of asphalt and cement concrete and well served with lighting and safety provisions,
(iv) The are two main taxiways from the aprons to the runway with a minor one serving the general aviation area,
(v) Terminal buildings for the new, old and general aviation areas, all equipped with modern check-in counters and security facilities in addition services and convenience provisions,
(vi) Among the support facilities include a watchtower, a fire station, auxiliary buildings (refueling installations, offices, aircraft service equipment, NAS, cargo handling, a hanger, a radar, etc.). security watchtowers are also strategically positioned around the airport,
(vii) On the land side there are passenger lounges, car parks, cafeterias, travel agents and recreation park to mention a few,
(viii) The airport ground is fenced with a firm chain link fence on all sides though damaged sections attributed the neighbouring communities. The airport also has surface drains along the pavements that do not seem to effectively drain surface runoff out of the airport.

2.3 Current Infrastructural Status

Inspection of the airport facilities revealed a number of issues that are of social and environmental nature. While detailed analysis of the pavement status is presented under the design report, the following findings could be reported for the EIA project report purposes

2.3.1 Runways

The main runway 03/21) is largely in good physical conditions and its components including lighting and security are intact. However, cracks were noted to be developing around the touch-down section for a distance of about 100 – 200m. The ground sections in this area are notably characterized with poor drainage in the sub-surface zones. This situation, however, changes towards the extreme southern end of the main runway where subsurface drainage improves. Storm water is, therefore, retained on depressed sections of the grounds, in a few points creating wetlands.

The secondary (cross winds) runway is significantly cracked for the entire 1.4 km to an extent of grass growing in the crevices. It is, however, still usable for light aircrafts since the support components including lighting is still intact. Ground in the immediate neighbourhood seems well drained save for a small section at the extreme near the radar whose surface topography seem to hold sub-surface water.

Runways (as well as other pavements) were visually inspected and found to have different degrees of weaknesses including surface defects (comprising of material losses, polishing and flushing), surface deformations and distortions, cracks (from heat and physical weaknesses), patches (from repairs) and potholes.

2.3.2 Aprons

The aprons are in good physical conditions. However, it was noted the surfaces are drained towards the natural drainage systems allowing storm water wash down grit material, any oil spills at the aprons and other pollutants from the aprons downstream. Though no serious defects are present at the aprons (constructed with concrete slab blocks), there are possibilities of cracks in the block joins. Details on physical status are in the design report.

Sections of the southern edge of the aprons and the adjoining pavements have been converted into an aircraft support machine holding yard. Aircraft service machines belonging to Kenya Aerotech Services, Eurocraft Services and Kenya Airways are packed on a section of the apron and have minor engine services carried out on the spot spilling oil and lubricant residuals on the pavement. Since the affected pavements are provided with appropriate drainage and oil interceptors, the spills are washed into the grass or find its way into open drains.

Soil swept from the apron location is mixed with oil (though low level) is pushed to the edge of the pavement for storage. Any surface runoff will directly wash the materials into nearby

open drains. No significant spills were noted at the general aviation area, though it has no provision of surface drainage systems.

2.3.3 Passenger Terminals

There are two passenger terminals, the old and the new buildings. The new terminals have more activities since it is installed with more safety equipment while the old terminal is only used during high passenger population or special occasions, otherwise utilized to house some of operation offices. Both terminals, however, share the same aprons. They both are in good physical conditions.

2.3.4 Drainage Components

Local hydrology seems to be greatly influenced by the micro-topography of the airport and its surroundings. Hard surfaces including pavements and roofs generates significant runoff that either runs into open storm drains, infiltrates into the ground or is stored in depressed areas (evident wet areas confirms this observation). Among the visible features of the surface drainage systems include;

(i) Runoff on the western side of the runway is collected into an open drain that joins the central main drainage channel towards the outfall no. 1,
(ii) Runoff from the northeastern side of the airport and general aviation terminal and part of the main apron is also collected and passed under the main runway towards the central main drainage channel outfall no. 1,
(iii) Runoff from the aprons, main terminal buildings, the fire station, refueling areas and other support service area locations is collected and channeled into the lower main drainage channel near the radar towards outfall no. 2,
(iv) The southern end of the main runway and the crosswind runway are drained through a separate drainage channel into Port Reitz through outfall no. 3,
(v) Parking areas on the landside are also drained into a drain that discharges directly into Port Reitz through outfall no. 4. However, the drainage system and the outfall here do not seem well elaborate and is blocked in some section by residential and commercial structures outside the airport grounds.

Significant sections of the airport grounds are notably below the surface drainage levels and hence runoff getting there does not get out of the grounds, but rather stagnates and slowly infiltrates into the ground. Such locations include the area around the weather station and Kenya Civil Aviation Authority observatory station and also a strip of land along the boundary with Jomvu Kuu settlements. The drains have broken edges and seem to have low capacity to carry peak storm water flow effectively.

Surface runoff from the aprons, aircraft support service areas (NAS, refueling yards, cargo terminal, the fire station, Kenya Aerotech Limited Services, Eurocraft Services) and the Kenya Air Force yard among other locations in the middle section of the airport grounds are drained into a major channel existing near the radar on the western border. Notable sections of the pavements are not well designed to discharge runoff into the available drain outfalls, leading to local flooding and water stagnation unpaved land. Observations of the

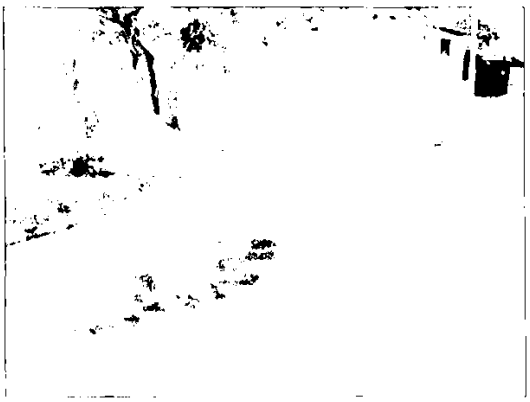
drain near the radar showed deposition of solid waste materials (plastics, dry grass, fabrics, etc.) and signs of oil residuals. This was an evident of drain status at operation areas, among them lack of oil and grit traps.

The southern end of the airport grounds including the crosswind runway of the airport grounds, Benair Engineering yard and end of the main runway are drained into a channel discharging directly into Port Reitz downstream of the Kenya Ports Authority grounds. The drain is clean and structurally sound.

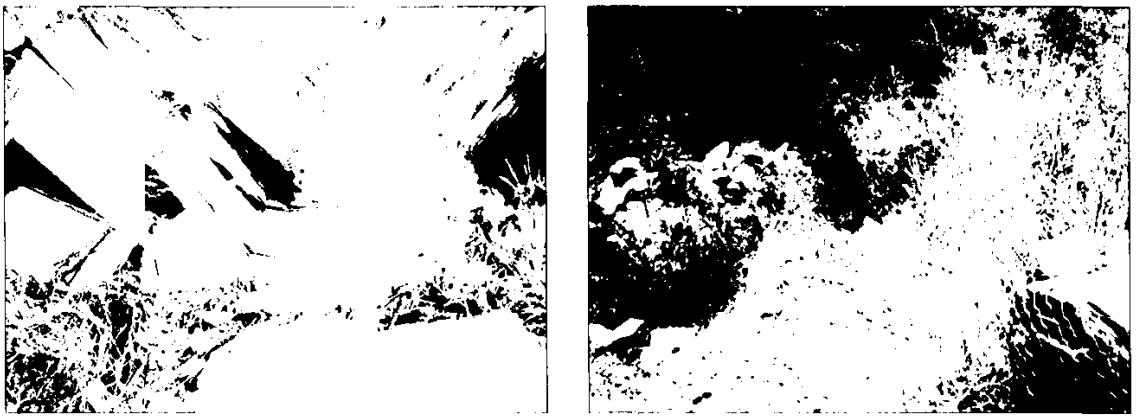
The landside area is naturally well drained, but the car park is not provided with adequate surface runoff drains. At least two sections of the access roads were found flooded. The problem is however, not significant. Residential areas in the neighbourhood including Jomvu Kuu, Magongo, Changamwe, Chaani, etc. are not provided with drainage systems. Development have also blocked most of the natural drains surface runoff, therefore, has potential to flow into the airport grounds from the higher ground such as Jomvu Kuu and Magongo estates. This further complicates drainage problems at the airport.

Observed wet areas close to the northern end of the main runway resulting from inadequate surface drainage

Stand pipe without drainage next to the Airfreight handling yard

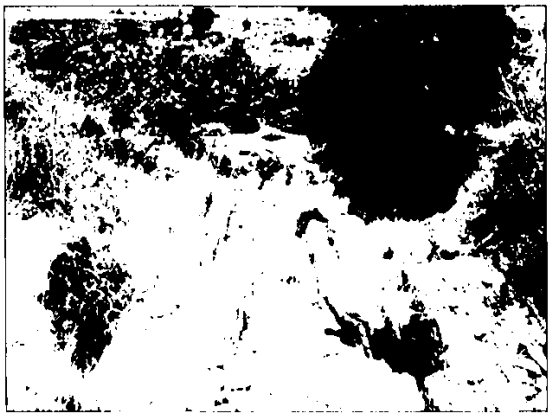


Flooding along a pavement next to Joycline car wash



A section of damaged in-house and outfall drains

Status of outfall drains (overgrown with vegetation and seemingly undersized)



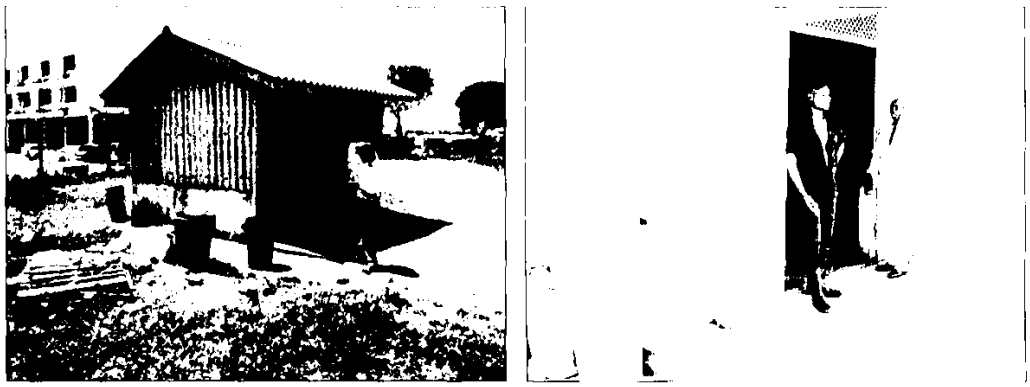
Observed gabions (structurally weak and cannot protect soils)

Existing preferred drains (firm suitable for soil protection)

2.3.5 Waste Management Facilities

Common solid wastes emanating from MIA include mainly packaging materials, plastics, scrap metals, fabrics and general office wastes. Others include food remains from restaurants, aircrafts (NAS) and Kitchen at various locations around the airport. The waste collected here is then burned in an open yard to the extreme southwestern corner of the airport ground. All other operators on the site are expected to handle their wastes without compromising on each other. There are, however, no overall guidelines for a harmonized waste handling procedures.

KAA operates a small solid waste holding house mainly for organics (food remains, packaging materials and related refuse) that is then burned on a location within the facility. The waste holding house, located near the airfreight terminal (a cubicle measuring 3m x 3m), acts as temporary storage for solid materials originating from the aircrafts, offices and a few other operators. It was reported that a few of other operators delivers their wastes to the holding house. It is, however, the responsibility of each operator to handle and manage their own wastes. Most premises, therefore, had related solid wastes damped next to their location awaiting external disposal. There is no uniform procedure for solid waste management at MIA.



Waste holding house for Kenya Airports Authority

Waste and scrap materials at the Kenya Aerotechs Limited Yard

the old and new terminals notably used for washing of official KAA and associated vehicles. Both discharge wash water directly into open drains without screening posing pollution problems to surface runoff.

The table below present observed sources of waste around the airport grounds:

Table 1: Waste management and disposal

Waste Type	Source and Location	Mode of Removal and Destination	Remarks
Plastics and polythene materials	Offices, aircrafts, cafeterias, workshops and along boundary fences with settlements. (Airport wide aspect)	• KAA burns own waste, • Other airside generation points removals for disposal at municipal dumping grounds • Landside waste generators dumps individually in municipal dumping grounds,	No guiding regulations
Papers, cartons and general stationary materials	Offices, aircrafts, books and maps sales, cafeterias, workshops. Along the boundary fences with settlements Main terminal buildings, refueling yards, airfreight terminal area, Benair Engineering areas.		Plastic materials blocks sections of the drainage system
Oil and grease spills	Workshops, equipment parking bays, aprons, car wash locations, fire station. Kenya Aerotech Ltd. workshop, Benair Engineering yard, KAA fire station, spills on the aprons, spills at the refueling areas, grease from the airfreight yard and spills from NAS compound). Two car wash yards (Joycline and a KAA yard between the terminal blocks) also generate oil residuals).	All oils and lubricants washed down the drainage system into the environment.	No guidelines on management of oil spills at the airport This aspect will require extra attention in the design. Oil residual notable on main drains.
Rubber wastes	Waste aircraft tyres, used motor tyres, rubber dust (in air and surface runoff) from the runways and taxiways. Kenya Aerotech ltd. and Eurocraft Services yard, Benair Engineering yard, Fire station areas, Kenya Airways workshop.	• Used aircraft and vehicle tyres dumped various locations around the airport, • No action on rubber pollutant.	This is insignificant but needs to be a key item on airport management plan.
Scrap metals (vehicle shells, drums, aircraft shells, obsolete metallic structures, etc.)	Workshops, construction points departmental areas. Kenya Aerotech ltd. yards, Kenya Air force yard, Benair Engineering yard, Refueling yard, Kenya Airways workshop, etc.	No recent removals of scrap metals from the airport reported.	Procedures for scrap materials removals complicated hence the accumulation.
Dead plant materials	Mainly grass, shrubs and tree twigs cut from open grounds of the airport	Used for mulching on in-house gardens and flower beds. Excess is	Blue Sea Services engaged on this assignment.

Waste Type	Source and Location	Mode of Removal and Destination	Remarks
	An airport wide issue.	dumped at the municipal dumping grounds and burned.	External drainage sections are not covered under this contract and their current bad physical state.
Food remains and packages	Aircrafts, cafeterias, the Officers Mess and NAS premises. Notable packaging materials (milk and bread) dumped around Benair Engineering yard)	All operators manage own food related waste materials.	No guidelines on the management of such wastes

Observed oil spill accumulation on pavements near the Kenya Aerotech Ltd. and Eurocraft Service yards. No provisions of drains or oil interceptors

2.4 Material Sites

The proposed rehabilitation project will require construction materials among them gravel and hard stone chippings to be obtained outside the project site. The material sites targeted are mainly in Bamburi area and locations in south coast for gravel and Mazeras, Taru and Jaribuni (Kilifi District) for hard stones, the latter being most promising. The materials sites are mainly on both private and public land, but specific site locations have not been established. Whereas the required quantities have not been specified, it is expected that the extraction process will involve intensive excavations, earth moving and loading onto lorries at the material sites followed by transportation to the airport grounds. The hard stone crashing sites could also have potential health risks to the immediate neighbourhood.

Other materials required for the rehabilitation works are all available within the city of Mombasa such as to include water (to be obtained from own boreholes and the public supply), cement, reinforcement bars, drainage pipes, drain cloths and concrete slabs. Concrete asphalt will also be needed for the pavements' surfacing and would be imported.

It is also appreciated that the rehabilitation works will generate waste materials from the existing pavements through milling of the pavements, excavations where necessary, scrap slabs from the drains and general construction debris. While part of the materials could be used for filling of the less crucial sections of the pavements, a significant amount may require to be disposed off externally. The responsibility of appropriate disposal of this material will lie with the contractor.

2.5 Rehabilitation Project Justification

Rehabilitation of the pavements and drainage system at the Moi International Airport has been prompted by the declining quality of the surfaces and poor drainage of surface and sub-surface water from the airport ground. The emerging conditions of the runways are a threat to the safety of aircraft operations with potential risks to damages to the aircrafts. Link pavements within the airport grounds require installations with appropriate drains. Improvement of the pavements will not only address the potential risks to safety, but will also prolong their lifespan and reliability. The importance of the airport to the country's social and economic development is worthy the intended investment.

Drainage around the airport seems to be the major cause of problems facing the pavements as a result of compromised foundations. Surface runoff emanating fro the neighbouring estates and premises, stagnating rainwater and surface runoff from the pavement surfaces tends to accumulate within the airport grounds creating ponds and permanent wet areas within 50 – 100m away from the airport on both sides. Infiltration of such surface and sub-surface water could easily penetrate the pavement foundations due to the porosity of the sub-surface soil formations. Outside the premises on the western and southern edges of the airport grounds, storm water is becoming a threat to the un-cohesive soils on the steep slopes with extended risks to land use downstream and environmental pollution. Improvement of the drainage system will in addition to effective removal of surface and sub-surface water, also protect the soils around the outfalls.

CHAPTER 3: REHABILITATION ALTERNATIVE ANALYSIS

3.1 An Overview

The rehabilitation plan of the airport will involve specific evaluations of the current status of the target components and undertaking appropriate improvement works. The main target components include the pavements and drainage systems while the lighting system will be addressed in as far as linkages with the pavements are concerned. There are no new pavements to be constructed neither will the existing ones be expanded. It will be structural improvement of the existing ones. Additional drains may be provided with a view to enhancing the capacity and coverage of the network. The works will be confined within the airport grounds and will have no direct linkage with the outside social and environmental setting.

The two main proposed works include;

(i) Milling of the current asphalt cement surfaces from the identified pavement sections and replacing the same with a fresh base and improved concrete asphalt cement surface (details are presented in the design report, see extract in annex IV),
(ii) The drainage system will be redesigned such as to cover improved surface drainage facilities, reinstall sub-surface drainage facilities and improve the outfalls and the capacity of the external drain outlet channels.

3.2 Pavement Improvement

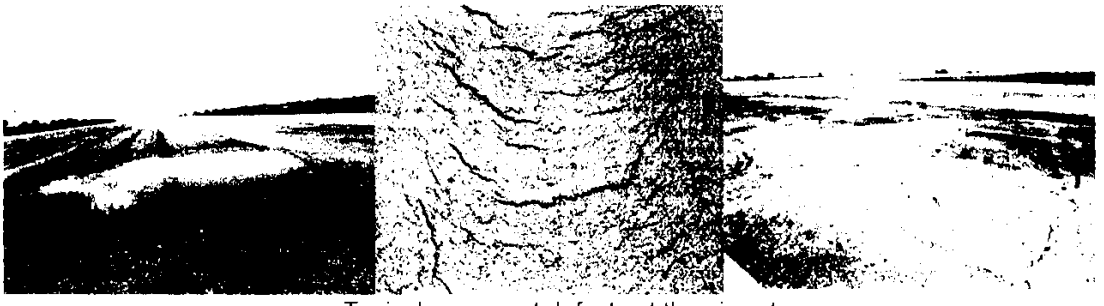
The pavements were largely found to have suffered defects including deformation, cracks, patches, potholes, surface depressions and distortions. The pavements are also observed to have poor surface and side drains, while some are not provided with shoulder and side drains at all, while other have drainage hindrance by overgrown grass. Due to these surface defects, pools of water are left on the pavements or by the sides threatening the stability of the bases.

Rehabilitation works will, therefore, involve the following activities;

(i) Improvement of surface drainage by reinstating the surface geometry,
(ii) Improving the side drains (redesign and reconstruction),
(iii) Removal of the worn out pavement surfacing,
(iv) Pavement crack sealing,
(v) Resurfacing of pavement by overlaying reinstated surfaces,
(vi) Correction of pavement deformations,
(vii) Strengthening pavement sections depending on traffic loading.

Defective sections of the pavements will, therefore, require milling of the top asphalt concrete upto 50mm and replacing the same with 150mm asphalt concrete with 100mm binder course and 50mm of a wearing course. This option does not require full

construction, especially where the surface and sub-base are structurally stable save for the stop way or protection pads that are extensively worn out and may require fresh cement concrete. The design proposals are in annex IV.



Typical pavement defects at the airport

3.3. Drainage Improvement

Drainage within the airport grounds seems to be failing in a number of locations. The pavement surfaces together with the raised ground outside the pavement have serious defects that hinder free surface runoff flow into the open drains. It also seems the side drains have also failed to collect surface runoff from the pavements. Other defects to the drainage systems include collapsed drain slab linings (associated with failed weep holes), collapsed and blocked sub-surface drains as well as clogged surface drains. All sections of the drains will be redesigned for construction to an improved standard.

External sections of the drainage systems, and more specifically the outfalls on the western side of the airport grounds, have also failed with evident landslides and collapsed gabions recently constructed along the steep slopes. This situation is associated with clearing of vegetation cover, blockage of drains with silt and dead plant matter and increased storm water flows. Improvement would also be undertaken through redesigning and perhaps a different mode of construction.

Rehabilitation of the drains will address the three drainage levels namely the plateaus, pavements and outfalls. Among the proposed actions proposed in the design report (text extract in annex IV) include;

3.3.1 Plateau Drains

(i) Installation of oil/grease traps at the apron, maintenance yards (Kenya Aerotech Limited, Eurocraft Services and Benair Engineering), Freight Terminal and Mombasa Refueling Yard to intercept any oils and grease before discharge into the main drainage system,
(ii) Repair to the damaged and worn out weep holes along the open lined drains,
(iii) Grading and filling depressions of the grass (turf) area to ensure natural drainage of the pavements runoff to the parallel open lined drains,

(iv) Extension of the open lined drain to serve the Meteorological Observatory station
(v) Provision of drainage to the old hanger area station next to the old runway at the southern end (Benair Engineering yard),
(vi) Cleaning and de-silting of all drains across the airport,
(vii) Reconstruction of damaged drains. This will involve removal of drain pre-cast side slab linings, trimming and relaying,
(viii) Provision of side drains to access roads serving the Meteorological Observatory and the western side of the airport,
(ix) Repair to the catch drains to the ground stabilization area serving outfall nos. 1 and 2.

3.3.2 Pavements Drains

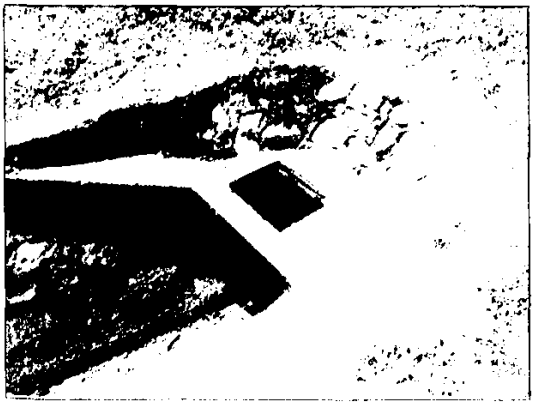
(i) Cleaning of all slotted drains along the pavement shoulders,
(ii) Replacement of the existing subsurface drains by installation of subsurface geo-pipe drains to run parallel to the main runway and taxiway A. The subsurface drains to drain into the existing cross culverts. The geo-pipe drains will lower the ground water table at all the main aircraft pavements while ensuring retention of all the soils,
(iii) Replacement of the gritted drains along the secondary runway, 500 mm wide and varying depth,
(iv) Construction of lined drains for the access road along the maintenance yard to terminate at the culverts near the fire station,
(v) Construction of catch drain at the shoulders of the general aviation apron to drain into the open lined drain parallel to Taxiway A.

3.3.3 Outfall Drains

(i) Repair to the outfall No. 1 and 2 to their original status. This will involve placing of stone filled gabion boxes at the outfall outlets. The gabion boxes should not be wire woven but poly woven ropes,
(ii) Repair the damaged sections and structural joints of outfall no. 1 and 2,
(iii) Reconstruct some lengths of outfall no. 2 while ensuring support with piles and subsurface drainage of the structure,
(iv) Extend the open lined drain with a twin box culvert 2 m x 1m from the Secondary Runway threshold 15 to drain to the natural steam,
(v) Remove all the loose side slabs and prepare weep holes as specified in the drawings and relay the slabs with fresh cement mortar,
(vi) Reconstruct the drains at the control tower and maintenance yard.
(vii) Construct a 300 mm diameter IBD drain with side slabs along the perimeter road from the secondary runway threshold 33 to outlet of outfall no. 3,
(viii) Construct a 1000 mm diameter outfall drain with subsurface drainage for the circular drains draining the marshy area near the western side of the northern end of the main runway,
(ix) Cleaning of all drains of debris and vegetation.

3.3.4 Ground Stabilization

(i) Filling of the gullies with construction waste materials from the pavement rehabilitations and protecting the same from erosion by installation of poly ropes woven stone filled gabion boxes/mattresses, construction of sub-surface drainage, catch drains to stabilise the areas.
(ii) Reconstruction of stabilization ground between Outfalls No. 1 and No. 2 by installation of subsurface drains and removal of excess overburden.
(iii) Filling of sink holes and provision of subsurface drains for all the unstable grounds resulting in lowering of water table.
(iv) Provisions of toe filter drain, at pre-selected locations, for all the cliffs along the western side and the southern end of the airport.
(v) Provision of sub-surface drains for all outfalls to avoid fluidisations of the supporting soils.



Sections of the drain s to be rehabilitated

3.4 Project Cost Estimate

This rehabilitation works is estimated to cost about KShs. 110,000,000.00 (Kenya Shillings One Hundred and Ten Million) only such as to cover the following items'

(i) Repair works of runway pavements and materials (~KShs. 60,000,000),
(ii) Repair works on drainages systems (~KShs. 25,000,000),
(iii) Reinstatement of slopes (~KShs. 15,000,000),
(iv) Labour and other expenses (~KShs. 10,000,000).

3.5 Proposed Project Implementation Schedule

It is expected to take approximately 24 months from the commencement date. However, during this duration briefing meetings and response to issues will always be done within the stipulated timeframe.

CHAPTER 4: ENVIRONMENTAL BASELINE CONDITIONS

4.1 General Overview

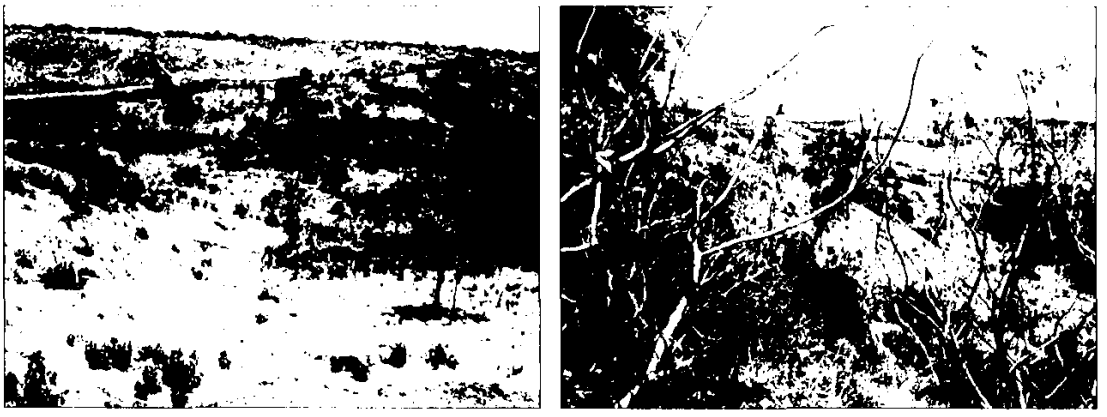
Moi International Airport is located in region attractive to tourists from all over the world who specifically comes for the scenic coastal destinations that stretches from Lungalunga in the south to Kiunga in the north. Among key areas of high interest include Shimoni and Diani in south coast, Kilifi, Malindi and Lamu in the north coast. Attractions in these areas are Kisite Marine national Park, Shimba Hills National Park, Watamu and Malindi Marine National Parks, Kiunga Marine National Park, Dodor National Park and Tsavo National Park to mention a few.

Mombasa city and its surroundings has got many environmental and social similarities with the rest of the coastal zone including geology and soils, vegetation types, drainage, hydrology, land use, cultural trends as well as economic patterns. However, urban development has significantly altered the local topography, hydrological layout and stability of the surface soils. Economic demands and migration of different cultures into the area has led to land use changes (with heavy settlements and commercial focus) and increased population trends. In this regard, while looking at the regional environmental and social characteristics, the localized current status in relation to the airport facility will be discussed.

During the evaluation of this baseline conditions, physical inspections of the area was backed up with literature of the wider coastal region. Social and cultural characteristics were also drawn from interviews and historical knowledge of the coastal people and the transformations over time. The following sections, therefore, briefly describes the general and site specific environmental and social status that also provides a basis for impact identification.

4.2 Topography

The airport grounds, like the neighbouring land on the eastern direction, have a general mild slope towards the south and southwest with steep gradients into Port Reitz section of the Indian Ocean. Economic development (commercial buildings, roads and public utilities) have altered significantly the surface topography, in most cases having extreme effects on the free surface runoff flow. The western side of the grounds is also characterized with steep slopes (of upto 10%) and loose soils that have also been exposed to vegetation clearing and growing of crops leaving behind bare earth. The slopes are toward a deep valley that also channeled into Port Reitz. This valley seems to be the influencing factor of the surface drainage at the airport grounds. However, the land to the north slopes gently to the northwards to Tudor and Mikindani estates while the eastern also maintains mild gradient through residential estates towards the Makupa, the harbour and Mombasa Island. Landscaping during construction and land development in the surround areas has significantly also altered the surface natural outlook of the area.

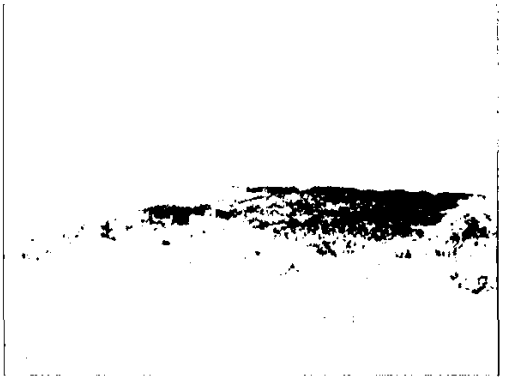


General topography on the immediate western direction of the airport

General topography on the eastern and southern direction of the airport

4.3 Hydrology and Drainage

The drainage of the coastal zone generally adjusts to the original slope towards the east that is typical of the general tilt of the Eastern African margin that has been altered by human activities. It would be noted that due to the ragged topographic nature upstream and around the airport area and the relatively high soil porosity, drainage is efficient with no possibility of flooding during rains. However, due to dense settlements in Mombasa city generally and around the airport specifically, it would seem like there is no defined natural drainage systems save for the few storm water channels most of which have been destroyed by human settlements.



A section of Port Reitz (Indian Ocean) receiving storm water from the airport grounds

4.4 Storm Water Characteristics

The existing drains are designed such as to trap surface runoff from hard surfaces (runways, taxiways and building roofs) but due to its inadequate capacity, most of the storm water on soft grounds is left to infiltrate into the ground. The drains are not fitted with oil traps or grit chambers at points of discharge (particularly at areas listed in table 1 above). In this regard, materials including oil/grease residuals, dry grass, soils, papers, polythene materials and packaging materials are notable downstream the drain systems (though efforts are in place through Blue Sea Services, a company engaged for bush clearing and cleaning of drainage is ensuring minimal solid materials are washed downstream.

On the other hand, sub-surface water drainage system along the main pavements (runways and taxiways) seems to have failed or collapsed immediately after installation. In this regard, such water is forced to accumulate underground creating the problems discussed earlier in his report. This is associated with the stagnation of water in the sections listed above compromising on the integrity of the pavements.

4.5 Water Sources Demand

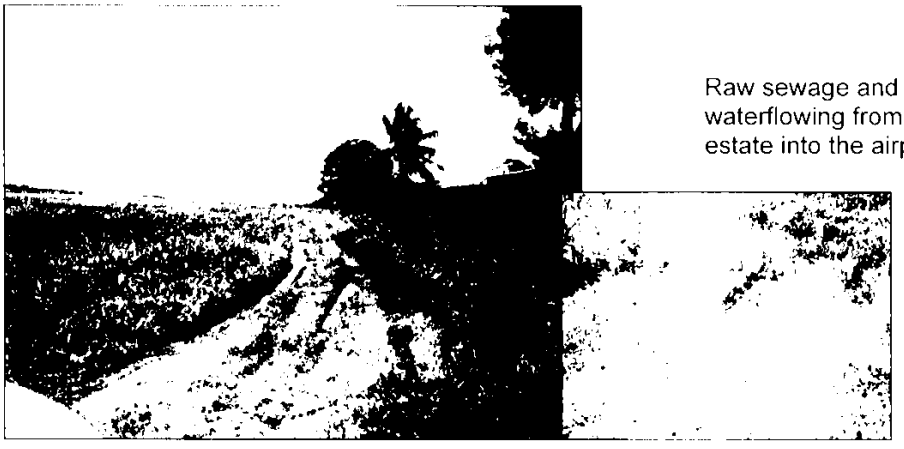
The airport area is served with piped water drawn from Mombasa City water supply. It was observed that there is notable shortage of water in the supply network as a result of the ever increasing social and commercial demand. The adequacy of the water supply capacity to meet the requirement demand of the airport operations and satisfy other dependants cannot, therefore, be assured. It was noted, however, that there is no mechanism of determining the total water usage (input, consumption and wastewater discharge) around the airport grounds.

Alternative sources of water in the area include rain water harvesting (mainly within the residential estates) that is dependent on the rainfall patterns, reliability and extent. Others depend on water vendors whose water is of uncertain quality. MIA purchases water in tankers for critical uses within the airport including sanitation, firefighting and general washing. This situation has created the need for the development of 4 boreholes drilled to meet the shortfall.

4.6 Sanitation and Waste Management

This part of Mombasa city is not served with sewer facilities and the most common sanitation practice includes pit latrines and septic tanks. Sewage from the area (mainly pit latrines) is collected into septic tanks and soak away pits or discharged into open drainage systems with the final sewage recipient being the sea at Port Reitz. Evident discharge of sewage from the overflowing shallow pit latrines into the airport grounds is evident across the boundary with Jomvu Kuu Estate. Indications from Mombasa City Council in regard to sewage and waste disposal are that a trunk sewer exists and runs along the main Nairobi highway and the neighbouring residents are being encouraged to connect. This exercise is beyond the means of the residents, most of who are tenants. MIA has its own sewer system but NO sewage treatment works and hence collected into a sewer network that is then channeled directly into Port Reitz.

There is no official solid refuse collection and disposal from the airport and surrounding areas. Residents will either dup solid refuse haphazardly while a few have resorted to private waste handlers for disposal of the wastes, a system with no defined control.



Raw sewage and storm waterflowing from Jomvu Kuu estate into the airport grounds

Solid refused dumped from Jomvu Kuu into the airport grounds

4.7 Land Cover Characterizations

There is enhanced land cover at the airport comprising of grass within the air side, while the landside has been planted with ornamental but indigenous shrubs on grassed land section. Notable indigenous vegetation cover is on the south of the airport where grass and short trees extends to the mangrove vegetation along Port Reitz coast line. Vegetation on the south western side has been removed by the neighbouring local community for cultivation leaving the steep slopes exposed to erosion hence undermining the soil stability. As a result, there are notable losses of soils through land slides and erosion during heavy storms. MIA Management has been installing gabions (blocks of mesh wire, stones and concrete),

There is beautification program of the airport involving planting of grass, flowers, trees (only where needed), cutting grass and clearing bushes. This is being done through a contracted company (Blue Sea Ltd.) to enhance vegetation cover.

4.8 Geology and Soils

The coastal zone is generally underlain by a base rock of sedimentary origin (shells, sandstones and clays). In general, the boundary between the geological systems or groups and their sub-divisions run parallel to the coastline, the rocks becoming progressively older as one travels inland. This series could fall into three well marked divisions as presented below in order of their succession:

(i) The Duruma Sandstone Series consisting of grits, sandstone and shales. The division is divisible into three broad lithological units with coarse sandstones at the top and bottom of the succession and finer sandstone and shales in the middle.
(ii) The Jurassic rocks that are entirely of marine origin and consists of limestone, mudstones, shales and occasional thin sandy beds. The airport largely lies within this division.
(iii) The Cainozoic rocks that include a thick series of sand and gravels, coral reef with associated lagoonal deposits of coral, calcareous sands and beach sands and various subsidiary sandy beds.

Geotechnical investigation reports carried out elsewhere in the region shows that top soil gradually changes to sandy clayey gravel at depths of 2 – 2.5m deep. The soil types have a strong correlation with the geology and topography of the region and differ widely in depth, texture, physical and chemical properties with variations running parallel to the coastal line due to sedimentation process. The significance of this geological and soil characteristics is the porosity associated with the sedimentary type of soils. Infiltration to the groundwater aquifers of polluting substances from the ground surface is also highly likely.

The soils at the site are generally wet (as a result of poor surface drainage in the neighbouring areas), weak and less consolidated at the top (0 – 2m) implying they are susceptible to sheer erosions, landslides and unable to withstand physical high pressures and hence unable to withstand heavy loads unless reinforced.

Typical nature of natural top un-cohesive soils at the airport grounds

4.9 Climatic Conditions

4.9.1 Rainfall

The coastal region receives an average annual convectional and bimodal rainfall of about 900mm with a marked decrease in intensity in the north and into the hinterland. The average annual mean rainfall in Mombasa District ranges from 400mm to 1,100mm. The rainfall pattern is influenced by proximity to the Indian Ocean, relatively low altitudes, temperature and trade winds with the seasons being more pronounced in the south. Long rains occur between the month of April and June (peak in May), while the short rains occur from October to December.

4.9.2 Temperature

The annual minimum temperatures in the area range between 22.5°C and 24.5°C while the maximum temperatures vary between 26°C and 30°C along the coastal belt. The district is generally hot and humid all the year round with a relative humidity of about 60% along the coastal belt due to the high evaporation rate and availability of surface water. From an environmental angle dispersal of aerial pollutants increases the span of coverage with higher temperatures. This may not directly apply for the construction phase, but is significant on aircraft activities associated with the airport.

4.10 Biodiversity

The project area is inhabited by human settlement and economic activities (industrial and commercial features) and no wildlife was noticed apart from smaller species of birds,

rodents and reptiles (mainly snakes) but the whole range of organisms could not be established under this assessment. Arabuko Sokoke forest (situated about 50km to the north of the site) and the lower fridges of Tsavo national Park have a nature influence on the animal species in Mombasa and its surroundings, though this situation has been changed by social and economic interests.

Plant species are dominated by coconut trees being the main agricultural crop. Other lesser agricultural plants noted includes cassava, cashew nuts, and isolated food crops towards inland zones (Miritini, Mazeras, Mariakani and the surrounding transition areas). Most of the land including the proposed site is covered with grass species, shrubs and in some places ornamental plants and flowers. Tree species seems stunted, perhaps due to the geological formations, soil characteristics and water shortage. Indigenous plant species are fast being replaced by human social and economic activities including commercial and settlements. Like the animal species, plants in the surrounding areas are influenced by ecosystems in the coastal region including Arabuko Sokoke, Shimba Hills, Tsavo forest and coastal mangrove forests.

CHAPTER 5: SOCIAL AND ECONOMIC BASELINE CONDITIONS

5.1 Administrative Settings

Mombasa District shares the same administration boundaries with the Municipal Council of Mombasa. The District is divided into 4 divisions, which are further sub-divided into 18 locations and 30 sub-locations. The district has 4 constituencies which although they share the same names with the Divisions (except for Mvita Constituency which is island division), they do not share the same boundaries. The shifting of Tudor, Ganjoni and Old Town locations to Changamwe, Likoni and Kisauni constituencies has resulted in the 3 constituencies being larger than their respective divisions, but has made Mvita constituency to be smaller in area than Island Division.

5.2 Population Trends

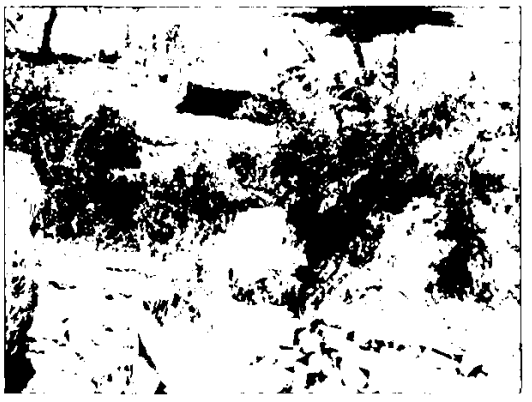
According to the 1999 population and housing census the population of Mombasa district was 665,018 people. The population growth rate is 3.6% compared to 3.0% during the previous period. The districts projected population is expected to increase to 796,571 and 920,313 people in the years 2004 and 2008 respectively. According, to the 1999 population and housing census the male to female ration was 54.7% and 45.3% respectively. This was attributed to the large number of men migrating to various coastal towns in search for employment and other income opportunities from other parts of the country. Changamwe Division, where the airport is situated, is the second most populated and population densities zone after Kisauni harbouring over 193,000 person (could be currently higher) comprising of residents, commercial and industrial workers as well as significant transit population. This trend is on the rise

5.3 Human Settlement

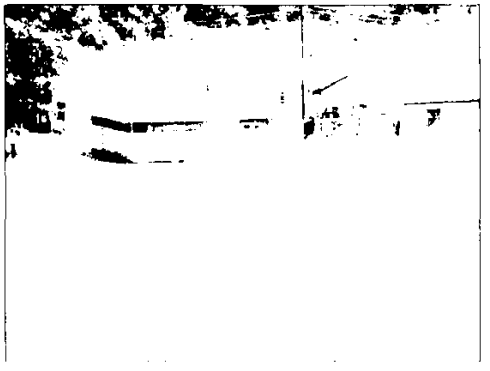
Mombasa is a cosmopolitan district being inhabited by people from all parts of the country, tribes and races including Asians Mijikendas and Arabs. The settlements are classified as a megapolis. The population distribution and settlement patterns in the district are influenced by the infrastructure network like roads, water, electricity, availability and accessibility of areas of gainful employment, availability of cheap housing security and land tenure systems. Presence of an international airport in the town presents additional opportunities for attracting residents from elsewhere into the town.

Kisauni division is the most populated followed by Changamwe division and Island Division. However, Island division has the highest population density. The areas with high population are found in Island division and along the major highways such as Mombasa – Lunga Lunga road in Likoni division, Mombasa – Nairobi road in Changamwe division and Mombasa-Malindi road in Kisauni division. The sparsely populated area include Mwakiruge, Maungoja, Mwangala, and Makupa Jetty areas which are least developed in terms of infrastructure and found in the outskirts of the district.

Settlements within 1km from the western airport boundary



Sample encroachments on the airport land



Settlements and commercial features on the immediate western neighbourhhod of the airport grounds

5.4 Agriculture Activities

Agricultural activities account only for 5% of economic activities in the district and contribute to 1% of the district household income. The activities involved include farming of horticultural products mainly by the large scale farms while maize, cassava, rice, cowpeas and simsim are on small scale farms. Livestock rearing include cattle, sheep, goats, rabbits and poultry. There are no such activities in the urban areas including the project zone.

5.5 Urban Development

Mombasa city has a diverse economy based on trade and commerce, tourism and manufacturing. The industrial sector in Mombasa comprises of about 6 large and over 400 medium and small scale manufacturing enterprises. Trade liberalization and the decline in tourism have adversely affected a number of industries especially collapsing textiles and clothing, staff redundancy. The establishment of an export promotion zone has attracted some foreign and domestic investment and in which about 3000 people are employed. Industrial development is restricted by severe water shortages, frequent power failures,

insecurity and labour availability. Despite these problems local business class continues to invest in tourism, commerce, manufacturing, transport and real estates.

5.6 Institutional Aspects

Mombasa District has some tertiary institution which are not only important to the district but to the coast province and the country at large. Among the institutions include:-

(i) Mombasa Polytechnic in the Mombasa island,
(ii) Shanzu Teachers Training College in north coast,
(iii) Ten (10) Youth Polytechnics which are under utilized due to lack of equipment and qualified instructors spread through the district,
(iv) Government Training Institute (Mombasa),
(v) National Youth Service Technical College (Mombasa),
(vi) Others are secondary and primary schools, private colleges, etc.

5.7 Health and Safety

Public health in Mombasa is influenced by both human activities as well as environmental trends. Human settlement trends affect the general sanitation and hygiene due to clouding, poor housing and adequate water supply. Effectively, contamination of available water sources, air pollution and land contamination leads to outspread related diseases. Industrial development and operations are also increasing threats to health through emissions, waste discharge and noise.

On the other hand, environmental effects are associated with effect climatic variations such as global warming, sea water intrusion to fresh ground water sources, floods, etc. Air quality in Mombasa has been deteriorating overtime with increasing residential areas, commercial and industrial development, and particularly around the airport. It is notable that most point sources of aerial emissions are on the leeward side of the residential estates. Airport grounds are just to the west of the Kenya Port Authority, the Habour, the informal settlements, commercial sites and Municipal solid waste dumping grounds.

Moi International Airport, like a few other organizations in the district, has its own disaster management plan to deal with issues that would arise from its operations and accidents. Among the existing hardware include fire fighting station, coordinated security (internally and externally) and also and observatory systems (through KCAA) among other measures

5.8 Economic Issues

Mombasa city has a diverse economy based on trade and commerce, tourism and manufacturing. The industrial sector in Mombasa comprises several large and over 400 medium and small scale manufacturing enterprises. Trade liberalization and the decline in tourism have adversely affected a number of industries especially collapsing textiles and clothing, staff redundancy. The establishment of an export promotion zone has attracted some foreign and domestic investment and in which about 3,000 people are employed. Industrial development is restricted by severe water shortages, frequent power failures,

insecurity and labour availability. Despite these problems local business class continues to invest in tourism, commerce, manufacturing, transport and real estates.

5.8.1 Economic Activities

Following are important economic linkages with Moi International Airport;

(i) Mombasa is an important tourist destination in Kenya and the region. Availability of high class beach hotels and resorts has made the sector an economic focus in the area. This sector creates jobs in the tune of 40,000 and contributes about 48% of the total economic activities in the region. In addition the sector earns the country revenue through taxation as well as the much needed foreign exchange.

(ii) High level investment associated with tourism and business hub that is Mombasa city generates opportunities for employment, and particularly for the youth. These include stores, public transport, hotel and catering services, workshops and public service.

(iii) Moi International airport contributes opportunities and facilitation towards trade and industry growth and development of the district through ob creation, business opportunities. Almost half are engaged in agro-processing, with oil refineries cement and textiles and clothing.

(iv) Small scale and jua kali enterprises (SSJKE) with the modest capital investment, the sector are important in that it is dynamic creates employment, utilizes local resources employ simple technology and provide attractive priced products in the district.

(v) The transport sector include the railway system, the 2 ports (Kilindini and old port), the Moi International Airport and road transport within the district which include public service vehicles, taxis and "tuktuks". There are several transport firms that transport goods to the neighboring countries such as Uganda, Sudan, Rwanda and even Ethiopia.

Sample industrial facilities on the immediate eastern neighbourhood of the airport grounds

5.9 Cross Cutting Issues

5.9.1 Gender

There are more men than women at middle income levels in Mombasa as a result of migration patterns in search for employments. Women are generally under-represented in the economy although their participation has increased in the recent years, but disproportionately involved. Women own limited productive assets especially land and have limited access to credit. They also tend to be ignorant of their rights and thus exploited and discriminated against in economic activities, both in wage employment and business enterprises.

According to statistics from Kenya National chamber of commerce and Industry 60% of business members are men and 40% are women. Mombasa is a cosmopolitan city and among the various cultures only the Muslims allow girls to inherit property from their parents.

5.9.2 Poverty

The poverty index in the district is relatively high with a significant proportion of the population living below the absolute poverty level. The main causes of poverty in the district are landlessness, increasing and high cost of living, inaccessibility to credit facilities and high unemployment rate among the youth. Lack of technical entrepreneurial skills, low income, HIV/AIDS pandemic, discrimination and cultural practices also contribute to poverty levels. The underlying causes of poverty are poor resource management, poor governance, gender imbalance, ignorance and marginalization of the disadvantaged.

Landless poor squatting on airport land

5.9.3 HIV/AIDS

Mombasa is among the districts with high HIV/AIDS prevalence rates currently standing at 16% compared to the national average prevalence of 14%. The factors that are believed to be responsible for HIV/AIDS spread include poverty, breakdown of traditional upbringing, idleness and loose morals among the youth associated with rapid urbanization and tourism sector e.g. commercial sex, existence of negative tribal, marital, cultural values like wife inheritance and early marriages which has contributed to early divorces and separation, early sexual exposure due to peer groups influence, inadequate parental advice, women having no control of their sexual protective methods and increased drug abuse.

CHAPTER 6: STAKEHOLDER CONSULTATIONS

6.1 Initial Consultations

The project report exercise involves limited consultations with stakeholders, both within the airport grounds and the surrounding area. Among the sentiments are briefly outlined below;

Mr. Daniel Mbugua (Head of Environmental Division)
In an initial meeting with the head of environment division at KAA, the following observations were made in regard to the rehabilitation works

(i) There should be focus on environmental influencing factors associated with the works including solid waste management, disposal of over burden (spoil disposal) emissions and discharging surface runoff,
(ii) Health and safety issues (public and occupational) should be addressed such as to include noise, accidents and other incidents control, sanitations and security during construction,
(iii) Management of storm water with respect to soil erosion, pollution transport to the external sources of water and the marine ecosystem should be considered with respect to long term control of pollutants from the airport operations,
(iv) Oils spills from point sources around the airport, including construction equipment and camp sites could also be of concern to the environment,
(v) Accumulation of rubber dust on the runways could be an environmental concern in the long term and require considerations in the rehabilitation design. This is, however, a worldwide concern,
(vi) While focusing on the environmental issues during construction, linkages with the long term operations to the environment and social aspects should not be ignored in the management plan

Mr. Yatich (Airport Manager)
The Airport Manager reported that the airport had been provided with an elaborated storm water drainage system but it seems to have structurally failed as well as getting compromised by surface runoff discharging into the airport grounds from the neigbouring estates. Noting that there are no documented in-house environmental management procedures, Mr. Yatich indicated that KAA has adopted the ICAO guidelines in her aerodromes and airport operations (more specifically annex 14).

Regarding the proposed rehabilitation works, the Manager expressed the wish that a comprehensive management plan would be established such as to address the neighbourhood interaction, and specifically Jomvu Kuu residential estates and the commercial facilities on the northern and western end of the airport grounds. The airport is also faced with a number of other social challenges most of which could be addressed in the long term outside the rehabilitation project. A comprehensive airport master plan is envisaged to address most of the integrated environmental and social concerns.

Blue Sea Services (Representative)
Blue Sea Services was engaged to ensure bush clearance (cutting grass within the airport grounds) and maintain seedlings planted around the facility. The company was also expected to ensure that all drains around the premises are maintained clear and clean. Their services are, however, limited to the inside area, and external bushes and drains are not part of this assignment. This was confirmed by a visit to the areas around the airport grounds.

Mr. Mwangi (Airport Engineer)
While confirming that sections of the airport drains have failed, Mr. Mwangi observed the problem facing the grounds from neighbouring areas. Surface runoff from Jomvu Kuu estates and other areas had not been catered for in the drainage design of the airport. This leaves such runoff to stagnate around the airport with potential threat to the pavements and the ground stability.

Invasion of parts of the airport grounds by the local communities, low ownership appreciation of airport facility by the local communities and encroachments by the residents into the airport fences are among the hindrances to effective drainage as well as risks of safety and security. This seems to significantly strain the co-existence of the airport and the neighbouring communities.

Mr. Mwangi Confirmed full support and required facilitation from his office to the construction and supervision activities, among them ensuring implementation of safety measures around the airport grounds.

6.2 Comments on PDR Presentation

During a presentation of the preliminary design report on 29th September 2008 in Nairobi, the following sentiments closely related to the environmental aspects were registered (attendance list is in annex VII).

(i) There was a request to drain the Mombasa – Nairobi highway through the airport grounds. This was, however, noted to be a risk to further destabilization of the airport grounds. The road could channel storm water through the natural drain to the north to discharge into Port Tudor via the Tudor Creek,
(ii) There are significant social issues relating to the airport with encroachments to the perimeter fences and squatters on the drainage outfall slopes on the south and western side of the airport. This issue need to be addressed in the long term outside this rehabilitation project,
(iii) Future expansions of the airport grounds and addition of extra components that are expected to have adverse social implications will be studied in the anticipated airport master plan. However, no details of the planned master plan are available at the moment since it is being formulated,
(iv) Climatic conditions are highly variable in the region implying ground water levels are likely to fluctuate over time. Design flood return period for drainage, therefore, not be stringent.

6.3 Stakeholders Meeting

Stakeholders were invited to a meeting at the Airport Managers office at MIA in Mombasa on 21st October 2008. Among the issues raised at the meeting in relation to environment and social issues are as follows;

(i) Squatters sitting on airport land are being evacuated to enable rehabilitation of the slopes and improvement of the outfall channels. All participants seemed to be in agreement on this action,

(ii) KAA will need to establish appropriate policies and guidelines to guide operators in the environment and social initiatives in their respective areas of operation,

(iii) The proposed improvement of pavements and drainage should also take into consideration point sources of environmental pollution such as to provide appropriate access and drains as well as related pollution control components.

(iv) There are security issues associated with the neighbourhood. Lack of a security buffer and encroachment onto the perimeter fence is perhaps one significant cause of this situation. There are numerous illegal entries into the airport grounds.

(v) The Mombasa City Council is in the process of providing sewer services in the airport area. Phase I of the project covered upto port Reitz estate while phase II is expected to extend upto Jomvu Kuu estate. It is at this stage that the airport could get connected. It was, however, observed that traditionally local people tends to prefer discharging sewage into open drains.

CHAPTER 7: ANTICIPATED IMPACTS AND MITIGATION MEASURES

7.1 An Overview

Physical inspection the airport with respect to the environmental aspects provided an opportunity to identify the preliminary anticipated implications of the rehabilitation project to the environment and social setting within and immediate neighbourhood of the airport. This being an existing facility, some or all of the impacts has already manifested themselves in the area in form of drainage efficiency and emissions. The following sections present an outline of the impacts anticipates from this project.

7.2 Specific Environmental Implications

7.2.1 Water Sources

Surface runoff from the airport is likely to be a mixture of pollutants emanating from various drained points. Among the potential pollution sources include;

(i) Construction activities could contribution to the above impacts through siltations (during earth moving, material delivery and fills) as well as spills from construction machinery may temporarily enhance these impacts,

(ii) Domestic sewage running from Jomvu Kuu residential houses discharging onto the airport grounds on the northwestern end of the main runway. Part of the sewage collects into a drain discharging through outfall no. 1 point while the other part percolates into the ground. This is an existing situation and has the potential of polluting surface and sub-surface water sources on the entire western side of the airport grounds,

(iii) Pavements dust and litter (grass, plastics, rubber and papers) is washed down the three main outfalls and could pollute surface runoff. While there is no flowing stream around the facility, storm water emanating from the airport grounds could carry the pollutants into sub-surface water sources. Contribution to undesirable depositions of solid materials into Port Reitz would, however, be minimal compared to other sources in the area, but ecosystems at the drainage mouths could be affected significantly,

(iv) Oil and grease from workshops and other machine service areas is directly discharged into open drains. This is an ongoing concern and has got the potential to contaminate surface and sub-surface water sources west of the airport and downstream of Jomvu Kuu estate. Oil and grease wastes are considered hazardous to the environment and have potential to interfere with the marine ecosystems in Port Reitz, especially at the drainage mouths,

(v) Groundwater within and around the airport is relatively shallow at between 20m – 30m. Given the porosity of the local soils, it then appears infiltration of contaminated water into the shallow aquifers is highly likely. Domestic sewage and oil residuals found flowing from Jomvu Kuu estate and surface support areas are threats to ground water sources.

Mitigation Measures

Protection of water sources within and around the airport ground should be a factor in the pavement and drainage rehabilitation.

(i) Provide as part of the rehabilitation, a cut cut-off drain along the northern and western section of the airport to intercept the surface and sub-surface runoff emanating from Jomvu Kuu estate, commercial activities to the north (including Doshi Premises) and Magongo estates.
(ii) Provide adequate drainage for the surface water holding areas including (wet areas near the KCAA observatory station, a western section along the western end of the main runway, sections between near the radar.
(iii) Provide workshops, equipment service bays and identified waste holding of pollution with appropriate drains linking the main drainage system. The drains should, however, be fitted with appropriate oil/grease interceptors as well as chambers for grit removal,
(iv) The contractor should ensure construction equipments are serviced on approved locations and replaced parts and scrap oils disposed off in approved disposal sites.

7.2.2 Solid Waste Disposal

The absence of a harmonized solid waste management among the operators within and around the airport seems to have notable negative influence on waste pathways. KAA has established own waste holding yard from where it is burned at a remote schedule location within the airport. All other operators remove their waste for dumping at the municipal council grounds. Impacts anticipated from poor solid waste management include;

(i) Wastes from construction activities (spoil earth, old asphalt concrete wastes, machine parts, excess construction materials, etc.) will mainly create aesthetic nuisance around the airport,
(ii) Aesthetic pollution where waste and scrap materials are heaped in piles near the points of generation. Areas of impact include waste holding yard such as Kenya Aerotech and Eurocraft Services yard (scrap oil filters and other vehicle parts), freight terminal areas (packaging materials, floor sweepings, etc.), Benair Engineering (motor oil bottles, food wrappers, old aircraft bodies and tyres, etc.),
(iii) Dumping solid waste from the airport sources without sorting into categories (plastics, papers, and organic matter) is likely to complicate the management of the public dumping grounds. While contribution to this situation is negligible, it would be necessary to streamline in-house waste management,
(iv) Accumulation of solid wastes at near point sources or in drains could create suitable locations for birds and other pests and hence threats to aviation safety (potential bird strikes),
(v) Scrap metal (metal frames, scrap vehicle bodies, aircraft bodies are both a visual nuisance and also potential breeding joints for pests and vector insects.
(vi) Holding grounds for solid wastes stand on open ground and accumulation of wastes (e.g. oil filters, grease, packaging materials, etc.) has a potential to

directly contaminate the shallow ground water sources around the airport and surface water sources,

(vii) Leachate from waste holding points could contaminate surface runoff and hence external surface and sub-surface water sources.

Mitigation Measures

Solid waste management should be addressed in both pavement and drainage rehabilitation options, among other issues being;

(i) Impress upon all operators within the airport grounds to provide suitably designed waste holding platforms with appropriate drainage linkages and components as well easy accessibility for waste removals,

(ii) Establish appropriate mechanism for a uniform waste handling by all operators within the airport with a view to ultimately structuring a joint removal procedure that then should be provided for in the rehabilitation design,

(iii) Waste holding yards (KAA waste holding house, Kenya Aerotech ltd., Eurocraft Services, Benair Engineering area) will need to be slabbed and appropriately drained,

(iv) Encourage a harmonized airport-wide environment procedures including waste management, waste water disposal, utilization of drains, oil/grease handling other aspects. This will ensure maximum benefit from the rehabilitation works.

(v) The contractor will be required to hold all waste generated into a pre-identified location for safe removal and disposal,

(vi) KAA to undertake a comprehensive waste audit of the airport in the long term – see EM action plan

7.2.3 Soil Loss

The proposed rehabilitation works may not have implications in this regard since there are minimal excavations. However, notable loss of soil and land degradation on the western and southern slopes of the airport is caused by poor drainage systems. Runoff from airport grounds is channeled into narrow channels drains that apparently have not been well reinforced at the outfall. The high hydraulic pressure so created is enough to push down the un-cohesive soils. The situation is enhanced by subsurface and stagnant water pools along the eastern boundary that infiltrating towards the lower areas causing further weaknesses to the soil base.

Mitigation Measures

While there might not be significant soil loss from the main grounds, the following actions would be necessary for parts around the facility;

(i) Redesign the external drains to incorporate concrete slabs (in place of the hard core gabions) to check on thefts and also enhance structural stability,

(ii) Provide for wider drainage outfall channels to reduce the hydraulic force of the storm water on the slope and hence check soil erosion,

(iii) The contractor to be advised to initiate tree planting on the entire slope belt after the drainage construction, preferably with deep rooted but short indigenous trees. KAA to enhance this in the long term.

(iv) The entire area on the western side of the airport belong to KAA should be fenced off to prevent any further encroachments and undermining of soil compaction and stability through removal of vegetation cover.

7.2.4 Aerial Emissions

The construction activities are not expected to have significant impacts in this regard. The most probable point sources of aerial emissions are the Moi International Airport refueling yards and the aircrafts that generate hydrocarbons, CO_2 and particulate matter. It be estimated that with an average traffic of 23,373 flights (various categories), CO_2, nitrogen sulphur oxides and hydrocarbons would be expected to be emitted (no quantification was undertaken under this assessment). While this may not have notable implications to the immediate environment and people, the global implications cannot be ignored. A detailed investigation on air pollution levels associated with aviation and how far it reaches cannot be achieved under this study.

Mitigation Measure

Aerial emissions can only be addressed on a long term basis such as to cover;

(i) The contractor will be prevailed upon to keep emissions at the lowest at the airport as well the materials site locations,

(ii) Contractor to deliver and store materials covered at all times to ensure minimal emission of associated dust into the atmosphere,

(iii) Contractor to maintain machinery and equipment in good conditions at all times to ensure minimal exhaust emissions,

(iv) KAA to undertake an air quality audit (or combined in waste management audit) in the long term – see the environmental management action plans.

7.2.5 Noise Levels

Noise is perhaps one of the main social concerns at and around the airport grounds. Construction machineries are not expected to generate significant noise levels to the neighbourhood, but could be notable to the construction workers. Currently, the major aircraft landing and takeoff corridor runs over least three residential estates (Jomvu Kuu and Miritini on the west, a new upcoming estate to the north of the runway, Magongo and sections of Mikindani to the east. Though noise levels have not been monitored, it is expected to be relatively high, especially considering that the airport is most active when residents are in their houses (early mornings and late evenings).

Other sources of noise include vehicles accessing the airport and passing around the grounds, ground service equipments, ground maintenance machineries and power generators. However, these sources are not expected to have significant contributions to the immediate neighbourhood receptors due to the notable distances.

Mitigation Measure

Aerial emissions can only be addressed on a long term basis such as to cover;

(i) Ensure minimal noise form the construction machinery and equipment, through maintenance,
(ii) Protect construction workers from excessive noise through provision of safety gear,
(iii) Construction activities near residential areas to be undertaken only during the day,
(iv) KAA to undertake noise mapping exercise around the airport in the long run.

7.2.6 Drainage System

The current status of the drainage system is as described earlier on the report and is among the focus of this rehabilitation works. The construction works are likely to temporarily interfere with the drainage system through blockage and diversions that may lead to temporary flooding. Routine activities at the operators locations are also likely to be disrupted as the areas are provided with drainage connections. Material residuals from the construction activities (silt, oil/grease, wrappers, etc.) might also be discharged into the open drain sections and washed to externals environmental receptors.

Mitigation Measures

The drain design review and construction should take into consideration the following aspects;

(i) All the pavement MUST be provided with adequate, easy to clean and maintain drains to be channeled into the main drainage systems towards the existing outfalls (currently, some pavement sections are discharging into the unpaved land creating the wet areas see (ii) above).
(ii) Every drain discharging from an operators yard as well as upstream of all outfalls should be fitted with a grit chamber,
(iii) Drains from point sources of oil/grease (Kenya Aerotech and Eurocraft services yards, refueling yards, Benair Engineering, the fire station and the aprons MUST be fitted with appropriate oil/grease interceptors. It will also be preferable to provide an appropriate waste oil/grease storage unit (this is a hazardous material and should be handed with caution),

(iv) The outfall drains should be designed such as to reduce the hydraulic pressure created by the total surface runoff from the airport grounds. This will reduce the risk to the un-cohesive soils along the steep slopes.

(v) Provide cutoff drains along the major pavements to check the sub-surface water will also be reduced from the cut-off deep drains and hence reduced risk of land slide along the area.

(vi) Enhance use of partially covered drains to reduce possibilities of bird activities within or around the airport.

7.2.7 Material Sites

Sources of construction materials including hard stones, gravel and sand are outside the project area. Hard stone and gravel abstraction will involve quarrying and excavations with notable earth moving to expose the material deposits. Sources of sand are either at the foothills, river beds and mouths or on valleys. Transportation of the materials to the airport also has significant linkage with social and environmental aspects of the affected areas. This implies varying implications such as;

(i) Soil erosion,
(ii) Loss of vegetation from the sites,
(iii) Land degradation at the sources and along the delivery routes,
(iv) Safety risks around the material sites (significant at the quarries and gravel sources) from accidental falls, use of explosives, unauthorized access by members of public,
(v) Damages and siltation to river beds,
(vi) Air pollution from dust emissions and discharges from excavation machinery and hard stone crushing,
(vii) Noise from extraction machinery to the neighbouring residents and along the delivery routes,
(viii) Potential safety risks to road users from material delivery trucks,
(ix) Emissions from onsite material holding and preparation points within the airport grounds.
(x) Risks to safety associated with the material pits during and after extraction,
(xi) Demand on water supplies from construction requirements.

Mitigation Measures

Sources of materials should addressed from a conservation and social responsibility basis.

(i) Appropriate agreements will require to be completed between the contractor and affected landowners on the material sites with regard to modes of extraction, duration of extraction and responsibilities on rehabilitation,

(ii) Fence the material sites during extractions and thereafter until appropriate rehabilitation has been accomplished,

(iii) The contractor to provide material delivery drivers with necessary awareness and precautions on road safety,
(iv) Materials delivery trucks to be covered at all times,
(v) Hard stone crushing process is done under dump conditions as much as possible.
(vi) Material storage at the airport be maintained covered or dump at all times,
(vii) Establish self sustenance with in-house water sources for construction,
(viii) The contractor to provide a rehabilitation plan of the material sites, irrespective of who will do it.

7.3 Specific Social Implications

7.3.1 Health and Safety

The proposed works are not expected to have significant direct implications on the health and safety of the immediate neighbourhood. Mild effects associated with dust and emissions from the construction activities will be temporary and will easily be mitigated. There are, however, notable concerns on the current operations in the airport to the residents, but are not associated with the proposed works. A rapid evaluation of these aspects revealed the following impacts that are, however, universal in airports operations worldwide;

(i) Residents of Jomvu and Magongo estates together with the people operating business as well as airport workers suffer high noise levels (not measured in this assessment) on both landings and takeoff. High peak hours are usually in the morning (6 – 9am) and evening (5 – 9pm), both times residents are basically at home. This mainly affects the immediate residents and institutions (not quantified).
(ii) Vibrations from aircraft engines and ground contacts have potential risks to the stability of buildings in the immediate neighbourhood. This possibility could be followed in a noise audit and mapping exercise.
(iii) Emission from aircrafts, on landing and takeoff could affect people for an area spanning upto 12km radius. These are the two occasions when the aircraft burns tons of fuels and hence the emissions. Affected areas in this regard, therefore, include the immediate residential estates and institutions (Jomvu, Magongo, Miritini, Changamwe, Chaani, Mikindani and Port Reitz) as well as the western side of Mombasa city and areas to the west of the airport, its landing funnel and the takeoff corridor. The level of emissions, however, cannot be quantified under this report.
(iv) Safety is a key factor in relation to aircraft operations as well as ground activities at the airport. The approach funnel is greatly encroached by informal settlements whose safety is at high risk from the approaching aircrafts. Residents of Jomvu and Magongo though a little far placed from the runway corridors also are at risk in the event of an aircraft accident. Road users along the Mombasa Nairobi highway that is just less than 100m from the runway are at safety risk.

CHAPTER 8: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

8.1 EMP Principles

Environmental management Plan (EMP) is developed as a tool to facilitate integration of proposed impact mitigation measures into the project implementation and operation thereafter. The plan is guided by the defined project objectives along with the overall corporate strategies and policies on environment management. The Kenya Airport Authorities (KAA) has established an environmental division whose responsibilities encompassed providing advice to the Management on a holistic environmental management with a focus on functions across the entire organization. The current main responsibilities of the environmental division include,

(i) To ensure that KAA adheres to all environmental related requirements and regulations in her operations.
(ii) To advise KAA projects implementation on environmental integration and implementation.
(iii) Integrate local and international guidelines for new projects and ongoing airport management, e.g. ICAO into operations.

In view of the above responsibilities, the key guiding principles this EMP during the proposed rehabilitation works at MIA are;

(i) The works are confined within the airport grounds implying no direct interaction with the surrounding communities and economic activities. Delivery of construction materials, however, may have effects to the external social and environmental setting along the delivery routes.
(ii) There are existing direct linkages of pavements to point sources of environmental pollution such as to include contaminated surface runoff and lack of appropriate connection to the nearest open drains.
(iii) Drainage system around the airport could provide a pathway of pollutants from in-house sources to the external environments including the sea water.
(iv) Aerial emissions from construction works (earth moving, material management and machinery operations) will have direct implications with settlements to west (Jomvu Kuu and Miritini estates).
(v) There are environmental issues associated to the airport operations and the rehabilitation area that should be implemented in the long term.

8.2 EMP Implementation

Mitigation of negative impacts from the rehabilitation works is based on established action plans with clear responsibilities, defined timeframes and cost estimates as well as appropriate monitoring indicators. Specific actions shall be defined such as to cover the construction and post-completion phases of the project. While appreciating the positive impacts of this rehabilitation works and that are being enhanced in the design, this EMP will only address the negative aspects that require preventive measures.

8.3 Proposed Actions

8.3.1 Waste Management (solids)

Anticipated Impacts:

(i) Aesthetic pollution to the workers, visitors and travelers,
(ii) Soil contamination at points of waste generation (points at the Kenya Aerotech Ltd., Eurocraft Services, Refueling Yard and Benair Engineering among others,
(iii) Blockage of drains at various locations around the grounds,
(iv) Pests breeding and attraction of birds with safety risks to aircrafts.
(v) Surface runoff from waste holding locations,
(vi) Pollution of surface runoff and external water sources.

Immediate Preventive Measures;

(i) All operators established designed in-house solid waste holding platforms/bins
(ii) The platforms bins are provided with appropriate drains for any leachates or related runoff.
(iii) Waste generators to define their waste flow paths within the airport grounds

Medium term Preventive Measures:

(i) KAA coordinate operators into a harmonized solid waste collection, storage and off-site transfer and disposal,
(ii) Undertake waste management audit for the entire airport,
(iii) Ensure no solid wastes enter the open drains.

Long term Preventive Measures

(i) Establish a waste management guideline for all operators,
(ii) Provide new compliance schedule
(iii) Undertake annual airport wide waste audit,
(iv) Establish and operationalsie a waste management strategy for the airport.

8.3.2 Drainage Management

Anticipated Impacts

(i) Inflow of contaminated surface runoff from the neighbouring estates, polluting in-house runoff. Soil contamination and risks to people's health
(ii) Discharge of pollutants from in-house sources comprising oil/grease, polluted leachate, solid residuals, etc
(iii) Discharge of pollutants through drains to external water receptors including the sea. Risks to health of residents
(iv) Low carrying capacity of external drains by design and maintenance. Land slides and soils loss.

Immediate Preventive Measures:

(i) Consider a cutoff drain along the northern end of the airport grounds and discharge towards the outfall no.1,

(ii) Provide drains from point pollution sources into the main drain among them Kenya Aerotech Limited, Eurocraft Services, refueling yard, KAA waste holding, KAF, NAS and Benair Engineering. Fit all drains at waste discharge points with oil interception and grit chambers,
(iii) Design wider drains for external discharge of storm water from the airport ground
(iv) Drain out all low lying ponding sections,
(v) No machines should be serviced on the pavement. Specific attention to Kenya Aerotect Limited and Eurocraft Services who should provide appropriately designed platforms within their workshop yards.

Medium term Preventive Measures:

(i) Liaise with the Mombasa City Council on upgrading and maintenance of the drainage systems around the airport grounds, particularly in Jomvu Kuu and Magongo areas,
(ii) Engage all in-house operators on the airside on the management of their liquid effluents and their respective surface runoff,
(iii) Extend drainage management services to the outfalls and maintain external sections clear.

Long term Preventive Measures

(i) Establish a guiding regulation or rules to be followed by all operators in regard to discharges into the drainage systems,
(ii) Monitor factors affecting drainage within the airport for prompt attention (sub-surface water, surface runoff inflows and defective drains),
(iii) Ensure operators respects drainage systems through established compliance audit schedules

8.3.3 Removal of Vegetation Cover

Anticipated Impacts

(i) Removal of grass cover along the affected pavements,
(ii) Clearance of bushes for drainage construction at the outfalls,
(iii) Risk of birds strikes (if tall trees are introduced providing habitants).

Immediate Measures

(i) Reintroduce grass cover around the construction areas,
(ii) Introduce low shrubs on the airport edges in the airside,
(iii) Plant indigenous (preferably short species) deep rooted trees at the drainage outfalls.
(iv) Encourage airside operators to participate in sustained and appropriate vegetation of the airport grounds.
(v) Enhance safety of the vegetation from destruction by neighbours and their livestock.

Long Term Measures:

(i) Maintain all wooded vegetation short (select indigenous deep rooted species)
(ii) Liaise with neighbouring landowners on planting trees that are also safe to airport operations.

8.3.4 Social Issues, Health and Safety

Anticipated Impacts

(i) Risk of safety to the rehabilitation workers from construction machinery,
(ii) Risk to airport intruders from neighbouring communities during and after construction works,
(iii) Elevated occupational and health noise levels to receptors (workers, travelers, operators and neighbourhoods),
(iv) Elevated aerial emissions into the neighbourhood,
(v) Safety risks to residents along the landing approach funnel,
(vi) Risks to aircrafts and passengers over the landing approach route
(vii) Safety risks of residents along the airport boundaries (Jomvu Kuu and Magongo estates,
(viii) Risks of residents below the drainage outfalls (landslides),

Immediate Preventive Measures:

(i) Ensure the constructor applies all safety requirements and necessary information for both workers and airport users,
(ii) Close and monitor all loose illegal entries into the airport grounds during and after the construction
(iii) Enhance security surveillance during the construction,
(iv) Airport safety measures to be enforced at all times,

Short Terms Measures

(i) Develop a social approach strategy for a harmonious co-existence with the local communities,
(ii) Establish key social linkages of the proposed works and airport operations thereafter,
(iii) Initiate social education on safety aspects associated with the airport operations for enhanced appreciation.
(iv) Involve the local communities in maintaining the drainage outfalls for enhanced ownership and responsibility.
(v) Initiate a process of occupational health and safety measures including air quality measurements, noise measurements and fire safety audits, etc.,

Long Term Measures

(i) Create a buffer zone (~50m) between the airport ground and the neighbouring residents. This might require necessary acquisition of the land following appropriate consultations with stakeholders.
(ii) Install a double secured fence is recommended around the airport grounds,
(iii) Consult with local authorities on land use compatibility in the area for enhanced safety of the airport and its users,

(iv) Aircraft related noise effects to the neighbouring residents be addressed
(v) Evacuation of all residents inhabiting the landing approach funnel for their safety, safety of the aircrafts and passengers. Support for other relevant arms of the government (Administration, Security, Lands office, Environment, Local Government the City Council, etc.) may be necessary. Certain investments may be involved in this exercise.

8.3.5 Material Sites

Anticipated Impacts

(i) Degradation of the land surrounding the material sites and the access roads by delivery trucks,
(ii) Vegetation removal at material sites and access paths,
(iii) Aerial emissions (dust particulate matter, engine exhaust emissions) into the neighbouring communities,
(iv) Elevated noise levels to the neighbouring areas,
(v) Potential road accidents associated with delivery trucks,
(vi) Open pits left upon completion of the works,
(vii) Dust emissions from delivery trucks en-route to the airport,
(viii) Aesthetic obstructions at materials holding points within the airport grounds.

Immediate Mitigation Measures

(i) Engage material site owners on agreements regarding responsibilities of material sites responsibilities upon completion of works,
(ii) The Contractor(s) to rehabilitate the material site if agreements says so,
(iii) Consult operators in the airport on the most acceptable location for material holding,
(iv) Material extraction methods should not pose safety risks to the neighbouring communities. Necessary information and awareness shall be furnished to the neighbourhood at all times,
(v) Materials shall always be covered while on transit and maintained so at the site of construction to prevent dust emissions,
(vi) Driver safety and road courtesy shall always be ensured by truck drivers delivering materials for the construction works.
(vii) Materials debris shall be removed for safe disposal upon completion of the works.

8.3.6 Compliance

In order to ensure full compliance with necessary environmental and social requirements, the following will be necessary;

(i) An intensive supervision will be necessary,
(ii) In this regard, the contractor will need to be provided with the environmental management plan as well as the legal provisions as outlined in this report.
(iii) The environmental division will also need to develop a legal register to enable evaluate the level of compliance at all times,

(iv) A completion report will be prepared at the conclusion of the rehabilitation works,
(v) The rehabilitated facilities will be included in the annual environmental audit of the airport thereafter.

8.4 Action Plan

Table 2: Management Action Matrix

Item	Item Description	Timeframe	Responsibility Cost Estimate (KShs.)	Remarks
1	Waste Management	**Immediate Actions (During construction):** ▪ Waste management facilities at operator sites ▪ Provide link drains ▪ Waste generator involvement	▪ KAA (Engineering) ▪ The Airport Manager/Engineer, ▪ Contractor ▪ Operators ▪ Design Engineers **Costs be part of the project costs**	▪ There is need for collective decision by the all the players to ensure provisions of necessary provisions with respect to drainage and linkages to the pavements. ▪ Initial waste management audit and subsequent environmental annual audits will facilitate the implementation of a waste management strategy ▪ The linkages between waste management, the pavements and drainage systems should be appreciated at all times.
		Medium Term Actions (1 years upon completion of works): ▪ Waste management audit ▪ Harmonized waste management ▪ Waste segregation	▪ KAA (Environmental Division) ▪ The Airport Management ▪ Operators	
		Long Term Actions (Upto 3 years) ▪ Waste management guidelines, ▪ Compliance ▪ Operationalise waste management strategy	**~KShs. 5M (However, Airport Operators to meet own costs on installations and audits)**	
2	Drainage Management	**Immediate Actions (During construction):** ▪ Surface and sub-surface drains including a cut-off drain), ▪ Drains from point pollution	▪ KAA (Engineering), ▪ Airport Manager, ▪ Airport Engineer) ▪ Design Engineer	▪ Drainage is a facility that should reach all parts of the airport. All operators should be provided with drainage link to all operation points

Item	Item Description	Timeframe	Responsibility Cost Estimate (KShs.)	Remarks
		short and deep rooted, ▪ Enhance community liaison for vegetation maintenance	monitor) **~KShs. 1.5M annually in outsourced services.**	together.
4	Social, Health and Safety	**Immediate Actions (During construction):** ▪ Application of health safety requirements, ▪ Linkages with surrounding communities, ▪ Address illegal entries ▪ Security during construction,	▪ KAA (Safety Division) ▪ Airport Management ▪ Contractor ▪ Operators ▪ Security Agents	There should be extra safety and security precautions during the construction period
		Medium Term Actions (1 year upon completion of works): ▪ Enhance coexistence with surrounding communities (enhanced CSR), ▪ Involve communities on drainage maintenance, ▪ Undertake occupational and environmental health and safety audits. ▪ Map air quality and noise contours around the airport	▪ KAA (Safety Division) ▪ KAA Corporate Office ▪ Airport Management ▪ Security Agents ▪ Local administration and ▪ Local Leadership. ▪ NEMA (may monitor)	A comprehensive strategy on social issues is required at the KAA policy level to guide all aerodromes in the country on social interactions. A budget line needs to be developed for this item.
		Long Term Actions (Upto 5 years) ▪ Collaborate on a safety/security buffer around the airport ▪ Influence land use trends around the airport ▪ Address noise related issues.	**No direct cost estimates**	

Item	Item Description	Timeframe	Responsibility Cost Estimate (KShs.)	Remarks
5	Material Sites	**Immediate Actions (During construction):** ▪ Identification of material sites ▪ Environmental impact assessment reports on material sites ▪ Safety precautions during material extractions and transportation, ▪ Material handling at the airport ▪ Construction waste material management ▪ Contract on materials sites rehabilitation.	▪ Contractor ▪ Material site land owners, ▪ KAA (Environmental Division) ▪ KAA (Corporate Office), ▪ KAA (Engineering) ▪ NEMA (may monitor situation)	Material sites had not been identified and confirmed at the time of this assessment. Broad areas are, however, known. EIA report will be necessary for the specific sites when identified.
		Medium Term Actions (Upon completion of works): ▪ All material sites be decommissioned and rehabilitated ▪ Monitoring	**No costs estimates at this stage**	
6	Compliance	**Continuous** ▪ Project Supervision ▪ Contractor's work plan based on this EMP ▪ Compliance monitoring ▪ Material site rehabilitation report ▪ Project completion report ▪ Environmental audits, ▪ Legal register.	▪ KAA (Environmental Division), ▪ KAA (Engineering), ▪ Airport Management, ▪ Contractor, ▪ Material sites landowners ▪ NEMA **No direct costs estimates**	

CHAPTER 9: POLICY AND LEGAL FRAMEWORK

9.1 Policy Guidelines

The guiding principle in District Development Plan (2002 – 2008) is the theme of the 9th National Development Plan "Effective Management for Sustainable Economic Growth and Poverty Reduction". The plan identifies the important roles to be played by all sectors in priority setting to spur sustainable economic growth and poverty reduction. In this regard, the roads department undertakes to give priority to maintenance and rehabilitate existing road network while providing new projects (upgrading and modernizing) for filling critical supply gaps for improved efficiency in economic development.

According to the Kenya National Environment Action Plan (NEAP, 1994) the Government recognized the negative impacts on ecosystems emanating from economic and social development programmes that disregarded environmental sustainability. Following on this, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished and/or are in the process of development. The NEAP process introduced environmental assessments in the country culminating into the development of the sessional paper no. 6 on Environment and Development.

9.2 Selected National Policies

9.2.1 National Environmental Action Plan (NEAP)

The NEAP for Kenya was prepared in mid 1990s. It was a deliberate policy effort aimed at integrating environmental considerations into the country's economic and social development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and conservation of natural resources are integral part of societal decision-making. The NEAP also established the process of identifying environmental problems and issues, raising awareness, building national consensus, defining policies, legislation and institutional needs, and planning environmental projects. An Environmental Action Plan for Arid and Semi-arid Lands (ASAL) and District-specific Environmental Action Plans for 24 ASAL districts were also formulated and formed part of the building block to the NEAP.

9.2.2 Environment and Development (Sessional Paper No. 6 of 1999)

The paper, now being developed into a full policy on environment, presents broad categories of development issues that require sustainable approach The paper harmonizes environmental and developmental objectives so as to ensure sustainability. The paper provides comprehensive guidelines and strategies for government action regarding environment and development. With regard to wildlife, the policy reemphasizes the aims of the Wildlife Policy of 1976 and especially the government's commitment towards involving local communities and other stakeholders in wildlife conservation and management, as well as developing mechanisms that allow them to benefit from the resource. The paper also

advocates for the establishment of zones that allow for the multiple use and management of wildlife.

9.2.3 The National Biodiversity Strategy

The overall objective of the National Biodiversity Strategy and Action Plan (NBSAP) is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity (CBD). It is a national framework of action to ensure that the present rate of biodiversity loss is reversed and the present levels of biological resources are maintained at sustainable levels for posterity. The general objectives of the strategy are to conserve Kenya's biodiversity to sustainably use its components; to fairly and equitably share the benefits arising from the utilization of biological resources among the stakeholders; and to enhance technical and scientific cooperation nationally and internationally, including the exchange of information in support of biological conservation.

9.2.4 The National Poverty Eradication Plan (NPEP) and the Poverty Reduction Strategies Paper (PRSP)

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

The NPEP emphasizes the empowerment of poor people and their communities to better manage their resources for collective advancement. The PRSP has the twin objectives of poverty reduction and economic growth. The paper articulates Kenya's commitment and approach to fighting poverty, with the basic rationale that the war against poverty cannot be won without participation of the poor themselves. Any development project that incorporates these strategies in its plans is most welcome in Kenya.

9.3 Legal Statutes

9.3.1 The Environmental Management and Coordination Act, 1999

Part II of the Environment Management & Coordination Act, 1999 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. In order to ensure that this is achieved, part VII section 68 of the same Act directs that any operator of any undertaking should carry out an environmental audit and prepare an appropriate report for submission to the National Environmental Management Authority (NEMA), who in turn may issue a license as appropriate. The

second schedule of the same Act lists proposed recreation facilities development activities (lodges and hotels) as among the facilities that must undergo annual environmental audits.

Part V section 42, subsection 1 directs that no person shall among others deposit any substance in a lake, river or wetland or under its bed if the substance will have adverse environmental effect on the river, lake or wetland. Section 44 requires that NEMA develop, issue and implement regulations, guidelines and measures for sustainable use of hill sides, hill tops and mountain area to control harvesting natural resources located in such areas among other activities

According to section 51, NEMA will in consultation with relevant Lead Agencies prescribe suitable measures to ensure the conservation of biological resources and shall issue guidelines pertaining to sustainable conservation of these resources such as the selection and management of protected areas, land use methods that are compatible with the conservation of biological diversity and selection and management of buffer zones near protected areas.

9.3.2 Environmental Impact Assessment Regulations

The environmental audit guidelines require that assessment be conducted in accordance with the issues spelt out in the second and third schedules of the regulations. These include coverage of the aspects on schedule 2 (ecological, social, landscape, land use and water considerations) and general guidelines on schedule 3 (impacts and their sources, project details, national legislation, mitigation measures, a management plan and environmental auditing schedules and procedures.

To facilitate implementation of the law, regulations on Environmental Impact Assessment (EIA) and Environmental Audits (EA) have been established under Legal Notice 101, of Kenya Gazette Supplement No. 56 of 13th June 2003. Besides this, a number of other national policies and legal statutes have been reviewed to enhance environmental sustainability in development projects across all sectors. Some of the policy and legal provisions are briefly presented in the following sub-sections

9.3.3 The Water Act (Cap. 372)

This Act regulates abstraction of water from all sources. Also it prohibits pollution of water. Part II, Section 3 states "every water resource is hereby vested in the state, subject to any rights of use granted by or under the Act or any other law". Section 18 provides for national monitoring and information systems on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority to demand from any person, specified information, documents, samples or materials on water resources. Under these rules, specific records may be required to be kept and the information thereof furnished to the authority on demand.

"The right to the use of water from any water resource is vested in the Minister except to the extent that is alienated by or under the Act or any other written law (Section 5)". Consequently, a water permit must be obtained before using any water resource. Section

29 (1), (2), and (3) stipulates the procedure for obtaining a water permit, while Section 4 states "except as provided in Section 33, an application for a permit shall be a subject of public consultation and where applicable, of environmental impact assessment in accordance with the requirements of the Environmental Management and Coordination Act, 1999".

Section 32 requires that in issuing an abstraction permit, among other considerations, will be an assessment of the existing lawful use of the water as well as the efficient and beneficial use of the water in the public interest. Other aspect considered would be the likely effect of the water use to water resources and users as well as the strategic importance of the proposed water use. Subsection 3 states that the nature and degree of water use authorized by a permit shall be reasonable and beneficial in relation to others who use the same sources of supply or source of water. The Fourth Schedule on abstraction of ground water requires the person constructing a well within 800m of an existing well to apply tests that include the rate of pumping and the rest levels of water.

In regard to obstruction or pollution of water courses or resources, section 94 states that no person shall obstruct, interfere with, divert or abstract water from any water resource. In addition, no person shall throw or convey any rubbish, dirt, refuse, effluent, trade waste or other offensive or unwholesome matter or thing into or near to any water resources in such a manner as to cause pollution of the water resources.

9.3.4 The Public Health Act (Cap. 242)

Part IX section 115 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Any noxious matter or waste water flowing or discharged into a watercourse is deemed as a nuisance. Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitate the breeding or multiplication of pests shall be deemed nuisances. The Act addresses matters of sanitation, hygiene and general environmental health and safety

9.3.5 Way Leaves Act (Cap. 292)

Section 3 of the Act states that the Government may carry any works through, over or under any land whatsoever provided it shall not interfere with any existing building or structures of an ongoing activity. Notice, however, will be given one month before carrying out any such works (section 4) with full description of the intended works and targeted place for inspection. Any damages caused by the works would then be compensated to the owner as per section. Finally section 8 states that any person without consent causes any building to be newly erected on a way leave, or cause hindrance along the way leave shall be guilty of an offence and any alternations will be done at his/her costs.

9.3.6 Land Acquisition Act (Cap. 295)

This Act provides for the compulsory or otherwise acquisition of land from private ownership for the benefit of the general public. Section 3 states that when the Minister is satisfied on the need for acquisition, notice will be issued through the Kenya Gazette and

copies delivered to all the persons affected. Full compensation for any damage resulting from the entry onto land to things such as survey upon necessary authorization will be undertaken in accordance with section 5 of the Act. Likewise where land is acquired compulsorily, full compensation shall be paid promptly to all persons affected in accordance to sections 8 and 10 along the following parameters;

(i) Area of land acquired,
(ii) The value of the property in the opinion of the Commissioner of land (after valuation),
(iii) Amount of the compensation payable,
(iv) Market value of the property,
(v) Damages sustained from the severance of the land parcel from the land,
(vi) Damages to other property in the process of acquiring the said land parcel,
(vii) Consequences of changing residence or place of business by the land owners,
(viii) Damages from diminution of profits of the land acquired.

Part II of the Act allows for the temporary acquisition of land for utilization in promotion of the public good for periods not exceeding 5 years. At the expiry of the period, the Commissioner of Land shall vacate the land and undertake to restore the land to the conditions it was before. Any damages or reduction of value shall be compensated to the land owners.

9.3.7 Public Roads and Roads of Access Act (Cap. 399)

Sections 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on the adjacent land owners seeking permission to construct the respective roads.

9.3.8 The Factories Act (Cap. 514)

Section 53 of this Act requires that workers employed in a process involving exposure to wet or to any injurious or offensive substances, suitable protective clothing and appliances (gloves, footwear, goggles, and head coverage) shall be provided. Section 4 of Kenya subsidiary legislation of 2004, Legal Notice No. 31 of Kenya Gazette Supplement No. 25 of 24th May, 2004 of the Factories Act Cap 514, requires that, all factories or other workplace owners to establish a safety and health committee, which shall consist of safety representatives from the management and the workers. The number of the committee members will range from 3 to 7 depending on the size (number) of employees.

The Act also requires the management to appoint a competent person who is a member of the management staff to be responsible for safety, health and welfare in the factory or workplace. Section 13 goes ahead to state that a health and safety audit of the workplace be carried out every twelve months by a registered health and safety adviser. If the owner(s) or management contravenes any of the rules, he/she shall be guilty of an offence.

9.3.9 Transport Licensing Act

Section 4 provides that no person shall, except under and in accordance with the terms of a license use a motor vehicle on a road for the carriage of goods for or in connection with any trade or business carried on by him. The act provides that all authorised goods vehicles shall be maintained in a fit and serviceable condition. The licensing authority may attach to a license of any class a condition that the authorised vehicle shall or shall not be used in a specified area or over a specified route or a condition that certain classes or description of goods shall or shall not be carried.

9.3.10 Physical Planning Act (Cap286)

Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land. The plan shows the manner in which the land in the area may be used. Section 29 of the physical Planning Act gives the county councils power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved physical development plans. On zoning, the act empowers them to formulate by-laws in respect of use and density of development.

Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. The act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original conditions within a period of ninety days. If no action is taken, then the council will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also states that no person shall carry out development within the area of a local authority without development permission granted by the local authority. At the same time, sub-section 5, re-enforce it further that, no licensing authority shall grant under any written law, a license for commercial use for which no development permission had been granted by the respective local authority.

Section 36 states that if in connection with development application a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an Environmental Impact Assessment report. The environmental impact assessment report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA 1999. Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to it's original conditions.

9.3.11 The Land Planning Act (Cap. 303)

Section 9 of the subsidiary legislation (The development and use of land regulations 1961) requires that before the local authorities submit any plans to the Minister for approval, steps should be taken as may be necessary to acquaint the owners of any land affected by such plans. Particulars of comments and objections made by the landowners should also be submitted. This is intended to reduce conflict with other interests such as settlement and other social and economic activities.

9.4 International Civil Aviation Organization (ICAO)

ICAO was created in 1944 to promote the safe and orderly development of civil aviation in the world under the United Nations. It is mandated to set international standards and regulations necessary for the safety, security, efficiency and regularity of air transport and serves as the medium for corporation in all field of civil aviation among the contracting parties. Policies established under ICAO addresses the international interests from all airports and aerodromes, but are localized through the specific country environmental laws. This applies to the country and specifically to KAA.

Among the guiding global environmental principles developed from ICAO on behalf of world's airports include;

(i) Minimise or mitigate the adverse effects of aircraft noise on people,
(ii) Minimise or mitigate the adverse effects of aviation related air pollution,
(iii) Minimise or mitigate the impacts of aviation on climate change,
(iv) Promote sustainability by improving the environmental performance during airport development and operation,
(v) Improve environmental awareness, training and sharing of information among world airports,
(vi) Promote understanding, corporation and collaboration with stakeholders.

The ICAO guidelines are clearly recognized and made practical by the local environmental laws and regulations as outlined above. In the meantime, KAA is in the process of developed in-house corporate environmental regulations for use in her operations including guidelines for her service providers.

CHAPTER 10: CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

It is noted that the proposed rehabilitation works will not have significant impacts to the external environmental and social setting. However, it is observed that;

(i) All the works will be confined in-house with little or no interaction with the neighbourhood. The main works will involve surface milling of the pavements and minimal excavations and earth moving. In this regard, discharge of dust and particulate matter into the neighbouring areas are insignificant while emissions will be relatively low,

(ii) There are various operators providing services with Moi International Airport including support ground aircraft services, catering, ground maintenance, cargo handling, security, travel agents and airline managements. The airport, however, lacks a harmonized procedure for handling environmental related aspects such as to be related to use of common pavements and discharge controls into drainage systems,

(iii) The airport do not have a defined handling procedure for waste (solid refuse, dry vegetation matter and oil/grease) emanating from the airport grounds. There are, therefore, notable solid waste holding points and spills near every generator's yard with direct linkages to the pavements and drainage sections,

(iv) Defects developing on then pavements are to a large extent associated with drainage status of the airport ground. High water table, failed drainage provisions of the airport and compromised drainage infrastructure on the surrounding land are among factors affecting the drainage efficiency within and around the airport grounds,

(v) It is noted that there is significant discharge of sewage and surface runoff from the neighbouring residential estates (surface and sub-surface flows) that needs to be intercepted. This runoff was apparently not designed for in the initial airport development but evidence of ponding at various locations and permanent wet areas on the northern end a short distance from the runway is an indication of drainage linkage to the weakening runway foundation and other pavements,

(vi) The airport drainage coverage is generally inadequate in terms of reaching key areas requiring draining, isolation of pollution point sources and the carrying capacity of the existing drains system. The network also seems to have suffered serious structural failures from blockages, collapsing sub-surface drainage components and increasing storm water flows,

(vii) The drainage outfalls were observed to pass through a geologically delicate ground (steep slopes of red un-cohesive soils that have been exposed through vegetation clearing by the squatting communities). The land is, therefore, highly damaged during heavy storm water from surface erosion and land slips. Gabions recently constructed do not top withstand the force of the storm water either,

(viii) There are notable social related issues linked to the airport grounds including encroachments by neighbouring residents, solid waste disposal into the grounds,

vandalism of installations (drains, lighting systems and fences) and occupation of the drainage outfall areas to the western side.

(ix) While the rehabilitation works do not have a direct interaction with the neighbourhood, the construction works will generate significant wastes comprising of scrap asphalt concrete, spoil overburden, machine parts, timber, scrap metal, packaging materials, etc. that will require safe disposal,

(x) Due to small land area available for the airport operations, the rehabilitation works could pose a safety concern to the aircraft operators, passengers and the construction workers,

(xi) Materials sites for gravel, hard stones and sand are outside the project area. The sites are privately owned, but the implications (dust, emissions, noise, safety, vegetation removal, etc.) of material extraction are likely to affect their entire neighbourhoods. It is appreciated that the Contractor and the landowners are responsible in this regard.

(xii) Finally, the airport grounds has notable social and ecological linkages (not related to the propose rehabilitation works) that could compromise the gains from this rehabilitation. These include safety of the landing and takeoff corridors, implications of the operations to the immediate neighbourhoods, security of airport installations and sanitation infrastructure.

10.2 Recommendations

The following recommendations have been found appropriate in addressing the above observations;

(i) The drainage design should integrate a cut-off drain on the northern part of the airport to intercept raw sewage and surface runoff emanating from the immediate neighbouring estates and other incidental storm water that may compromise on the stability of the main runway,

(ii) The Contractor(s) shall be advised to ensure minimal interference with the neighbouring communities with respect to their safety at all times such as to include control of dust and other emissions and elevated noise levels among others,

(iii) Review the drainage capacity and coverage such as to include the low lying sections of the airport grounds, yards under various service providers, workshops areas, waste holding areas around the grounds as discussed in this report,

(iv) Drainage designs should provide oil/grease traps and grit chambers for all drains, and specifically at workshops and machine service areas (listed in the main report), waste holding areas, the apron, pavement receptions and discharge points to the outfalls. The interceptors and grit chambers will be cleaned on regular basis and the materials safely disposed off,

(v) Stabilize the drainage outfall areas by designing wider drains, construction of concrete drains OR improved firm gabions on strong bases pillars as discussed in the design proposal. Then re-vegetation with deep rooted but short indigenous trees and allowing grass and short shrubs is recommended to hold the soil together,

(vi) Management of wastes generated in the pavement rehabilitation and drainage construction will be the responsibility of the contractor. External dumping shall be on approved grounds while in-house re-use (e.g. filling of the gullies at the outfalls) shall be with approval from KAA's Environmental Division,

(vii) Air quality and noise are aspects inseparable between the construction activities and routine airport operations. While advising the Contractor to ensure minimal emissions and noise levels, it would be recommended that KAA's Environmental Division initiate air quality surveys and noise mapping around the airport ground and the immediate surroundings in the long term,

(viii) The encroachments and conflicting settlements around the airport are not directly related to the proposed rehabilitation works. However, their implications on the gains from the works call for medium to long terms interventions. A corporate social responsibility strategy should be established to enhance co-existence in the short term. For long term safety solutions, it will be necessary to initiate negotiations through appropriate channels on safety issues focusing on the encroaching Jomvu Kuu and Magongo estates as well as the settlements on the landing and takeoff corridors with a view to acquiring a safety buffer all around the airport.

(ix) Rehabilitate all materials sites upon completion of the proposed works. In this regard, appropriate agreements between the contractor and materials site owners will be necessary to facilitate apportionment of rehabilitations responsibilities.

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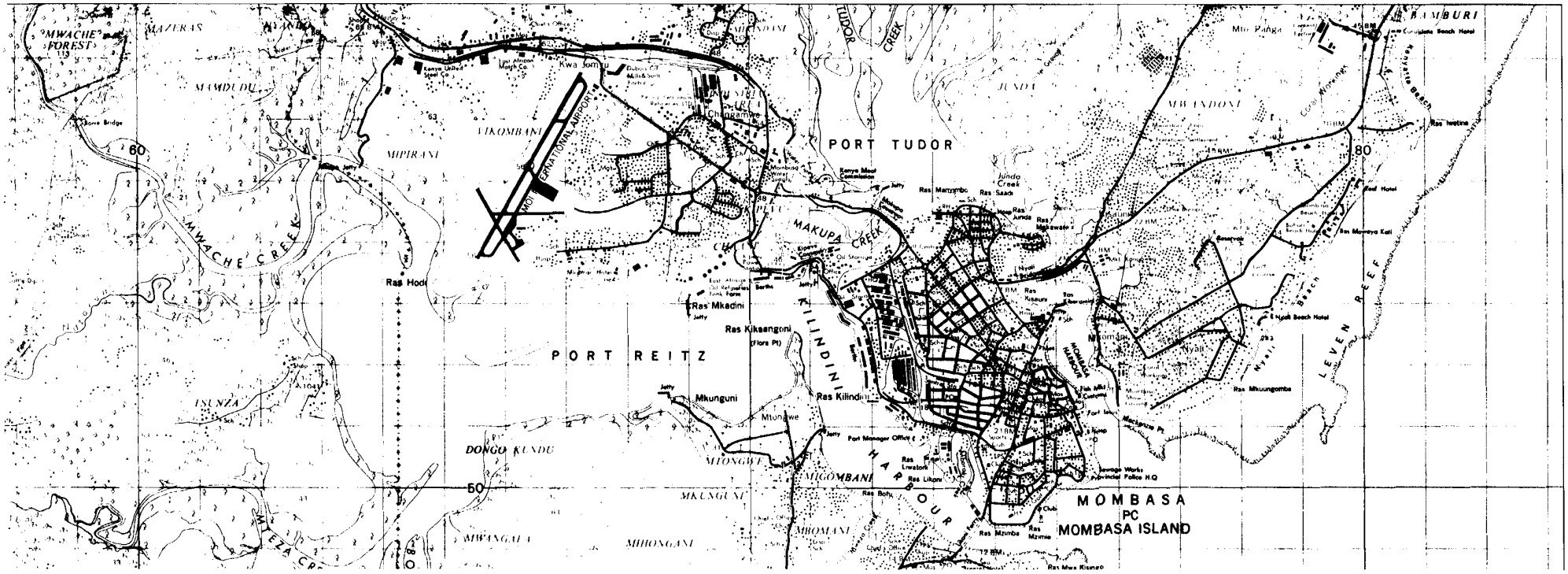
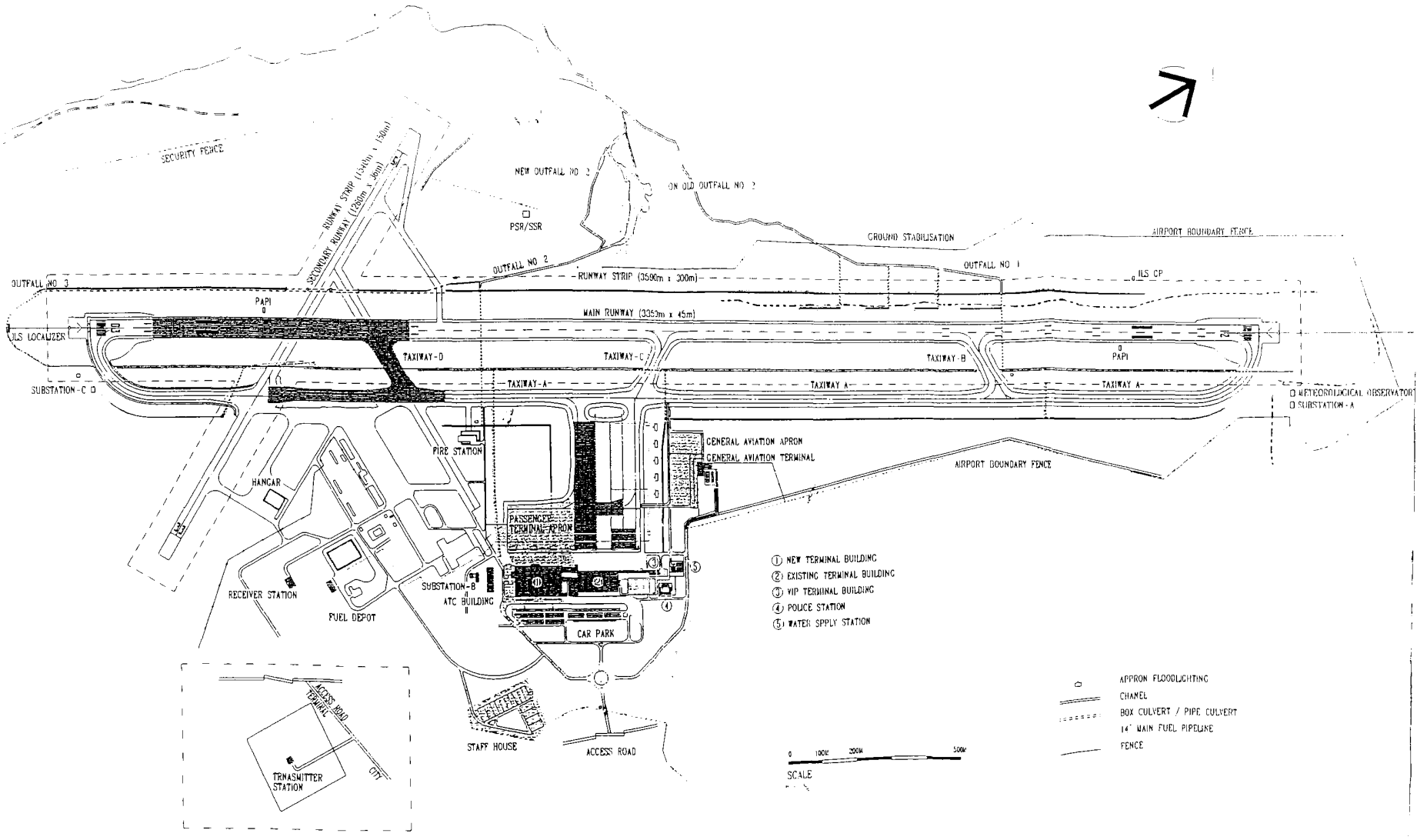
ANNEXES

Annex I: Site location map and layout plan


MWACHE FOREST
MAZERAS
MAWDUDU
VIKOMBANI
MIPIRANI
MWACHE CREEK
Ras Hodi
INTERNATIONAL AIRPORT
Kwa Jomvu
Changamwe
PORT TUDOR
TUDOR CREEK
JUNDA
MBUANDONI
Mtongwe
MAKUPA CREEK
Ras Mkadini
Ras Kikasangoni
PORT REITZ
KILINDINI
Ras Kilindini
Mkunguni
Mtongwe
DONGO KUNDU
MTONGWE
MIGOMBANI
MKUNGUNI
MIHOMANI
MIHONGANI
MWANGALA
MWEZA CREEK
INDIAN OCEAN
MAKUPA CREEK
Ras Mtamba
Ras Saack
Ras Jumba
Ras Makawade
Ras Kisauni
Nyali
Ras Mkuungomba
LEVEN REEF
Ras Likoni
Ras Mzimba
Ras Mzimo
MOMBASA
PC
MOMBASA ISLAND
60
80
50


SECURITY FENCE
SECONDARY RUNWAY (1280m x 30m)
RUNWAY STRIP (1340m x 150m)
NEW OUTFALL NO 2
OLD OUTFALL NO 2
PSR/SSR
GROUND STABILISATION
AIRPORT BOUNDARY FENCE
OUTFALL NO 2
OUTFALL NO 1
ILS CP
OUTFALL NO 3
RUNWAY STRIP (3590m x 300m)
PAPI
MAIN RUNWAY (3353m x 45m)
ILS LOCALIZER
TAXIWAY-D
TAXIWAY-C
TAXIWAY-B
PAPI
SUBSTATION-C
TAXIWAY-A
TAXIWAY A
TAXIWAY A
METEOROLOGICAL OBSERVATORY
SUBSTATION-A
FIRE STATION
GENERAL AVIATION APRON
GENERAL AVIATION TERMINAL
AIRPORT BOUNDARY FENCE
HANGAR
PASSENGER TERMINAL APRON
RECEIVER STATION
FUEL DEPOT
SUBSTATION-B
ATC BUILDING
CAR PARK
STAFF HOUSE
ACCESS ROAD
ACCESS ROAD TO TERMINAL
TRNASMITTER STATION
CITY
1 NEW TERMINAL BUILDING
2 EXISTING TERMINAL BUILDING
3 VIP TERMINAL BUILDING
4 POLICE STATION
5 WATER SPPLY STATION
APRON FLOODLIGHTING
CHANEL
BOX CULVERT / PIPE CULVERT
14" MAIN FUEL PIPELINE
FENCE
0 100M 200M 500M
SCALE

LAYOUT PLAN

Annex II: Original Terms of Reference

SECTION V: - TERMS OF REFERENCE

TERMS OF REFERENCE FOR CONSULTANCY SERVICES FOR REHABILITATION OF AIRCRAFT MOVEMENT PAVEMENTS AT MOI INTERNATIONAL AIRPORT, MOMBASA.

1.0 STUDY BACKGROUND

1.1 General

The Kenya Airports Authority (KAA) was established as a corporate body in May, 1991 through an Act of Parliament, *The Kenya Airports Authority Act (Cap 395 of the Laws of Kenya)*. The Authority is charged with the responsibility of planning, design, maintenance and operation of all aerodromes in Kenya, a responsibility previously discharged by the former Aerodromes Department. Under the Act, the duties and responsibilities of the Kenya Airports Authority are:-

a) Provide a coordinated system of aerodromes and related facilities
b) Administer, control and manage aerodromes and of the property vested in it under the act
c) Provide, develop and maintain such services and facilities as are in its opinion necessary for efficient operation of aircraft
d) Provide rescue and fire fighting equipment and services at aerodromes

In all, the Authority manages three International Airports at Jomo Kenyatta International Airport (JKIA), Moi international Airport (MIA) and Eldoret International Airport. It also manages a further six (6) domestic airports at Wilson, Kisumu, Malindi, Lamu, Lokichoggio and Ukunda aerodromes.

Kenya Airports Authority intends to engage a firm of consultants with adequate knowledge in aviation activities to carry out consultancy services for Moi International Airport, Mombasa. The consultancy services will cover the study and preliminary designs, detailed design and construction supervision phases for the proposed aircraft movement pavements rehabilitation. Most of these pavements were last rehabilitated in 1994 and have now shown distress signs, hence the need to undertake this assignment. The detailed description of the consulting services to be performed is described in these Terms of Reference (TO R).

1.2 Selection Criteria

The Consultant selected to for this assignment shall have had extensive experience in the Study, Design and Tender Documentation of airport aircraft movement pavement rehabilitation projects.

1.3 Project Description

1.3.1 Project Location

Moi International Airport is located approximately 8km to the west of the center of Mombasa City. The scope of the project covers all the existing runways, taxiways and apron areas within the airside of the airport as detailed out in the attached layout drawing. The pavement areas covered in this assignment are mostly of the flexible type, with a few areas also having a rigid pavement type especially at the apron aircraft parking stands.

1.3.2 Airport Activity

Moi International Airport is the second largest airport in Kenya after Jomo Kenyatta International airport. It mostly handles tourism related international and local flights which include wide-body aircraft as well small general aviation aircraft. In 2006, the airport handle; total of 19,109 aircraft movements and 1.2 million passengers.

2.0 STUDY OBJECTIVES

It is therefore the desire of Kenya Airports Authority to have a comprehensive study undertaken to ensure upgrading of the aircraft pavements at the Airport in order to:

- Sustain capacity of the airport to handle the existing aircraft traffic.
- Ensure that all the pavements offer a safe operation all the aircraft using the airport.
- Ensure that the rehabilitated/upgraded pavements remain in a good surface and structural condition to cater for the expected aircraft traffic throughout the design life of the pavements.

3.0 SCOPE OF THE SERVICES

3.1 General

The Consultant shall perform all work necessary as called for in these Terms of Reference including all technical studies and field investigations; detailed designs and ultimately construction supervision as well as other related services. In carrying their work, the Consultant shall co-operate fully with the concerned agencies of the Government of Kenya and other stakeholders, in particular the Kenya Airports Authority, Kenya Civil Aviation Authority, major operators in the airport, amongst others. The Consultant shall provide the necessary support services related to and necessary for the completion of the assignment. The work shall cover but not be limited to the aspects outlined in these Terms of Reference.

3.2 Overview description

3.2.1 The services consists of: -

Phase 1 – Consultancy studies, Preliminary and Detailed Design.

Stage A – Consultancy studies and Preliminary design

(a) Review the existing airport traffic data – including forecasts & master plans, and undertake expected future traffic projection expected to provide the basis for analysis of loading and geometric layout of the aircraft movement pavements.
(b) Analyze the visual, structural and functional conditions of all the aircraft movement pavements with a view of obtaining an overall pavement condition rating, as well as a basis for pavement rehabilitation.
(c) Collection of social, environmental, and physical data, etc that is necessary to assist in the design of the pavements;
(d) Preliminary engineering survey and design work for the possible pavement and other facilities rehabilitation options (at least three), including preliminary costs estimates and implementation schedule;
(e) Undertaking a financial and economic analysis for the rehabilitation options.
(f) Carrying out an environmental impact assessment of the project area in relation to the proposed project.

Stage B - Detailed Engineering Design.

After comments and approval of the preliminary designs by the Client, the Consultant shall carry out a detailed engineering survey and design including engineering cost estimates and materials investigations.

Stage C – Tender Documentation and Assistance in Tendering.

This stage involves preparation of tender documentation for the recommended pavements and other facilities rehabilitation/upgrading option, as well as assisting the client in the tendering process.

Phase 2 –Construction Supervision.

a) The consultant shall carry out construction supervision for the works for the recommended option.

3.3 Detailed Scope of the services.

3.3.1 General

The Consultant shall perform all engineering, financial and environmental analyses and related work as described herein to attain the objective of the study. The Consultant is therefore expected to undertake a general study of the project area and collect social, environmental, and physical data, etc that is necessary to assist in the execution of the assignment. The Consultant is also expected to undertake basic topographical surveys and other measurements necessary to assist in implementing all the requirements of the assignment.

3.3.2 Phase 1: Consultancy Studies, Preliminary and Detailed design

Stage A: Consultancy Studies and Preliminary Design

3.3.2.1 Traffic analysis

- T he Consultant shall study and review the previous traffic forecasts as well as the current traffic statistics in terms of passengers, cargo and aircraft movements including type and aircraft mix for a 20 year period from 2007/8 to 2027/8.
- In carrying out the traffic studies, the Consultant shall take into consideration the effects of the prevailing economic activities at Mombasa and the Kenyan coast, as well as in Kenya and the general East African region.

3.3.2.2 Pavement analysis.

- The Consultant shall undertake an analysis of the existing main runway 03/21, crosswind runway, all taxiways and aircraft parking aprons consisting of:

  a) Visual assessment of the pavements' condition in accordance with internationally approved airport pavement evaluation procedures;

  b) Non - destructive testing in accordance with internationally approved airport pavement evaluation procedures;

  c) In-situ testing to determine properties and laboratory classification as well as the strength of the existing pavement structural layers.

  d) Study and measurement of the longitudinal and transverse overall riding quality and surface friction of the all the pavements, with more emphasis on runway 03/21 using internationally approved airport pavement evaluation procedures;

  e) Determining the overall rating of the pavements and derive any necessary rehabilitation/upgrading required, clearly separating the requirements for critical and non-critical sections of the pavements to cater for the short term (5yrs); medium term (10yrs) and long term (20yrs) aircraft requirements including the Pavement Classification Number (PCN).

3.3.2.3 Drainage Investigations

- The Consultant shall assess the existing airside drainage system by studying and determining the surface runoff and underground water quantities and characteristics and comparing them with the available surface and subsoil drainage facilities.
- In the event of deficiency in these existing facilities, the consultant will come up with the details of all the drainage requirements using internationally approved airport drainage guidelines.

3.3.2.4 Geometric Analysis

- On concluding the traffic analysis, the Consultant shall conduct a geometrical analysis of the pavements in terms of their capability of handling the critical features of the Design aircraft in the short term, medium term and long term traffic as well as make a comment on the capability of the existing and rehabilitated/upgraded facilities in handling an occasional extra-ordinary aircraft e.g. the Airbus A380 and Antonov 224 etc, including enumerating the requirements needed to accommodate the normal operation of such extra-ordinary aircraft in the aerodrome.

- The Consultant shall assess the existing airport masterplan, other existing drawings and present configuration of the pavement system capacity in handling all the projected traffic and suggest any need for future expansion of the facilities.

3.3.2.5 Slope Stability Investigation

- The Consultant shall undertake investigations in the steep sections within the airport boundaries especially those bordering the runways and come up with technical solutions on slope stabilization.

3.3.2.6 Rehabilitation/upgrading options

- On conclusion of the studies, analyses and investigations including the preliminary designs; the Consultant shall come up with rehabilitation/upgrading options for consideration by the Client – at least 3 in number. The options arrived at should aim at various balancing acts of using various construction materials for the pavements and other facilities and considering the full operation of the airport during the construction phase.

3.3.2.7 Preliminary Design and Cost Estimates

- The consultant shall prepare preliminary designs and cost estimates for all the proposed options.
- The costs shall be based on locally available materials and standards as much as possible. Use of international standards and imported materials shall only be considered only when it is not feasible to use local ones, unless otherwise indicated in this document.

3.3.2.9 Financial Analysis

- Based on traffic forecasts and the cost estimates, the Consultant shall prepare financial forecasts for undertaking the proposed rehabilitation/upgrading of facilities taking into consideration the associated, maintenance, and administrative costs and the anticipated revenue generation.

3.3.2.10 Design Standards

- While undertaking the preliminary design of the pavements and drainage facilities, the Consultant is expected to use the most current International Civil Aviation Organization (ICAO) Annexes and Design Manuals as well as the relevant Federal Aviation Administration (FAA) design methods and Advisory Circulars.

3.3.2.11 Environmental Impact Assessment

- The Consultant shall conduct analyses which shall detail the positive and negative effects of the proposed project on the environment, and prepare an EIA report recommending appropriate solutions to minimize any undesirable effects resulting from improvements of the pavements. The analyses shall include, but not limited to the following factors:

  a) The role of the project in the development plans at national and regional level;

  b) Preservation of areas and land use of particular value including agricultural and, natural conservation areas, forests and other important natural resources, cultural and historic sites, etc;

  c) Assessment of direct impact on agriculture and forestry, particularly utilization of the fuel wood and water;

  d) Disturbance of vegetation, and plans for re-vegetation;

  e) The prevention of soil erosion and sedimentation;

  f) The presentation of health hazards arising from pounding water and pollution of water courses and/ or sources;

  g) Measures for the rehabilitation of construction materials, borrow quarries;

  h) Health and sanitation for the pavement construction labour units;

  i) The avoidance of reduction of visual intrusion

- The Environmental Impact Assessment (EIA) must conform to the local National Environment Management Authority (NEMA) Act, Section 58, second schedule.

Stage B: Detailed engineering design

After the Client's comments and approval of the preliminary studies and design of the project, the Consultant shall proceed with the Detailed Engineering Design for the recommended pavements and other facilities rehabilitation/upgrading option. These shall involve the following activities:

- Undertaking of detailed designs for the pavements and other facilities rehabilitation/upgrading from the recommendations made above.

- On conclusion of the detailed design phase, the Consultant shall prepare and submit a comprehensive aircraft movement pavement safety and maintenance plan for the pavements under design.

Stage C: Tender documentation and assistance in tendering

This stage shall proceed in tandem with stage B, and shall involve the following:

- Preparing tender documents for the pavements and other facilities rehabilitation/upgrading. The tender documents shall be based on the Standard Tender Document for procurement of Works (Roads, Bridges, Water and other Civil Engineering Works); as prepared by the Public Procurement Oversight Authority (PPOA), P.O. BOX 30007 – 00200, Nairobi.
- Assistance to the Client on the tendering process shall take place as soon as the tender documents have been approved.

The entire Phase 1 services will be based on six (6) month completion period.

3.3.3 PHASE 2: CONSTRUCTION SUPERVISION AND POST CONSTRUCTION SERVICES

Supervision of construction of the rehabilitation/upgrading of the pavements and other facilities based on a construction period of 24 months shall include:

- Ensuring that the Works are executed while not compromising on the safety aspects of an operational airport. In this regard, the Consultant will ensure that the requirements contained in FAA Advisory Circular AC No. 150/5370 - 2E Operational Safety on Airports during Construction are adhered to throughout the construction phase.
- Issuance of all necessary instructions to the contractor(s) on site, checking and controlling the work to ensure conformity with Contract requirements.
- Provision of general guidance to the contractor(s) on site to achieve set programs.
- Undertaking of works inspections and testing and approving completed works.
- Measuring permanent works as per the requirement of the contract.
- Certifying contractor(s) payment certificates.
- Checking and approving contractor(s) drawings
- Preparing and submitting construction progress reports as well as supervision reports or other necessary reports.
- Conducting site progress meetings
- Assisting the Client in the assessment of contractor(s) claims.
- Conducting post construction inspections and follow-up action during defects liability period.

The format of one set of the report shall consist the following:

(1)A separate Compact Disc each for the main report in MS Word format and drawings in AUTOCAD format.

(2) Volumes of Hard copies.

6.0 DATA, SERVICES, PERSONNEL AND FACILITIES TO BE PROVIDED BY THE CLIENT

6.1 Documents and Reports

6.1.1 The Client shall supply all pertinent data and information and give such assistance as shall reasonably be required for the conduct by the Consultant of his duties under thi contract save that such assistance shall not be extended to the provision of any supplies or services. The Consultant will be required to obtain on his own standards, maps, manuals and other documents that are required to undertake the services. On the Consultant's request, the Client will avail the following: -

(i) Airport Masterplan
(ii) Current and historical traffic statistics
(iii) Previous technical reports and documents of the airport's pavements and other facilities.

6.2 Liaison

6.2.1 The Client shall provide liaison with other Government Ministries and Departments in order to introduce the Consultant to them. The Consultant shall be fully responsible for collecting data and information from these agencies, including paying for it where necessary.

6.3 Taxes and Duties

6.3.1 The Consultant shall be liable to pay all duties and taxes in connection with this assignment including VAT and other taxable payable under the laws of Kenya. No tax or duty exemption shall be given to the Consultant. The Consultant shall be deemed to have taken the above into consideration while preparing his financial proposal.

Annex III: Revised Terms of Reference

REHABILITATION OF AIRCRAFT PAVEMENTS AT MOI INTERNATIONAL AIRPORT (MOMBASA)

Terms of Reference

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Background

The Kenya Airport Authority (KAA), established through an Act of Parliament (The Kenya Airport Authority Act, Cap. 395), is responsible of planning, designing, maintenance and operation of all aerodromes in the country. Among the specific duties include;

(i) Coordinating operations in aerodromes and management of related facilities,
(ii) Overall management and administration of aerodromes,
(iii) Provision of services and facilities necessary for aircraft operation,
(iv) Ensure safety at aerodromes

Among the facilities under KAA include Jomo Kenyatta International Airport (JKIA), Moi International Airport (MIA) and Eldoret International Airport (EIA). In addition, there are domestic airports including Wilson, Kisumu, Malindi, Lamu, Lokichogio and Ukunda.

Moi International Airport is located in a region attractive to tourists from all over the world who specifically comes for the scenic coastal destinations that stretches from Lungalunga in the south to Kiunga in the north. Among key areas of high interest include Shimoni and Diani in south coast, Kilifi, Malindi and Lamu in the north coast. Attractions in these areas are Kisite Marine national Park, Shimba Hills National Park, Watamu and Malindi Marine National Parks, Kiunga Marine National Park, Dodor National Park and Tsavo National Park to mention a few.

Moi International Airport (MIA) is experiencing structural problems with its aircraft pavements that need to be addressed to enhance sustained carrying capacity for upto 20 years, ensure safe aircraft operations landings and takeoffs and protection of the airport land from encroachments and loss through erosion. The second problem is associated to hydrology. In view of this situation, KAA intends to undertake a rehabilitation of the aircraft pavements at MIA. This will involve design review and appropriate rehabilitation of the aircraft pavements (runways, taxiways and aprons), terminal buildings and support facilities as well as selected landside facilities.

In compliance with EMCA, 1999 and associated regulations airports and airfield projects require to undergo an environmental impact assessment. This will detail the positive and negative impacts from the proposed project works and establish suitable mitigation and preventive measures for integration into the project implementation. APEC Limited Consulting Engineers have been engaged to carry out consultancy works on feasibility study, design, tender administration and supervision. Environmental impact assessment study was part of this process as presented in the project report.

Study Objective

The proposed rehabilitation of works will involve rehabilitation of the aircraft pavements, drainage systems, stabilization of sloppy grounds to the west and southwest of the airport and review of drainage infrastructure of airport grounds. The proposed works could have potential implications on the physical and social environment of the airport and its surroundings during the construction and commissioning stages.

The objective of this EIA study will be to identify the potential impacts associated with project and establish suitable mitigation measures for integration in the rehabilitation implementation. Specific objectives should include,

(i) To establish environmental issues relating to the proposed project,
(ii) To provide the baseline conditions of the project area,
(iii) To identify significant impacts to the environment and social status around the airport, including linkages of the aircraft pavements and drainage to other airport operation components,
(iv) Establishment of appropriate mitigation and preventive measures for the significant impacts. The measures should be harmonized with existing airport operation procedures as well as ICAO guidelines on airport management,
(v) Development of an environmental management action plan to facilitate implementation of the mitigation and preventive measures.

Scope of Study

The scope of the EIA is to develop suitable recommendations to be integrated in the project design and implementation for mitigation of anticipated adverse impacts to the environment and social setting the project and service areas. An evaluation of public opinions and stakeholders attitude towards the project should be captured through interviews and consultative forums conducted throughout the project area. The study should be conducted in compliance with the Environmental Impact Assessment Regulation as outlined under the Gazette Notice No. 56 of 13th June 2003 established under EMCA, 1999.

Defined Specific Objectives of the EIA include;

- A description of the rehabilitation project and the baseline environment and social conditions,
- Consultations and stakeholder participation,
- Identification of the impacts associated with entire project,
- Establishment of appropriate mitigation measures,
- Development of an environment management plan with monitoring indicators for post construction period.

Study Components

In accordance to the EIA regulations the objectives of the study should include the following key issues;

- A clear description of the proposed project including its objectives, design concepts,

proposed water uses and anticipated environmental and social impacts,

- Description of the baseline conditions in the project areas such as to cover the physical location, environmental setting, social, cultural and economic issues,
- A description of the legal, policy and institutional framework within which the proposed dam project will be implemented,
- Description of the project alternatives and selection criteria,
- Field evaluations including environmental sampling where necessary,
- Undertake consultations and public participation forums,
- Details of the anticipated impacts to the environment, social, cultural and economic aspects of the area covered by the project.
- Appropriate mitigation and/or corrective measures,
- Develop an environmental management plan (EMP) presenting the project activities, potential impacts, mitigation actions, targets and responsibilities, associated costs and monitoring indicators,

The Approach

The ultimate goal of this approach will be to identify impacts resulting from the proposed project to be determined on the basis of the baseline conditions established and information obtained from the documents reviewed. Detailed evaluation of the project area should be undertaken to focus on any significant environmental issues. The communities living within the airport area will require to be interviewed during consultation and participation process.

The process following the scoping stage will be expected to cover the following;

- Documentary (Literature) Review,
- Field Assessment
- Consultations and public participation forums,
- Information analysis,
- Reporting

Expected Outcome

The study is expected to generate the following reports;

- Scoping report comprising of a general outline of the project design concepts, EIA methodology, significant environmental aspects and social issues. This will be delivered within one weeks of study commencement (5 hard copies and a CD ROM),
- A draft EIA project report for review by the KAA Management and comments towards the final project report to be delivered within four weeks upon commencement (5 hard copies and a CD ROM),
- Final EIA project report for submission to NEMA by KAA to be delivered within two weeks after the draft or after comments are received from KAA whichever is earlier (15 hard copies and CD ROM).

ESIA Consulting Team

The core EIA team is expected to comprise of the following expertise,

- Lead EIA Expert with at least 10 years in the environmental resources management sector (Senior Environmentalist and Team Leader),
- Hydrologist with at least 5 years experience,
- Socio-economist with at least 10 years experience,
- Design Engineer with over 10 years experience in highway designs

Annex IV: Rehabilitation Design Alternatives

Pavement Rehabilitation Options

Main Runway (03/21), Taxiway Alpha, Bravo, Charlie and Delta

(i) Option 1

The pavement structure does not require strengthening. Therefore, it is proposed, in this option, to mill the top 50 mm for the entire pavement areas including the shoulders, regulate the surface with 50 mm – 100 mm of asphalt concrete to restore the cross section geometry and lay a uniform 50 mm thick new asphalt concrete wearing course.

The entire surfacing of the runway stop way or protection pads on both ends of the runway has failed extensively and the entire pavement should be removed and replaced with a new Portland Cement Concrete.

No extensive signs of base failures were noted in the visual or structural survey. Only a small section on Taxiway Alpha and Bravo will require full depth reconstruction.

In this option, the entire surface is rejuvenated but there is no justification in resurfacing serviceable sections which have been repaired in the recent past. However, an overlay of 150 mm asphalt concrete is recommended to prolong the surface life and enhance the surface drainage.

(ii) Option 2

The shoulders for the main runway and the taxiways were generally in good condition. In option 2, it is proposed to mill 50 mm only of the carriageway sections of the main runway and taxiways which are in poor to fair condition, regulate to restore the cross section geometry and reinstate the sections. The sections which are in good condition will be repaired by crack sealing and patch work. This option is conservative but may give an impression of an "incomplete job."

(iii) Option 3

In option 3, it is proposed that the runway is rehabilitated as in option 1 except that the pavement type of the touch down zones extending to 800 m on both ends of the runway is changed from flexible to rigid. Similarly, the pavements at hold sections at both the ends of Taxiway Alpha, 200 m in length, are proposed to be converted to rigid pavement.

Taxiways Lima and Kilo

From the Visual Survey, the surfacing of both Taxiways Lima and Kilo was noted to be in poor condition with some sections showing serious reflection/Alligator cracks. Though a core cut through the cracks showed

the cracks had not extended beyond 50 mm depth. It is just a matter of time as this may be a sign of failure in the bituminous surfacing.

The DCP tests carried out gave very high CBR values indicating that the sub structure pavement layers had adequate strength. It is proposed that the small section with subgrade failure be reconstructed to full depth. For the remaining sections, it is recommended that the surface is milled to a depth of 70 mm and reinstated with an overlay of 150 mm Asphalt Concrete to improve on surface drainage, and prolong the surface life.

Secondary Runway (15/33)

As was evident from the results of the visual survey, the secondary runway (15/33) had been poorly maintained with no side drains. The surfacing had extensive cracks that were overgrown with grass. In addition, the cross section geometry for the runway does not meet ICAO standards in terms of slopes. The base is hand packed stone.

The following rehabilitation options have been proposed:

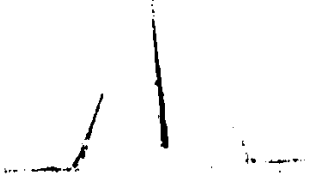
- Remove the existing 35-50 mm surfacing from the entire runway.
- Regulate the surface of base to restore the transverse grades using Graded Crushed Stone, and
- Lay 50 mm asphalt concrete surfacing. This will effectively restore the cross section geometry of the runway.

Asphalt Aprons

The asphalt aprons were noted to have surfacing failures with most of the parking bays having recently been patched. It is recommended to mill 50 mm of the existing asphalt surfacing and replace with an overlay of 150 mm thickness of asphalt concrete to enhance surface drainage. The General Aviation Apron, Ground Service Equipment Yard and Airside Access Roads may not require milling but a direct overlay of 100 mm thick of asphalt concrete.

It is also recommended to have the existing asphalt surfacing removed and replaced with Portland Cement Concrete slabs, 370 mm thick, to match the existing slabs. This is a solution to slippage failure in the asphalt surfacing at turning points.

Portland Cement Concrete Aprons



Since, from design it has been established that the existing design is adequate for the design traffic, the rehabilitation works will focus on restoring the serviceability of all

Portland Cement Concrete (PCC) slabs in good conditions. The work to be carried out at the identified panels will include

- Remove the entire panels that have extensive cracks or other major surface defects and construct new PCC slabs
- Cut out sections of the slab panels where failure has been identified and replace with full depth of PCC slab
- Repair isolated cracks that are repairable, and
- Carry out extensive joint repair work for all joints in the PCC slabs

Airport Requirement for the Airbus A380

Characteristics of the Airbus A380 that affect the airport design are as follows:

- The aircraft is built on two decks with a seating capacity of 555
- Wingspan is 79.8m
- Length is 72.75m
- Height is 24.08m
- Maximum takeoff weight is 560,000 kg for the A380-800 and 590,000 kg for the freight version, the A380-800F

The required modifications at the airport would include:

- Twin passenger boarding bridge to accommodate the twin deck aircraft
- Special size parking bay 85m width by 78m length
- Strengthening of the pavements to accommodate the higher load per wheel of the A380 on the full takeoff weight

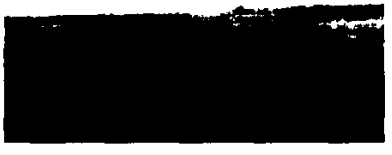
Proposed Rehabilitation Drainage Works

The proposed rehabilitation of drainage works are for the following areas:

- Plateau
- Outfalls and other drains
- Aircraft pavements.

Plateau Drainage

- Installation of grease traps at the Apron, Maintenance Yard, Freight Terminal and GSE to intercept oils and grease before discharge into the main drainage system
- Repair to the damaged and worn out weep holes along the open lined drains.
- Grading, and filling depressions, of the grass (turf) area to ensure natural drainage of the pavements runoff to the parallel open lined drains
- Extension of the open lined drain to serve the Meteorological Observatory and station
- Provision of drainage to the Old Hanger area Station next to the Old Runway at the southern end.
- Cleaning and de-silting of all drains.
- Reconstruction of damaged drains. This will involve removal of drain precast side slabs, trimming and relaying.
- Provision of side drains to access roads serving the Meteorological Observatory and the western side of the airport
- Repair to the catch drains to the ground stabilization area serving Outfall Nos. 1 and 2



- Grading, and filling depressions, of the grass (turf) area adjacent to the Old Runway to ensure natural drainage of the pavements and adjacent area runoff to the proposed parallel gritted drains

Pavements Drainage

- Cleaning of all slotted drains.
- Replacement of the existing subsurface drains by Installation of subsurface drains (geopipe drains) to run parallel to the Main Runway and Taxiway A. The subsurface drains to drain into the existing cross culverts. The geopipe drains will lower the ground water table at all the main aircraft pavements while ensuring retention of all the soils.
- Replacement of the gritted drains along the Secondary Runway, 500 mm wide and varying depth.
- Construction of lined drains for the access road along the Maintenance Yard to terminate at the culverts near Fire station.
- Construction of catch drain at the shoulder of General Aviation Apron to drain into the open lined drain parallel to Taxiway A.

Outfalls and Other Drains

- Repair to the outfall No. 3 and 4 to their original status. This will involve placing of stone filled gabion boxes at the outfall outlets. The gabion boxes should not be wire woven but poly woven ropes. Steel wire woven is prone to pilferage by vandals as was evident from protection works recently carried out by the airport personnel using steel woven wire which was stolen immediately thereafter).
- Repair the damaged sections and structural joints of Outfall No. 1
- Reconstruct some lengths of outfall No. 2 while ensuring support with piles and subsurface drainage of the structure.
- Extend the open lined drain with a twin box culvert 2 m x 1m from the Secondary Runway threshold 15 to drain to the natural steam.
- Repair the damaged sections and structural joints of Outfall No. 1.
- Remove all the loose side slabs and prepare weep holes as specified in the drawings and relay the slabs with fresh cement mortar.
- Repair to all the scoured channel surfaces base slabs and joints.

- Reconstruct damaged sections of the existing drains
- Replacement of the 300 mm diameter culverts with 600 mm diameter culverts at the Control Tower and Maintenance Yard.
- Reconstruct the drains at the Control Tower and Maintenance Yard.

- Reconstruct the drains at the Control Tower and Maintenance Yard.
- Construct a 300 mm diameter IBD drain with side slabs along the perimeter road from the Secondary Runway threshold 33 to outlet of Outfall No. 3.
- Construct a 1000 mm diameter outfall drain with subsurface drainage for the circular drains draining the marshy area near the western side of the northern end of the Main Runway.

- Cleaning of all drains of all debris and disposal safely to avoid the debris from being deposited in the drains.

Proposed Ground and Soil Stability Rehabilitation Works

The proposed rehabilitation and protection works are aimed at arresting and preventing future failures of the slopes and stabilization of the grounds. These proposed works will involve:

- Filling of the gullies with materials considered as waste from the pavement rehabilitations and protecting the same from erosion by installation of poly ropes woven stone filled gabion boxes/mattresses, construction of subsurface drainage, catch drains to stabilise the areas.
- Reconstruction of stabilization ground between Outfalls No. 1 and No. 2 by installation of subsurface drains and removal of excess overburden.
- Slopes reinforcement by installation of poly ropes woven stone filled gabion boxes/mattresses at Outfall No. 2 and drain between Threshold 15 and the natural stream.
- Filling of sink holes and provision of subsurface drains for all the unstable grounds resulting in lowering of water table.
- Provisions of toe filter drain, at pre-selected locations, for all the cliffs along the western side and the southern end of the airport.
- Provision of sub-surface drains for all outfalls to avoid fluidisations of the supporting soils.

Annex V: Selected Environmental Regulations and Standards

realities; and

(l) be binding on all persons and all government departments, agencies, state corporations or other organs of Government upon adoption by the National Assembly.

Provincial Environment Action Plans.

39. Every Provincial Environment Committee shall, every five years, prepare a provincial environment action plan in respect of the province for which it is appointed, incorporating the elements of the relevant district environment action plans prepared under section 40 and shall submit such plan to the chairman of the National Environment Action Plan Committee for incorporation into the national environment action plan.

District Environment Action Plans.

40. Every District Environment Committee shall, every five years, prepare a district environment action plan in respect of the district for which it is appointed and shall submit such plan to the chairman of the Provincial Environment Action Plan Committee for incorporation into the provincial environment action plan proposed under section 39.

Contents of Provincial and District Environmental Action Plans.

41. Every provincial environment action plan and every district environment action plan prepared under sections 39 and 40 respectively shall contain provisions dealing with matters contained in section 38 (a), (b), (c), (d), (e), (f), (g), (h), (i), and (j) in relation to their respective province or district.

PART V - PROTECTION AND CONSERVATION OF THE ENVIRONMENT

Protection of rivers, lakes and wetlands.

42.(1) No person shall, without prior written approval of the Director-General given after an environmental

impact assessment, in relation to a river, lake or wetland in Kenya, carry out any of the following activities -

(a) erect, reconstruct, place, alter, extend, remove or demolish any structure or part of any structure in, or under the river, lake or wetland;

(b) excavate, drill, tunnel or disturb the river, lake or wetland;

(c) introduce any animal whether alien or indigenous in a lake, river or wetland;

(d) introduce or plant any part of a plant specimen, whether alien or indigenous, dead or alive, in any river, lake or wetland;

(e) deposit any substance in a lake, river or wetland or in, on, or under its bed, if that substance would or is likely to have adverse environmental effects on the river, lake or wetland;

(f) direct or block any river, lake or wetland from its natural and normal course; or

(g) drain any lake, river or wetland.

(2) The Minister may, by notice in the Gazette, declare a lake shore, wetland, coastal zone or river bank to be a protected area and impose such restrictions as he considers necessary, to protect the lake shore, wetland, coastal zone and river bank from environmental degradation. In declaring a lake shore, wetland, coastal zone or river bank a protected area, the Minister shall take into consideration the following factors -

geographical size of the lake shore, wetland, coastal zone or river bank; and

(b) the interests of the communities resident around the lake shore, wetland, coastal zone or river bank concerned.

(3) The Minister may, by notice in the Gazette, issue general and specific orders, regulations or standards for the management of river banks, lake shores, wetlands or coastal zones and such orders, regulations or standards may include management, protection, or conservation measures in respect of any area at risk of environmental degradation and shall provide for -

(a) the development of an overall environmental management plan for a lake, river, wetland or coastal area, taking into account the relevant sectoral interests;

43. (b) measures for the prevention or control of coastal erosion;

(c) the conservation of mangrove and coral reef ecosystems;

44. (d) plans for the harvesting of minerals within the coastal zone, including strategies for the restoration of mineral sites;

(e) contingency plans for the prevention and control of all deliberate and accidental discharge of pollutants into the sea, lakes or rivers;

(f) plans for the protection of wetlands;

(g) the regulation of harvesting of aquatic living and non-living resources to ensure optimum sustainable yield;

(h) special guidelines for access to and exploitation of living and non-living resources in the continental shelf, territorial sea and the Exclusive Economic Zone;

(i) promotion of environmentally friendly tourism; and

(j) the management of biological resources;

(4) The Authority shall, in consultation with the relevant lead agencies, issue guidelines for the management of the environment of lakes and rivers.

(5) Any person who contravenes or fails to comply with any orders, regulations or standards issued under this section shall be guilty of an offence.

Protection of traditional interests.

43. The Minister may, by notice in the Gazette, declare the traditional interests of local communities customarily resident within or around a lake shore, wetland, coastal zone or river bank or forest to be protected interests.

Protection of hill tops, hill sides, mountain areas and forests.

44. The Authority shall, in consultation with the relevant lead agencies, develop, issue and implement regulations, procedures, guidelines and measures for the sustainable use of hill sides, hill tops, mountain areas and forests and such regulations, guidelines, procedures and measures shall control the harvesting of forests and any natural resources located in or on a hill side, hill top or mountain area so as to protect water catchment areas, prevent soil erosion and regulate human settlement.

specified under subsection (1) which are within the limits of its jurisdiction.

(3) Where the areas specified under subsection (1) are subject to leasehold or any other interest in land including customary tenure, the holder of that interest shall implement measures required to be implemented by the District Environment Committee including measures to plant trees and other vegetation in those areas.

Other measures for management of hill tops, hill sides and mountainous areas.

47.(1) The Authority shall, in consultation with the relevant lead agencies, issue guidelines and prescribe measures for the sustainable use of hill tops, hill slides and mountainous areas.

(2) The guidelines issued and measures prescribed by the Authority under subsection (1) shall be by way of Gazette Notice and shall include those relating to -

(a) appropriate farming methods;

(b) carrying capacity of the areas described in subsection (1) in relation to animal husbandry;

(c) measures to curb soil erosion;

(d) disaster preparedness in areas prone to landslides;

(e) the protection of areas referred to in subsection (1) from human settlements;

(f) the protection of water catchment areas; and

(g) any other measures the Authority considers necessary.

(3) The District Environment Committees shall be responsible for ensuring that the guidelines issued and measures prescribed under subsection (2) in respect of their districts are implemented.

(4) Any person who contravenes any measure prescribed by the Authority under this section or who fails to comply with a lawful direction issued by a District Environment Committee under this section shall be guilty of an offence.

Protection of forests.

48. (1) Subject to subsection (2) the Director-General may, after consultation with the Chief Conservator of Forests, enter into any contractual arrangement with a private owner of any land on such terms and conditions as may be mutually agreed for purposes of registering such land as forest land.

(2) The Director-General shall not take any action, in respect of any forest or mountain area, which is prejudicial to the traditional interests of the local communities customarily resident within or around such forest or mountain area.

Conservation of energy and planting of trees or woodlots.

49. The Authority shall, in consultation with the relevant lead agencies, promote the use of renewable sources of energy by -

(a) promoting research in appropriate renewable sources of energy;

(b) creating incentives for the promotion of renewable sources of energy;

(c) promoting measures for the conservation of non-renewable sources of energy; and

(d) taking measures to encourage the planting of trees and woodlots by individual land users, institutions and by community groups.

Conservation of biological diversity.

50. The Authority shall, in consultation with the relevant lead agencies, prescribe measures necessary to ensure the conservation of biological diversity in Kenya and in this respect the Authority shall -

(a) identify, prepare and maintain an inventory of biological diversity of Kenya;

(b) determine which components of biological diversity are endangered, rare or threatened with extinction;

(c) identify potential threats to biological diversity and devise measures to remove or arrest their effects;

(d) undertake measures intended to integrate the conservation and sustainable utilisation ethic in relation to biological diversity in existing government activities and activities by private persons;

(e) specify national strategies, plans and government programmes for conservation and sustainable use of biological diversity;

(f) protect indigenous property rights of local communities in respect of biological diversity; and

(g) measure the value of unexploited natural resources in terms of watershed protection, influences on climate, cultural and aesthetic

value, as well as actual and potential genetic value thereof.

Conservation of biological resources *in situ*.

51. The Authority shall, in consultation with the relevant lead agencies, prescribe measures adequate to ensure the conservation of biological resources *in-situ* and in this regard shall issue guidelines for -

(a) land use methods that are compatible with conservation of biological diversity;

(b) the selection and management of protected areas so as to promote the conservation of the various terrestrial and aquatic ecosystems under the jurisdiction of Kenya;

(c) selection and management of buffer zones near protected areas;

(d) special arrangements for the protection of species, ecosystems and habitats threatened with extinction;

(e) prohibiting and controlling the introduction of alien species into natural habitats; and

(f) integrating traditional knowledge for the conservation of biological diversity with mainstream scientific knowledge.

Conservation of biological resources *ex-situ*.

52. The Authority shall, in consultation with the relevant lead agencies -

(a) prescribe measures for the conservation of biological resources *ex-situ* especially for those species threatened with extinction;

(b) issue guidelines for the management of:-

(i) germplasm banks;

(ii) botanical gardens;

(iii) zoos or aquaria;

(iv) animal orphanages; and

(v) any other facilities recommended to the Authority by any of its Committees or considered necessary by the Authority.

(c) ensure that species threatened with extinction which are conserved *ex-situ* are re-introduced into their native habitats and ecosystems where:-

(i) the threat to the species has been terminated; or

(ii) a viable population of the threatened species has been achieved.

Access to genetic resources of Kenya.

53.(1) The Authority shall, in consultation with the relevant lead agencies, issue guidelines and prescribe measures for the sustainable management and utilisation of genetic resources of Kenya for the benefit of the people of Kenya.

(2) Without prejudice to the general effect of subsection (1), the guidelines issued or measures prescribed under that subsection shall specify -

(a) appropriate arrangements for access to genetic resources of Kenya by non-citizens of Kenya including the issue of licences and fees to be paid for that access;

(b) measures for regulating the import or export of germplasm;

(c) the sharing of benefits derived from genetic resources of Kenya;

(d) biosafety measures necessary to regulate biotechnology;

(e) measures necessary to regulate the development, access to and transfer of biotechnology; and

(f) any other matter that the Authority considers necessary for the better management of the genetic resources of Kenya.

Protection of environmentally significant areas.

54.(1) The Minister may, in consultation with the relevant lead agencies, by notice in the Gazette, declare any area of land, sea, lake or river to be a protected natural environment for the purpose of promoting and preserving specific ecological processes, natural environment systems, natural beauty or species of indigenous wildlife or the preservation of biological diversity in general.

(2) Without prejudice to subsection (1), the Authority may, in consultation with the relevant lead agencies, issue guidelines and prescribe measurers for the management and protection of any area of environmental significance declared to be a protected natural environment area under this section.

Protection of the coastal zone.

55.(1) The Minister may, by notice in the Gazette, declare an area to be a protected coastal zone.

and natural resources or the prevention or abatement of environmental degradation.

(2) Without prejudice to the generality of subsection (1) the tax and fiscal incentives, disincentives or fees may include -

(a) customs and excise waiver in respect of imported capital goods which prevent or substantially reduce environmental degradation caused by an undertaking;

(b) tax rebates to industries or other establishments that invest in plants, equipment and machinery for pollution control, re-cycling of wastes, water harvesting and conservation, prevention of floods and for using other energy resources as substitutes for hydrocarbons;

(c) tax disincentives to deter bad environmental behaviour that leads to depletion of environmental resources or that cause pollution; or

(d) user fees to ensure that those who use environmental resources pay proper value for the utilization of such resources.

PART VI - ENVIRONMENTAL IMPACT ASSESSMENT

Application for an Environmental Impact Assessment Licence.

58.(1) Notwithstanding any approval, permit or licence granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, shall, before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second

approve any application by an expert wishing to be authorised to undertake environmental impact assessment. Such application shall be made in the prescribed manner and accompanied by any fees that may be required.

(7) Environmental impact assessment shall be conducted in accordance with the environmental impact assessment regulations, guidelines and procedures issued under this Act.

(8) The Director-General shall respond to the applications for environmental impact assessment licence within three months.

(9) Any person who upon submitting his application does not receive any communication from the Director-General within the period stipulated under subsection (8) may start his undertaking.

Publication of Environmental Impact Assessment.

59.(1) Upon receipt of an environmental impact assessment study report from any proponent under section 58(2), the Authority shall cause to be published for two successive weeks in the Gazette and in a newspaper circulating in the area or proposed area of the project a notice which shall state -

(a) a summary description of the project;

(b) the place where the project is to be carried out;

(c) the place where the environmental impact assessment study, evaluation or review report may be inspected; and

(d) a time limit of not exceeding sixty days for the submission of oral or written comments

environmental impact assessment study, evaluation or review report.

(2) The Authority may, on application by any person extend the period stipulated in sub-paragraph (d) so as to afford reasonable opportunity for such person to submit oral or written comments on the environmental impact assessment report.

Comments on Environmental Impact Assessment report by Lead Agencies.

60. A lead agency shall, upon the written request of the Director-General, submit written comments on an environmental impact assessment study, evaluation and review report within thirty days from the date of the written request.

Technical Advisory Committee on Environmental Impact Assessment.

61. The Authority may set up a technical advisory committee to advise it on environmental impact assessment related reports and the Director-General shall prescribe the terms of reference and rules of procedure for the technical advisory committee appointed hereunder.

Further Environmental Impact Assessment.

62. The Authority may require any proponent of a project to carry out at his own expense further evaluation or environmental impact assessment study, review or submit additional information for the purposes of ensuring that the environmental impact assessment study, review or evaluation report is as accurate and exhaustive as possible.

Environmental Impact Licence.

63. The Authority may, after being satisfied as to the adequacy of an environmental impact assessment study, evaluation or review report, issue an environmental impact assessment licence on such terms and conditions as may be appropriate and necessary to facilitate sustainable development and sound environmental management.

Submission of fresh Environmental Impact Assessment report after Environmental Impact Assessment Licence issued.

64.(1) The Authority may, at any time after the issue of an environmental impact assessment licence direct the holder of such licence to submit at his own expense a fresh environmental impact assessment study, evaluation or review report within such time as the Authority may specify where –

(a) there is a substantial change or modification in the project or in the manner in which the project is being operated;

(b) the project poses environmental threat which could not be reasonably foreseen at the time of the study, evaluation or review; or

(c) it is established that the information or data given by the proponent in support of his application for an environmental impact assessment licence under section 58 was false, inaccurate or intended to mislead.

(2) Any person who fails, neglects or refuses to comply with the directions of the Authority issued under subsection (1) shall be guilty of an offence.

Transfer of Environmental Impact Assessment Licence.

65.(1) An environmental impact assessment licence may be transferred by the holder to another person only in respect of the project in relation to which such licence was issued.

(2) Where an environmental impact assessment licence is transferred under this section, the person to whom it is transferred and the person transferring it shall jointly notify the Director-General in writing of the transfer, not later than thirty days after the transfer.

(3) Where no joint notification of a transfer is given in accordance with subsection (2), the registered holder of the licence shall be deemed for the

(3) The terms of reference and rules of procedure of a technical advisory committee shall be drawn by the Authority in accordance with section 61 of the Act.

(4) The Committees may, with the approval of the Director General, co-opt any persons it deems necessary for its proper functioning.

Application for Environmental Impact Assessment licence.

6 An application for an environmental impact assessment licence shall be in the form of a project report in Form 1set out in the First Schedule to these Regulations, and the applicant shall submit the application together with the prescribed fee to the Authority or the Authority's appointed agent in the District where the project is to be undertaken.

PART II—THE PROJECT REPORT

Preparation of Project report.

7. (1) A proponent shall prepare a project report stating—

(a) the nature of the project;

(b) the location of the project including the physical area that may be affected by the project's activities;

(c) the activities that shall be undertaken during the project construction, operation and decommissioning phases;

(d) the design of the project;

(e) the materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal;

(f) the potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project;

(g) an action plan for the prevention and management of possible accidents during the project cycle;

(h) a plan to ensure the health and safety of the workers and neighbouring communities;

(i) the economic and socio-cultural impacts to the local community and the nation in general;

(j) the project budget; and

(k) any other information the Authority may require.

(2) In preparing a project report under this regulation, the proponent shall pay particular attention to the issues specified in the Second Schedule to these Regulations.

(3) A project report shall be prepared by an environmental impact assessment expert registered as such under these Regulations.

report to the Authority or the Authority's appointed agent in the prescribed form accompanied by the prescribed fees.

Comments on the project report.

9. (1) Where the project report conforms to the requirements of regulation 7 (1), the Authority shall within seven days upon receipt of the project report, submit a copy of the project report to—

(a) each of the relevant lead agencies;

(b) the relevant District Environment Committee: and

(c) where more than one district is involved, to the relevant Provincial Environment Committee,

for their written comments which comments shall be submitted to the Authority within twenty one days from the date of receipt of the project report from the Authority, or such other period as the Authority may prescribe.

(2) On receipt of the comments referred to in subparagraph (1) or where no comments have been received by the end of the period of thirty days from the date of receipt of the project report, the Authority shall proceed to determine the project report.

Approval of Project Report

10. (1)On determination of the project report, the decision of the Authority, together with the reasons thereof, shall be communicated to the proponent within forty-five days of the submission of the project report.

(2) Where the Authority is satisfied that the project will have no significant impact on the environment, or that the project report discloses sufficient mitigation measures, the Authority may issue a licence in Form 3 set out in the First Schedule to these Regulations.

(3) If the Authority finds that the project will have a significant impact on the environment, and the project report discloses no sufficient mitigation measures, the Authority shall require that the proponent undertake an environmental impact assessment study in accordance with these Regulations.

(4) A proponent who is dissatisfied with the Authority's decision that an environmental impact assessment study is required may within fourteen days of the Authority's decision appeal against the decision to the Tribunal in accordance with regulation 46.

PART III—THE ENVIRONMENTAL IMPACT ASSESSMENT STUDY

Terms of Reference

11. (1) An environmental impact assessment study shall be conducted in accordance with terms of reference developed during the scoping exercise by the proponent and approved by the Authority.

(2) The terms of reference shall include matters required to be considered in the making of an environmental impact assessment as may be prescribed in the Second Schedule to these Regulations and such other matters as the Director General may in writing require.

Industry.
Law or Law Enforcement.
Local Government.
Natural Resources.
Public Administration.
Public Works.
Research and Technology.
Tourism.
Water Resources.

SECOND SCHEDULE (s.58(1),(4))

PROJECTS TO UNDERGO ENVIRONMENTAL IMPACT ASSESSMENT

1. General -

   (a) an activity out of character with its surrounding;
   (b) any structure of a scale not in keeping with its surrounding;
   (c) major changes in land use.

2. Urban Development including:-

   (a) designation of new townships;
   (b) establishment of industrial estates;
   (c) establishment or expansion of recreational areas;
   (d) establishment or expansion of recreational townships in mountain areas, national parks and game reserves;
   (e) shopping centres and complexes.

3. Transportation including -

   (a) all major roads;
   (b) all roads in scenic, wooded or mountainous areas and wetlands;
   (c) railway lines;
   (d) airports and airfields;
   (e) oil and gas pipelines;
   (f) water transport.

4. Dams, rivers and water resources including -

   (a) storage dams, barrages and Piers;
   (b) river diversions and water transfer between catchments;
   (c) flood control schemes;
   (d) drilling for the purpose of utilising ground water resources including geothermal energy.

5. Aerial spraying.

6. Mining, including quarrying and open-cast extraction of -

(a) precious metals;
(b) gemstones;
(c) metalliferous ores;
(d) coal;
(e) phosphates;
(f) limestone and dolomite;
(g) stone and slate;
(h) aggregates, sand and gravel;
(i) clay;
(j) exploration for the production of petroleum in any form.
(k) extracting alluvial gold with use of mercury.

7. Forestry related activities including -

(a) timber harvesting;
(b) clearance of forest areas;
(c) reforestation and afforestation;

8. Agriculture including -

(a) large-scale agriculture;
(b) use of pesticide;
(c) introduction of new crops and animals;
(d) use of fertilizers;
(e) irrigation.

9. Processing and manufacturing industries including -

(a) mineral processing, reduction of ores and minerals;
(b) smelting and refining of ores and minerals;
(c) foundries;
(d) brick and earthware manufacture;
(e) cement works and lime processing;
(f) glass works;
(g) fertilizer manufacture or processing;
(h) explosive plants;
(i) oil refineries and petro-chemical works;
(j) tanning and dressing of hides and skins;
(k) abattoirs and meat-processing plants;
(l) chemical works and process plants;
(m) brewing and malting;
(n) bulk grain processing plants;

(q) food-processing plants;
(r) plants for the manufacture of assembly of motor vehicles;
(s) plant for the construction or repair of aircraft or railway equipment;
(t) plants for the manufacture or assembly of motor vehicles;
(u) plants for the manufacture of tanks, reservoirs and sheet-metal containers;
(v) plants for the manufacture of coal briquettes;
(w) plant for manufacturing batteries;

10. Electrical infrastructure including -

(a) electricity generation stations;
(b) electrical transmission lines;
(c) electrical sub-stations;
(d) pumped-storage schemes.

11. Management of hydrocarbons including -

the storage of natural gas and combustible or explosive fuels.

12. Waste disposal including -

(a) sites for solid waste disposal;
(b) sites for hazardous waste disposal;
(c) sewage disposal works;
(d) works involving major atmospheric emissions;
(e) works emitting offensive odours.

13. Natural conservation areas including -

(a) creation of national parks, game reserves and buffer zones;
(b) establishment of wilderness areas;
(c) formulation or modification of forest management policies;
(d) formulation of modification of water catchment management policies;
(e) policies for the management of ecosystems, especially by use of fire;
(f) commercial exploitation of natural fauna and flora;
(g) introduction of alien species of fauna and flora into ecosystems;

14. Nuclear Reactors.

15. Major developments in biotechnology including the introduction and testing of genetically modified organisms.

(2) In arriving at the amount of any compensation payable under this section regard shall be had to the enhanced or improved value, immediate or prospective, which shall or may accrue to any such land by reason of the carrying out of the aforesaid purposes or any of them.

(3) The amount of any such compensation as aforesaid shall, in default of agreement, be determined by arbitration.

Additional powers relating to water. Cap. 372.

180. Every local authority, whether or not such local authority is a water undertaker under the Water Act, shall have power to compel the provision of a proper and sufficient water supply for every dwelling-house, school, store, shop, factory or workshop, if the local authority considers that the provision of such supply is necessary, practicable and reasonable.

Electricity Supply

Works of the supply of electricity, light, heat and power. L.N. 634/1963. Cap. 314.

181. (1) Subject to the Electric Power Act and to any other written law relating thereto, a local authority may undertake the supply of, and may establish, acquire and maintain works for the supply of electricity, light, heat or power within its area, or with the consent of any other local authority, within the area of that local authority; and without prejudice to the generality of the foregoing, a local authority may sell (including sale against payment by instalments) electric lines, fittings, and appliances to private consumers.

(2) With prejudice to any power conferred by or under the Electric Power Act upon a licensee, subsections (3) and (4) of section 178 of this Act shall supply *mutatis mutandis* to and in relation to the supply of electricity by a local authority.

PART XII—CERTAIN POWERS, DUTIES AND PROVISIONS RELATING TO ROADS AND FERRIES

Control and vesting of public streets in municipalities and townships. 31 of 1971, Sch.

182. (1) Every municipal council or town council shall have the general control and care of all public streets which are situated within its area, and the same are hereby vested in such local authority in trust to keep and maintain the same for the use and benefit of the public.

(2) A municipal council or town council may make, construct, alter, and repair and for any such purpose temporarily close or divert, any such street, and may make new streets.

(3) A municipal council or town council may, subject to any law relating to road traffic, by order, prohibit the driving of vehicles on any specified road otherwise than in a specified direction:

Provided that no such order shall be made unless notice of the intention to make the same shall be published in the Gazette at least fourteen days before the date on which it is intended to make such order, and, before making such order, there shall be taken into consideration—

(i) any objections which may have been made to the making thereof; and

(ii) the existence of alternative routes suitable for the traffic which would or might be affected by the order.

183. *(Repealed by L.N. 35/1970.)*

Powers of local authorities to take materials for roads and works.
L.N. 634/1963, L.N. 34/1965.
Cap. 306.

184. (1) Subject to the Mining Act, a local authority, by its agents and officers, for the purpose of the construction and maintenance of roads or the carrying out of any works which it is empowered under this Act or under any agreement, direction, delegation or transfer entered into, given or made under this Act to carry out, may enter upon any land within its area and remove therefrom any clay (other than kaolin), country rock, gravel, murram, lime, sand, shale, shingle, slate or surface soil, and may carry across any land, by a route to be agreed between the owner or occupier thereof and the local authority, such material removed from other land, and may provide in connexion with such functions labour or other camps, works buildings, access roads, and space for stockpiling, and may erect machinery and other gear for the purpose of quarrying any such material.

(2) Before entering upon any land for the purpose of exercising any of the powers conferred by subsection (1), the local authority shall give not less than one month's notice by personal service or by registered post to the last known address of the owner or occupier of such land, of the intention to enter upon such land, the powers which it proposes to exercise, and the area of such land to which it will confine its activities.

(3) If the owner or occupier of such land is aggrieved by the proposed exercise by the local authority of the powers conferred by this section or by the proposed exercise of the powers in the area specified in the notice, he may, within one month from the service upon him of the notice under subsection (2), make representations to the Minister thereon and shall within the same period inform the local authority concerned of the nature of such representations.

(4) Where representations are made to the Minister under subsection (3), the Minister may, after consulting the local authority concerned, give such direction to the local authority thereon as he thinks fit.

(5) Compensation shall be payable by a local authority to the owner or occupier of any land for any damage done to buildings, roads or crops, or otherwise, in the exercise by it of any of the powers conferred upon it by this section, and for any interference with the rights of occupancy of such land, and the amount of such compensation shall, in default of agreement, be determined by arbitration.

(6) If, as a result of the exercise of any of the powers conferred by this section, a danger to persons (other than employees of the local authority or of their agents) or to domestic animals is created, the local authority shall, at the request of the owner or occupier of the land, carry out fencing at its own expense to such an extent as adequately to guard against such danger.

(7) The sites for any labour or other camps to be provided by the local authority and the alignment of any roads of access shall be determined by the local authority only after consultation with the owner and occupier of the land on which the same are to be situate.

(8) Any pit or quarry made in exercise of any of the powers conferred by this section shall, at the request of the owner or occupier of the land, be filled up or, in the discretion of the local authority, fenced, at the expense of the local authority, when the local authority abandons such pit or quarry.

Cap. 385.

(9) This section shall be subject to the Forests Act and any rules made thereunder, and to the extent of any inconsistency between this section and that Act and any rules thereunder, the latter shall prevail.

(10) For the purpose of this section, the expression "owner or occupier" means in respect of Government land, the Commissioner of Lands, in respect of Trust land within the area the title to which is registered under the Land Consolidation Act) means the county council or other local authority having jurisdiction over the area in question under section 115 of the Constitution, and in respect of forest areas, means the Chief Conservator of Forests.

188. (1) Subject to this section, a municipal council may permanently close or divert or alter the line of any street or road vested in it under this Act.

(2) Before any such closing or diversion or alteration is carried out, the municipal council shall—

(a) prepare a plan showing the nature thereof, and

(b) not less than one month before the proposed commencement of the work, give notice in the Gazette and in one or more newspapers (if any) circulating in its area, as well as by a sufficient number of placards posted on or near the street or road which it is proposed to close, divert or alter, of the proposed work and of a place where the said plan may be inspected at all reasonable hours; and

(c) serve a copy of the said notice on the owners or reputed owners, lessees or reputed lessees, and occupiers of all property abutting upon the said street or road or appropriate part thereof and, where it is proposed to divert or alter the line of such street or road, of all property which will abut upon the street or road if diverted or altered as aforesaid, whose address can after reasonable inquiry be ascertained; and

(d) if the proposed closure, diversion or alteration will affect land not vested in the municipal council, serve a copy of the said notice on the Commissioner of Lands; and

(e) in the case of a proposal to close a road, serve a copy of such notice upon the Minister for the time being responsible for town planning.

(3) If the Commissioner of Lands or any person interested as owner, lessee or occupier in any property abutting on the street or road which it is proposed to close, divert or alter under this section, or any other person aggrieved by such proposed closure, diversion or alteration, shall at any time within the period of one month from publication of the notice in the Gazette and in one or more newspapers (if any) as aforesaid, or, where such notice is published on different dates, within one month from the last date of publication, serve written notice on the municipal council of any objection to such closure, diversion or alteration, then, unless such objection is withdrawn, such closure, diversion or alteration shall not be carried out without the sanction of the Minister who may, on

or in contravention of any condition under subsection (2), operates or carries on within a prohibited area any toll bridge or service of ferry boats, or who plies for hire or reward any ferry boat within a prohibited area, shall be guilty of an offence and shall be liable to a fine not exceeding two thousand shillings or to imprisonment for a period not exceeding two months, and, in addition, to a fine not exceeding two hundred shillings in respect of each and every day upon which he operates or carries on such toll bridge or service of ferry boats or plies for hire or reward such ferry boats as aforesaid.

(9) The Minister shall, before he gives any approval required under this section, consult the Minister for the time being responsible for communications.

(10) For the purposes of the application of this section to the Municipality of Mombasa, the term "ferry boat" means any floating vessel, propelled by any means whatsoever, plying for hire within the municipality for the purpose of carrying passengers, animals, goods or vehicles between any two points one of which is a point on the Island of Mombasa and the other of which is a point on the coast mainland within a radial distance of one mile from the Island of Mombasa:

Provided that the said term shall not include any such floating vessel which is not capable of carrying more than three passengers and three hundred pounds in weight of goods.

187. (*Repealed by L.N. 35/1970.*)

188. (*Repealed by L.N. 749/1963.*)

189. (*Repealed by L.N. 35/1970.*)

190. (*Repealed by 13 of 1968, s. 3.*)

191. (*Repealed by L.N. 35/1970.*)

Definition of vesting.

192. For the purposes of this Part, "vesting", in relation to a road, means the transfer of the possession of the surface of the land concerned for use as a road and such material below and space above the surface as may be necessary, together with the possession of the rights of a highway authority, but shall not mean the transfer of the ownership of the land.

Saving in respect of national and international roads.
L.N. 634/1963.

192A. Nothing in this Part shall apply to any road declared by the Minister under any written law to be a national or international trunk road.

(3) The Authority shall determine an application for a permit by granting the permit or rejecting the application.

(4) Except as provided by section 33, an application for a permit shall be the subject of public consultation and, where applicable, of environmental impact assessment in accordance with the requirements of the Environmental Management and Co-ordination Act, 1999.

Act No. 8 of 1999.

(5) Any person opposed to the grant of a permit may object in writing to the Authority.

(6) The applicant and any person who may have objected to the grant of the application shall be notified of the decision of the Authority and, in the event of the rejection of an application or objection, as the case may be, of the reasons therefor.

(7) It is the duty of the Authority to determine an application for a permit as soon as practicable after its lodgment.

(8) Where an application duly made in accordance with this section is not determined by the Authority within six months after lodgment, any fee paid by the applicant under subsection (2) (b) shall be refunded to the applicant.

Conditions of permits.

30. (1) A permit shall be subject to—

(a) such conditions as may be prescribed by or under this Act in relation to the permit; and

(b) such other conditions, not inconsistent with the conditions so prescribed, as the authority may impose by endorsement on, or instrument in writing annexed to, the permit.

(2) Without prejudice to the generality of subsection (1), the provisions of the Second Schedule shall be conditions of every permit which authorises the construction of works.

(3) Rules made under this Act may make provision imposing conditions on, or with respect to the conditions which are or shall be imposed on, permits generally or any class or description of permits.

(4) Without prejudice to the generality of subsection (2), such rules may—

(a) require the imposition of prescribed conditions in prescribed circumstances;

(b) require the payment by the permit holder of prescribed fees in respect of the exercise of rights under the permit.

(c) provide that a contravention of any or any specified conditions prescribed by or under this Act as conditions of permits shall constitute an offence punishable by a prescribed penalty.

prejudice any remedy for the recovery of damages for any loss, damage or injury sustained by any person by reason of the contravention in respect of which the penalty is imposed.

Charges for water use.

31.(1) The conditions of a permit may require that, on issue of the permit and at prescribed intervals thereafter, the permit holder shall pay charges to the Authority for use of water in accordance with the permit.

(2) The charges shall be determined by reference to a schedule of charges published in the Gazette from time to time by the Authority, with the approval of the Minister and following public consultation.

Considerations for the issue of permits.

32.(1) In issuing a permit, and in fixing any conditions to be imposed on a permit, the Authority shall take into account such factors as it considers relevant, including—

(a) existing lawful uses of the water;

(b) efficient and beneficial use of water in the public interest;

(c) any catchment management strategy applicable to the relevant water resource;

(d) the likely effect of the proposed water use on the water resource and on other water users;

(e) the class and the resource quality objectives of the water resource;